

Umbagog National Wildlife Refuge

Comprehensive Conservation Plan

January 2009



Sweet Meadow
Paul Casey/USFWS

Blackburnian warbler
©Bob Steele

Moose
©2008 Mary Konchar

Loon
©2008 Mary Konchar



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

The *U.S. Fish and Wildlife Service* is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The Service manages the 95-million acre National Wildlife Refuge System comprised of more than 545 national wildlife refuges and thousands of waterfowl production areas. It also operates 65 national fish hatcheries and 78 ecological services field stations. The agency enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Assistance Program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

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



U.S. Fish & Wildlife Service

Umbagog National Wildlife Refuge

(Formerly the Lake Umbagog National Wildlife Refuge)

*Comprehensive Conservation Plan
January 2009*

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January 9, 2009

Date



U.S. Fish & Wildlife Service

Umbagog National Wildlife Refuge

Comprehensive Conservation Plan

Refuge Vision Statement

“We envision Umbagog National Wildlife Refuge as an essential link in the network of conservation lands in the Northern Forests. We will showcase science-based, adaptive management in a working forest landscape and provide an outstanding center for research. We will achieve this through strong partnerships with State agencies, conservation organizations, land managers, and neighboring communities.

“Our management will perpetuate the diversity and integrity of upland spruce-fir and northern hardwood forests, boreal and riverine wetlands, and lake habitats for the continued health of native fish and wildlife populations. These habitats will provide an important regional breeding area for migratory land birds, waterfowl, and other species of regional significance, such as the common loon and bald eagle.

“Visitors of all ages will feel welcome to enjoy the full complement of priority wildlife-dependent public uses. We will foster their knowledge of and support for conserving northern forest habitats through exceptional outreach and visitor programs. We want all our visitors to return home filled with enthusiasm for promoting and practicing resource stewardship in their own communities.

“We hope residents of neighboring communities in Maine and New Hampshire will value the refuge for enhancing their quality of life. Within the National Wildlife Refuge System, the refuge will be treasured for conserving Federal trust resources and providing inspirational outdoor experiences for present and future generations of Americans.”

Umbagog National Wildlife Refuge

Comprehensive Conservation Plan

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Abstract

Type of action: Administrative
U.S. Department of Interior

Lead agency: Fish and Wildlife Service

Responsible official: Marvin Moriarty, Regional Director, Region 5

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This Comprehensive Conservation Plan (CCP) for Umbagog National Wildlife Refuge (Refuge) is the culmination of a 6-year planning process that involved the Service, state agencies from both Maine and New Hampshire, the local community, refuge neighbors, private landowners, and conservation partners. It will guide the management of all refuge programs over the next 15 years. This plan's highest priority is to protect the biological integrity, diversity, and environmental health of Umbagog Lake and its associated rivers and streams. Its second highest priority is to conserve upland mixed forest habitat and sustain the native species dependent on it. This CCP expands the refuge boundary, allowing the Service to pursue from willing sellers the acquisition of 47,807 acres of important habitats for such species of concern as common loons, bald eagles, and blackburnian and black-throated green warblers. Implementing the CCP will improve the quality of existing wildlife-dependent recreational programs and offer several new public use opportunities on refuge lands. It will also strengthen refuge partnerships with respective state agencies and local entities that offer similar recreational programs in the area. Refuge visitor programs and community outreach will be further enhanced by the construction of a new refuge headquarters and visitor contact facility.

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Chapter 1

Carolina Ferro Vasconcelos/USFWS



Umbagog Lake

The Purpose of and Need for Action

Introduction

Umbagog National Wildlife Refuge (NWR; refuge) consists of 21,650 acres in Coos County, New Hampshire, and Oxford County, Maine. Established in 1992 with the first land purchase, its purposes are to provide long-term protection for unique wetlands, threatened or endangered species, migratory birds of conservation concern, and to sustain regionally significant concentrations of wildlife. Approximately half of the refuge consists of forested and non-forested wetland habitats and water, and half is forested upland habitat typical of the Northern Forest ecosystem.

This final Comprehensive Conservation Plan (CCP) was prepared pursuant to the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd et seq.). It is the culmination of a planning process that began in 2002. Meetings with the public, State agencies, commercial industry representatives, landowners, and conservation partners were held to identify and evaluate management alternatives. A draft and final CCP/Environmental Impact Statement (CCP/EIS) were previously distributed for public review and comment. These documents describe other management alternatives we considered for implementation.

This final CCP presents the combination of management goals, objectives, and strategies that we believe will best achieve our vision for the refuge, contribute to the National Wildlife Refuge System (Refuge System) mission, achieve refuge purposes, fulfill legal mandates, and serve the American public. The CCP will guide management decisions and actions on the refuge over the next 15 years. It will also be used as a tool to help the States of New Hampshire and Maine natural, P resource agencies, our conservation partners, Tribal governments, local communities, and the public understand our priorities.

Chapter 1 explains the purpose and need for preparing a CCP, and sets the stage for 4 subsequent chapters and 9 appendixes. It

- defines our planning analysis area,
- presents the mission, policies and mandates affecting the development of the plan,
- identifies other conservation plans we used as references,
- lists the purposes for which the refuge was established and its land acquisition history,
- clarifies the vision and goals that drive refuge management,
- describes our planning process and its compliance with NEPA regulations, and
- identifies public issues or concerns that surfaced during plan development.

Chapter 2, “Planning Process,” describes the planning process we followed, including public and partner involvement, in the course of developing this plan.

Chapter 3, “Description of the Refuge Environment,” describes the physical, biological, and human environment of the refuge.

Chapter 4, “Management Direction,” presents the goals, objectives and strategies that will guide our management decisions and help set priorities over the next 15 years.

The Purpose of and Need for Action

Chapter 5, “Consultation and Coordination with Others,” summarizes how we involved the public and our partners in the planning process. Their continued involvement is vital for the future management of the refuge.

Nine appendixes provide additional supporting documentation and references.

The purpose of a CCP is to define a set of actions that, in the Service’s best professional judgment, best achieves the purposes, goals, and vision of the refuge and contributes to the National Wildlife Refuge System’s mission, adheres to Service’s policies and other mandates, addresses identified issues of significance, and incorporates sound principles of fish and wildlife science.

Specifically, the CCP provides the refuge with strategic management direction for the next 15 years, by

- stating clearly the desired future conditions for refuge habitat, wildlife, visitor services, staffing, and facilities;
- explaining clearly to state agencies, refuge neighbors, visitors, and partners the reasons for management actions;
- ensuring that refuge management conforms to the policies and goals of the Refuge System and legal mandates;
- ensuring that present and future public uses are compatible with the purposes of the refuge;
- providing long-term continuity and direction in refuge management; and,
- justifying budget requests for staffing, operating and maintenance funds.

There are several reasons we identify a *need* for this CCP. First, the Refuge Improvement Act requires us to write a CCP for every national wildlife refuge to help fulfill the mission of the Refuge System.

Second, Umbagog Refuge lacked a master plan to accomplish the actions above, yet its environment has changed dramatically over the past decade. For example, the economy and land ownership patterns in local communities have changed; pressures for public access have continued to grow; and new ecosystem and species conservation plans bearing directly on refuge management have been developed.

Third, we have developed strong partnerships vital for our continued success, and we must convey our vision for the refuge to those partners and the public.

Fourth, we want to improve outreach and communications with our neighbors and the local community.

Fifth, we want to respond to public input regarding public uses programs and visitor facilities.

Finally, we need a CCP to guide us in conserving land to protect federal trust species in the Northern Forest. The refuge has acquired most of its land in the last 5 years.

All of these reasons clearly underscore the need for the strategic direction a CCP provides. Our planning process incorporated input from the natural resource agencies of New Hampshire and Maine, affected communities, individuals and organizations, our partners and the public.

Regional Context and Project Analysis Area

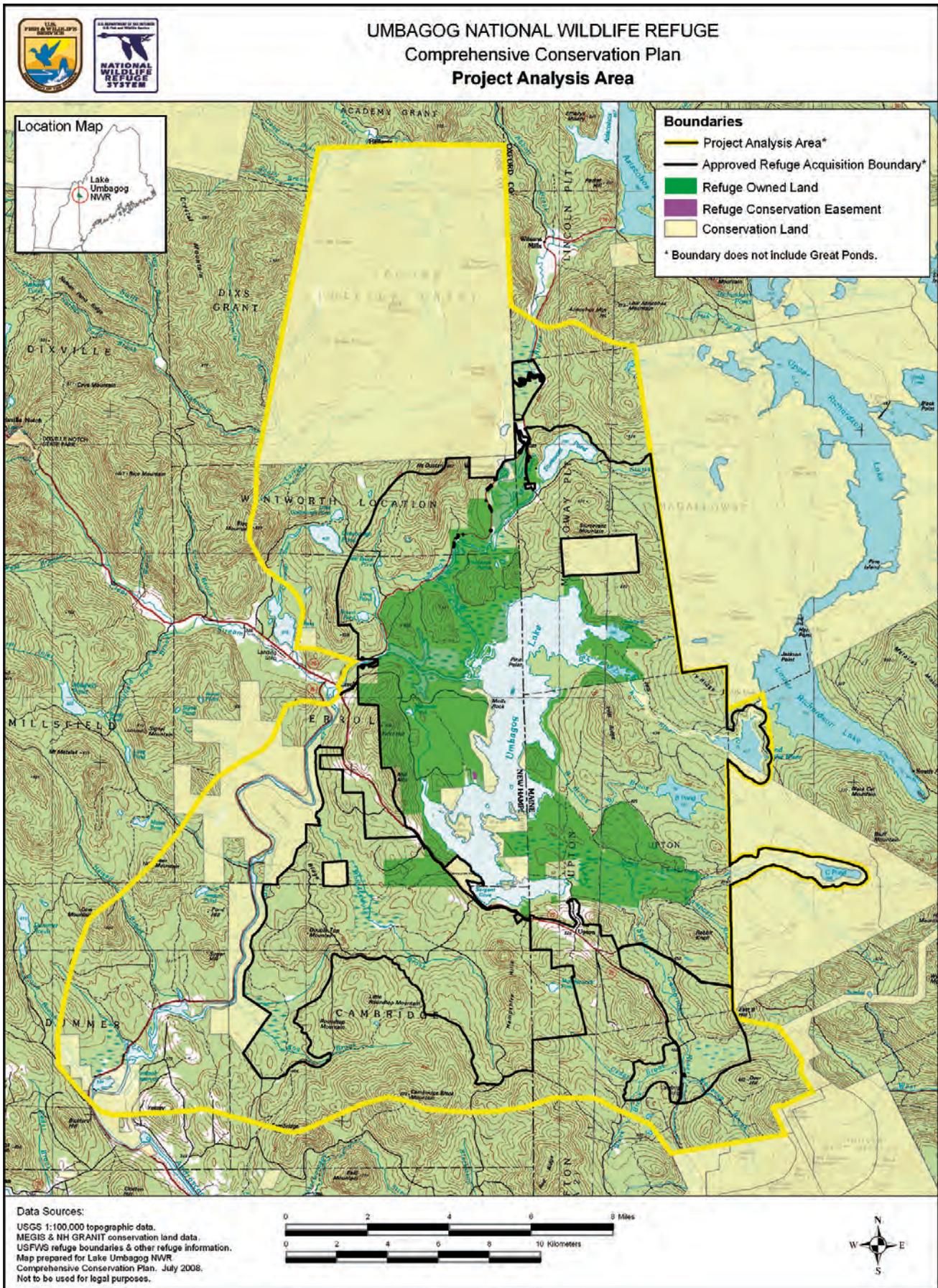
The regional context for the refuge is the Upper Androscoggin River watershed (map 1-1). We use the definition of the watershed developed by the Appalachian Mountain Club (AMC; Publicover and Weihrauch 2003). The AMC defines a larger watershed than does the U.S. Geological Survey (USGS). The AMC-defined watershed includes an area below Shelburne Dam draining south of the Mahoosuc Range and Elephant Mountain that shares many of the “north country” characteristics north of the Mahoosuc Range (Publicover and Weihrauch 2003).

The watershed boundary on map 1-1 defines the socioeconomic and ecological context for evaluating the relationship of the refuge to regional resources of concern. The land ownership, land use or management patterns in that political, social, and ecological environment may affect our management of the refuge. Of particular note, map 1-1 also depicts the regional land conservation network in and around the watershed. More than a dozen partners cooperate in that network, of which the refuge lands form an integral part.

The watershed covers more than 2,300 square miles in northern New Hampshire and western Maine. At its northernmost point, it drains the south slopes of the mountains along the Canadian border. It includes all areas that drain into the Androscoggin River upstream of its confluence with the Web River in Dixfield, Maine. The Androscoggin River starts at the outlet of Umbagog Lake.

Forest covers most of the rugged mountains, steep slopes and narrow valleys in the watershed landscape. Human population densities there are relatively low; many of the northern reaches lack permanent populations. The AMC “Ecological Atlas of the Upper Androscoggin Watershed” (Publicover and Weihrauch 2003) provides more details on the land use history, land ownership patterns, natural history, habitat types, and conservation challenges in the watershed.

In cooperation with our state partners, we also developed a project analysis area within the watershed: an area of influence immediately around the refuge (map 1-2). Management or other activities in our project analysis area could directly affect refuge resources or influence our ability to achieve its purposes, vision, or goals. We did not distinguish among the types of private land ownership or land development within that boundary. It includes the incorporated towns of Errol, New Hampshire, and Magalloway and Upton, Maine; the unincorporated towns of Wentworth Location and Cambridge, New Hampshire; and, private land trusts, undeveloped lands owned by timber companies, and conservation lands owned by state or federal agencies.



The Service and the Refuge System Policies and Mandates Guiding CCP Development

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

The Service is part of the Department of the Interior. The Department's mission is

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

Congress entrusts to the Service the conservation and protection of these national natural resources: migratory birds and fish, federal-listed endangered or threatened species, inter-jurisdictional fish, wetlands, certain marine mammals, and national wildlife refuges. We also enforce federal wildlife laws and international treaties on importing and exporting wildlife, assist states with their fish and wildlife programs, and help other countries develop conservation programs.

The Service manual, available online at <http://www.fws.gov/policy/manuals>, contains the standing and continuing directives on fulfilling our responsibilities. The 600 series of the Service manual addresses land use management, and sections 601-609 specifically address management of national wildlife refuges.

We publish special directives that affect the rights of citizens or the authorities of other agencies separately in the Code of Federal Regulations (CFR); the Service manual does not duplicate them (see 50 CFR 1–99 online at <http://www.access.gpo.gov/nara/cfr/index.html>).

The National Wildlife Refuge System and its Mission and Policies

The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and the protection of ecosystems. More than 545 national wildlife refuges encompass more than 95 million acres of lands and waters in all 50 states and several island territories. Each year, more than 40 million visitors hunt, fish, observe and photograph wildlife, or participate in environmental education and interpretation on refuges.

In 1997, President William Jefferson Clinton signed into law the Refuge Improvement Act. That act establishes a unifying mission for the Refuge System.

“The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” —Refuge Improvement Act; Public Law 105-57

The act states that the Refuge System must focus on wildlife conservation as its highest priority. It also states that the mission of the Refuge System, coupled with the purposes for which each refuge was established, will provide the principal management direction on that refuge. In addition, it establishes a new process for determining the compatibility of public uses on refuges, and requires us to prepare a CCP for each refuge.

The Refuge System Manual contains policy governing the operation and management of the Refuge System that the Service Manual does not cover, including technical information on implementing refuge polices and guidelines on enforcing laws. You can review that manual at refuge headquarters. These are a few noteworthy policies instrumental in developing this CCP.



Marvin Moriarty/USFWS

Umbagog Lake in winter

Policy on Refuge System Planning

This policy (602 FW 1, 2, and 3) establishes the requirements and guidance for Refuge System planning, including CCPs and step-down management plans. It states that we will manage all refuges in accordance with an approved CCP that, when implemented, will help

- achieve refuge purposes;
- fulfill the Refuge System mission;
- maintain and, where appropriate, restore the ecological integrity of each refuge and the Refuge System;
- achieve the goals of the National Wilderness Preservation System and the National Wild and Scenic Rivers System; and,
- conform to other mandates.

That planning policy provides guidance, systematic direction, and minimum requirements for developing all CCPs, and provides a systematic decision-making process that fulfills those requirements. Among them, we are to review any existing special designation areas or the potential for such designations (e.g., wilderness and wild and scenic rivers); and, incorporate a summary of those reviews into each CCP (602 FW 3).

Policy on Maintaining Biological Integrity, Diversity, and Environmental Health

This policy provides guidance on maintaining or restoring the biological integrity, diversity, and environmental health of the Refuge System, including the protection of a broad spectrum of fish, wildlife, and habitat resources in refuge ecosystems. It provides refuge managers with a process for

evaluating the best management direction to prevent the additional degradation of environmental conditions and restore lost or severely degraded environmental components. It also provides guidelines for dealing with external threats to the biological integrity, diversity, and environmental health of a refuge and its ecosystem (601 FW 3).

Policy on Appropriateness of Refuge Uses

Federal law and Service policy provide the direction and planning framework for protecting the Refuge System from inappropriate, incompatible or harmful human activities and ensuring that visitors can enjoy its lands and waters. This policy (603 FW 1) provides a national framework for determining appropriate refuge uses in an effort to prevent or eliminate those uses that should not occur in the Refuge System. It describes the initial decision process the refuge manager follows when first considering whether or not to allow a proposed use on a refuge. An appropriate use must meet at least one of the following four conditions:

- 1) The use is a wildlife-dependent recreational use as identified in the Refuge Improvement Act.
- 2) The use contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Refuge Improvement Act was signed into law.

- 3) The use involves the take of fish and wildlife under State regulations.
- 4) The use has been found to be appropriate after concluding a specified findings process using 10 criteria.

This policy can be viewed on-line at <http://www.fws.gov/policy/library/06-5645.pdf>.

Policy on Compatibility

This policy (603 FW 2) complements the appropriateness policy. The refuge manager must first find a use is appropriate before undertaking a compatibility review of that use. If the proposed use is not appropriate, the refuge manager will not allow the use and will not prepare a compatibility determination.

This policy and its regulations, including a description of the process and requirements for conducting compatibility reviews, can be viewed on-line at <http://policy.fws.gov/library/00fr62483.pdf>. Our summary follows.

- The Refuge Improvement Act and its regulations require an affirmative finding by the refuge manager on the compatibility of a public use before we allow it on a national wildlife refuge.
- A compatible use is one “that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.”
- The act defines six wildlife-dependent uses that are to receive our enhanced consideration on refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation.
- The refuge manager may authorize those priority uses on a refuge when they are compatible and consistent with public safety.
- When the refuge manager publishes a compatibility determination, it will stipulate the required maximum reevaluation dates: 15 years for wildlife-dependent recreational uses; or 10 years for other uses.
- However, the refuge manager may reevaluate the compatibility of any use at any time: for example, sooner than its mandatory date, or even before we complete the CCP process, if new information reveals unacceptable impacts or incompatibility with refuge purposes (602 FW 2.11, 2.12).
- The refuge manager may allow or deny any use, even one that is compatible, based on other considerations such as public safety, policy, or available funding.

Other Mandates

Although Service and Refuge System policy and the purposes of each refuge provide the foundation for its management, other federal laws, executive orders, treaties, interstate compacts, and regulations on conserving and protecting natural resources also affect how we manage refuges. A centralized library of Service-wide policies, executive orders, director’s orders, and the “Digest of Federal Resource Laws of Interest to the U.S. Fish and Wildlife Service” can be viewed at <http://www.fws.gov/policy/>.

Of interest to readers may be the numerous Federal laws that direct the Service to identify, protect, and preserve its important cultural resources, including historic structures, archaeological sites, and artifacts. NEPA mandates our consideration of cultural resources in planning federal actions. The Refuge Improvement Act requires that the CCP for each refuge identify its archaeological and cultural values.

The National Historic Preservation Act (NHPA; Pub. L. 102–575; 16 U.S.C. 470) requires federal agencies to locate and protect historic resources—archaeological sites and historic structures eligible for listing or listed in the National Register of Historic Places and museum property—on their land or on land affected by their activities. It also requires agencies to establish a program for those activities and carry them out in consultation with State Historic Preservation Offices (SHPOs).

The NHPA also charges federal agencies with locating, evaluating, and nominating sites on their land to the National Register of Historic Places. We maintain an inventory of known archaeological sites and historic structures in the Northeast Regional Office and file copies of the sites at each refuge. Our regional historic preservation officer in Hadley, Massachusetts, oversees our compliance with the NHPA and our consultations with state SHPOs. We must also comply with the Archaeological Resources Protection Act (Pub. L. 96–95, 16 U.S.C. 470aa-mm). It requires that we protect our archaeological sites from vandalism or looting and issue permits for site excavation.

Conservation Plans and Initiatives Guiding the Project

Birds of Conservation Concern 2002 Report

The Service developed this report (USFWS 2002) in consultation with the leaders of ongoing bird conservation initiatives and partnerships such as Partners In Flight (PIF), the North American Waterfowl Management Plan (NAWMP) and its Joint Ventures, the North American Waterbird Conservation Plan (NAWCP), and the U.S. Shorebird Conservation Plan. The report fulfills the mandate of the 1988 amendment to the Fish and Wildlife Conservation Act (16 U.S.C. §§2901 et seq.) requiring the Secretary of the Interior, through the Service, to “identify species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act of 1973.”

The 2002 report contains 45 lists that identify bird species of conservation concern at national, regional, and landscape scales. It includes a principal national list, seven regional lists corresponding to the seven regional administrative units of the Service, and species lists for each of the 37 Bird Conservation Regions designated by the North American Bird Conservation Initiative (NABCI) in the United States. NABCI defined those Bird Conservation Regions (BCRs) as ecologically based units in a framework for planning, implementing, and evaluating bird conservation. The refuge lies in the Atlantic Northern Forest Bird Conservation Region (BCR 14; see additional discussion below).

Our agency’s overarching goal in developing that report is to stimulate federal, state, and private agencies to coordinate, develop, and implement integrated approaches for conserving and managing the birds deemed most in need of conservation. The report is available online at <http://www.fws.gov/migratorybirds/reports/BCC02/BCC02.pdf>.

North American Bird Conservation Initiative: Blueprint for the Design and Delivery of Bird Conservation in the Atlantic Northern Forest—Bird Conservation Region 14 (2005)

The Atlantic Coast Joint Venture partnership created this blueprint in response to the NABCI challenge of building on existing partnerships to plan, implement, and evaluate cooperative bird conservation across North America. You may read the entire text of this document, “Blueprint for the Design and Delivery of Bird Conservation in the Atlantic Northern Forest,” online at http://www.acjv.org/documents/bcr14_blueprint.pdf. It presents a strategic design of the key components that this BCR initiative will need to implement to maintain healthy populations of birds native to the Atlantic Northern Forest BCR, more commonly

referred to as BCR 14. Specifically, it establishes a series of goals for moving BCR 14 toward a vision of sustained bird populations; it presents the biological foundation for its recommendation; and, it lays out a framework for implementing and evaluating them (Dettmers 2004).

The BCR 14 blueprint identifies 53 bird species designated “highest” or “high” conservation priority in the region, and 15 habitat types important for supporting one or more of those priority bird species during at least one of their life stages. Those habitats either need critical conservation attention, or are crucial in long-term planning to conserve continentally and regionally important bird populations. Of the 53 highest and high-priority birds, 21 breed on the refuge, and several others migrate through. The refuge supports 9 of the 15 priority habitat types. We considered each of those species and habitats in writing CCP appendix B, “Species and Habitats of Conservation Concern,” and in developing our habitat goals, objectives, and strategies. Some examples of priority species, ranked highest, high, or moderate, in the BCR14 plan for different habitat types which are known to occur on the refuge include:

- *Mixed forest*: Canada warbler, wood thrush (highest); black-throated blue warbler (high); blackburnian warbler, black-throated green warbler (moderate)
- *Coniferous forest*: Bay-breasted warbler, Canada warbler (highest), boreal chickadee (high), black-backed woodpecker (moderate)
- *Deciduous and Mixed Forest*: Canada warbler, wood thrush (highest); black-throated blue warbler (high); ovenbird (moderate)
- *Shrub-scrub*: Canada warbler, American woodcock (highest), rusty blackbird (high), palm warbler, yellow-bellied flycatcher (moderate)
- *Forested wetland*: American black duck (highest), common goldeneye, rusty blackbird (high); wood duck (moderate)
- *Palustrine emergent marsh*: American black duck (highest); northern harrier, Wilson’s snipe, American bittern (moderate)
- *Freshwater lakes, rivers, and streams*: American black duck (highest), common goldeneye (high); wood duck, bald eagle (moderate)

Partners in Flight Bird Conservation Plans

In 1990, PIF began as a voluntary, international coalition of government agencies, conservation organizations, academic institutions, private industries, and citizens dedicated to reversing the population declines of bird species and “keeping common birds common.” The foundation of its long-term strategy is a series of scientifically based bird conservation plans using physiographic areas as planning units.

The goal of each PIF plan is to ensure the long-term maintenance of healthy populations of native birds, primarily non-game birds. The plan for each physiographic area ranks bird species according to their conservation priority, describes their desired habitat conditions, develops biological objectives, and recommends conservation measures. The priority ranking factors in habitat loss, population trends, and the vulnerability of a species and its habitats to regional and local threats.

Our project area lies in Physiographic Area 28, The Eastern Spruce-Hardwood Forest. The PIF Plan for Physiographic Area 28 represents a bird conservation plan for the subsection of Bird Conservation Region 14 in which the refuge is located.

In developing our CCP habitat goals and objectives, we referred to its draft plan, now online at http://www.blm.gov/wildlife/plan/pl_28_10.pdf.

The plan (Rosenberg and Hodgman 2000) includes objectives for the following habitat types and associated species of conservation concern on the refuge:

- *Northern hardwood and mixed forest*: Canada and black-throated blue warbler, wood thrush, and veery;
- *Mature conifer (spruce-fir) forest*: bay-breasted, Cape May and Blackburnian warbler, spruce grouse, and red crossbill;
- *Boreal peatland*: spruce grouse and olive-sided flycatcher;
- *Early successional forest/edge*: American woodcock and olive-sided flycatcher; and,
- *Freshwater wetland/rivers/lakes*: American black duck

North American Waterfowl Management Plan (NAWMP; update 2004)

Originally written in 1986, the NAWMP Plan describes a 15-year strategy for the United States, Canada, and Mexico to restore and sustain waterfowl populations by protecting, restoring and enhancing habitat. The plan committee, including representatives from Canada, the United States, and Mexico, has modified the 1986 plan twice to account for biological, sociological, and economic changes that influenced the status of waterfowl and the conduct of cooperative habitat conservation. The most recent modification in 2004 updates the latest needs, priorities, and strategies for the next 15 years, and guides partners in strengthening the biological foundation of North American waterfowl conservation and stakeholder confidence in the direction of the plan. You may review it online at <http://www.fws.gov/birdhabitat/NAWMP/images/implementationframework.pdf>.

To convey goals, priorities, and strategies more effectively, that 2004 modification comprises two separate documents: Strategic Guidance and Implementation Framework. The former document is for agency administrators and policy makers who set the direction and priorities for conservation. The latter document includes technical information for use by biologists and land managers.

American black duck in flight



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The plans are implemented at the regional level in 14 habitat Joint Ventures and 3 species Joint Ventures: Arctic Goose, Black Duck, and Sea Duck. Our project area lies in the Atlantic Coast Joint Venture, which includes all the Atlantic Flyway states from Maine to Florida and Puerto Rico. The part of the refuge in Maine lies in the “Inland Wetlands” focus area; the part in New Hampshire lies in the “Lake Umbagog Focus Area,” an indication of the importance of the refuge. You may view a map of focus areas for New Hampshire and Maine online at <http://www.acjv.org/>.

The waterfowl goal for the Atlantic Coast Joint Venture is, “Protect and manage priority wetland habitats for migration, wintering, and production of waterfowl, with special consideration to black ducks, and to benefit other wildlife in the joint venture area.”

The Black Duck Joint Venture plan also relates to our project. Black ducks use the refuge during their breeding season and fall migration. The Black Duck Joint Venture Plan-Final Draft Strategic Plan (USFWS/CWS 1993) resides online at <http://www.pwrc.usgs.gov/bdjv/>. We used both plans in developing waterfowl objectives and strategies in CCP goals 1 and 2.

This plan (Kushlan et al. 2002) is an independent partnership among individuals and institutions interested in, or responsible for, conserving water birds and their habitats. The plan is just one element of a multi-faceted conservation program. The primary goal of the plan is to ensure that the distribution, diversity, and abundance of populations and habitats of breeding, migratory, and non-breeding water birds are sustained or restored throughout the lands and waters of North America, Central America, and the Caribbean. It provides a framework for conserving and managing colonially nesting water-dependent birds. In addition, it will facilitate continent-wide planning and monitoring, national, state, and provincial conservation, regional coordination, and local habitat protection and management.

A Mid-Atlantic/New England/Maritimes Regional Working Group has been established. It is a regional partnership of organizations and individuals working to facilitate waterbird conservation in this region. Their overarching goal is to help local resource managers within the region protect waterbirds and their habitats. This will be accomplished by facilitating the development and distribution of information on the status and conservation needs of waterbirds and habitats, and by building partnerships between wildlife managers, scientists, conservationists and supporters.

You can access the continental plan online at <http://www.nawcp.org/pubs/ContinentalPlan.cfm>. You can access information on Mid-Atlantic/New England/Maritimes Regional planning online at <http://www.fws.gov/birds/waterbirds/MANEM/>. We used information from both those sources in developing waterfowl objectives and strategies for CCP goals 1 and 2.

U.S. Shorebird (2001, 2nd ed.) and North Atlantic Regional Shorebird Plans

Concerns about shorebirds led to the creation of the U.S. Shorebird Conservation Plan in 2000. Brown, et al. published a second edition in May 2001. Developed under a partnership of individuals and organizations throughout the United States, the plan develops conservation goals for each U.S. region, identifies important habitat conservation and research needs, and proposes education and outreach programs to increase public awareness of shorebirds and of threats to them.

In the Northeast, the North Atlantic Regional Shorebird Plan was also drafted to step down the goals of the continental plan to smaller scales to identify priority species and habitat and species goals, and prioritize implementation projects. You may read the U.S. Shorebird Plan online at <http://www.fws.gov/shorebirdplan/USShorebird/downloads/USShorebirdPlan2Ed.pdf>

The North Atlantic Regional Shorebird Plan appears online at <http://www.fws.gov/shorebirdplan/RegionalShorebird/RegionalPlans.htm>. We used both plans in developing our objectives and strategies for goals 1 and 2.

National Bald Eagle Management Guidelines (May 2007)

In July 2007, the Service issued a final ruling to remove the bald eagle from the federal list of endangered and threatened species. The bald eagle remains under the protection of the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The Service developed National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. The guidelines help minimize impacts on bald eagles, particularly where people may constitute a “disturbance,” which the Eagle Act prohibits. The guidelines (1) publicize the provisions of the Eagle Act that continue to protect bald eagles, to reduce the possibility that people will violate the law, (2) advise landowners, land managers and the public of the potential for various human activities to disturb bald eagles, and (3) encourage additional,

nonbinding land management practices that benefit bald eagles. The Service intended the guidelines to be used primarily as a tool for landowners and planners who seek information and recommendations on how to avoid disturbing bald eagles. You may view the guidelines at <http://www.fws.gov/migratorybirds/issues/BaldEagle/NationalBaldEagleManagementGuidelines.pdf>.

Partners in Amphibian and Reptile Conservation, National State Agency Herpetological Conservation Report (Draft 2004)

Partners in Amphibian and Reptile Conservation (PARC) was created in response to the increasing, well-documented national declines in amphibian and reptile populations. PARC members come from state and federal agencies, conservation organizations, museums, the pet trade industry, nature centers, zoos, the power industry, universities, herpetological organizations, research laboratories, forest industries and environmental consultants. Its five geographic regions—Northeast, Southeast, Midwest, Southwest and Northwest—focus on national and regional herpetofaunal conservation challenges. Regional working groups allow for region-specific communication.

The National State Agency Herpetological Conservation Report (NHCR), a summary report sponsored by PARC, provides a general overview of each state wildlife agency's support for reptile and amphibian conservation and research through September 2004. Each state report was compiled in cooperation with its agency's lead biologist on herpetofaunal conservation. The purpose is to facilitate communication among state agencies and partner organizations throughout the PARC network to identify and address regional and national herpetological priorities.

PARC intends to expand the scope of the NHCR to include other states, provinces, and territories. It will also include other state agencies that are supporting herpetofaunal conservation and research, such as transportation departments, park departments, and forest agencies. The states of New Hampshire and Maine have completed reports included in the NHCR online at <http://www.parcplace.org/documents/PARCNationalStates2004.pdf>. The next NHCR will also integrate the list of species of conservation concern into each state's comprehensive wildlife conservation strategy (see below). We used the latest draft NHCR plan in developing objectives and strategies for CCP goals 1, 2, and 3, and in developing CCP appendix B, "Species and Habitats of Conservation Concern."

Eastern Brook Trout Joint Venture

In 2004, in recognition of the need to address regional and range-wide threats to brook trout, a group of public and private entities formed the Eastern Brook Trout Joint Venture (EBTJV) with a mission to halt the decline of brook trout and restore fishable populations. Its unique partnership has grown and now includes state and federal agencies, regional and local governments, businesses, conservation organizations, academia, scientific societies, and private citizens. It is the nation's first pilot project under the *National Fish and Wildlife Initiative*, and is a geographically focused, locally driven, and scientifically-based effort to protect, restore and enhance aquatic habitat throughout the range of the Eastern brook trout. The EBTJV has been modeled after the joint ventures aligned with the North American Waterfowl Management Plan.

The EBTJV is developing a draft Conservation Strategy that identifies current threats to Eastern brook trout, proposes a general strategy to deal with these threats, and outlines potential corrective measures. One important technical report is "Distribution, Status and Perturbations to Brook Trout within the Eastern United States." It will categorize a variety of threats to brook trout and their habitat and helps to identify restoration and protection priorities. This and other products will then be used to formulate operational plans to begin implementation of high priority programs. More information is available online at <http://www.fishhabitat.org>.

Brook trout



Duane Raver/USFWS

Native brook trout occur in our project area and we have identified them as a species of conservation concern in CCP appendix B. Sub-watersheds in our project area represent most of the intact brook trout habitat remaining outside of Maine. Maine is considered the last true stronghold for brook trout in the eastern U.S. We will continue to consult with Service and state fisheries biologists involved in the development of the EBTJV Conservation Strategy to assist us in developing and implementing objectives and strategies related to brook trout and other associated aquatic resources.

New Hampshire Fish and Game Department, Wildlife Action Plan (WAP 2005), and State of Maine Comprehensive Conservation Strategy

In 2002, Congress created the State Wildlife Grant Program (SWG), and appropriated \$80 million for state grants. The purpose of the program is to help state and tribal fish and wildlife agencies conserve fish and wildlife species of greatest conservation need. The funds appropriated under the program are allocated to states according to a formula that takes into account their size and population.

To be eligible for additional federal grants and satisfy the requirements for participating in the SWG program, each state and U.S. territory must develop a statewide “Comprehensive Wildlife Conservation Strategy” and submit it to the National Advisory Acceptance Team by October 1, 2005. Each plan must address eight required elements, identify and focus on “species of greatest conservation need,” yet address the “full array of wildlife” and wildlife-related issues, and “keep common species common.”

The New Hampshire and Maine plans (NHFG 2005; MDIFW 2005) resulted from that charge. The goal of each plan is to create a vision for conserving that state’s wildlife and stimulate other states, federal agencies, and conservation partners to think strategically about their individual and coordinated roles in prioritizing conservation.

In addressing the eight elements below, those two plans supplement and validate the information on species and habitat and their distribution in our analysis area, and help us identify conservation threats and management strategies for species and habitats of conservation concern in the CCP. The expertise that convened to compile those plans and their partner and public involvement further enhance their benefits for us. We used them in developing objectives and strategies for CCP goals 1, 2, and 3, and in developing CCP appendix B, “Species and Habitats of Conservation Concern.” These are the eight elements.

- 1) Information on the distribution and abundance of species of wildlife, including low and declining populations, as the state fish and wildlife agency deems appropriate, that are indicative of the diversity and health of the state’s wildlife.

- 2) Descriptions of locations and relative condition of key habitats and community types essential to the conservation of species identified in element 1.
- 3) Descriptions of problems that may adversely affect species identified in element 1 or their habitats, and priority research and survey efforts needed to identify factors that may assist in restoration and improved conservation of these species and habitats.
- 4) Descriptions of conservation actions necessary to conserve the identified species and habitats and priorities for implementing such actions.
- 5) Plans proposed for monitoring species identified in element 1 and their habitats, for monitoring the effectiveness of the conservation actions proposed in element 4, and for adapting those conservation actions to respond appropriately to new information or changing conditions.
- 6) Description of procedures to review the plan at intervals not to exceed 10 years.
- 7) Plans for coordinating, to the extent feasible, the development, implementation, review, and revision of the plan strategy with federal, state, and local agencies and Native American tribes that manage significant areas of land and water within the state, or administer programs that significantly affect the conservation of identified species and habitats.
- 8) Plans for involving the public in the development and implementation of plan strategies.

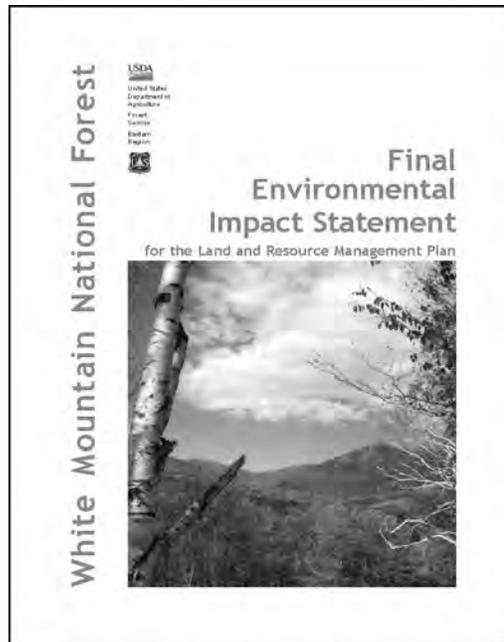
Other Regional Information Sources

We also consulted the plans and resources below as we refined our CCP management objectives and strategies, especially those with a local context.

- Finding Common Ground: Conserving the Northern Forest. 1994. Northern Forest Lands Council, Concord, New Hampshire; copy available at refuge headquarters.
- The Northern Forest Lands Study of New England and New York: A report to the Congress of the United States on the recent changes in landownership and land use in the Northern Forest of Maine, New Hampshire, New York, and Vermont. Governors' Task Force on Northern Forest Lands. 1990. USDA Forest Service, Rutland, Vermont; copy available at refuge headquarters.
- 10th Anniversary Forum, Final Report: Recommendations for the Conservation of the Northern Forest. 2005. Northern Forest Lands Council, Concord, New Hampshire; copy available at refuge headquarters
- Maine State Forest and Conserved Lands plans for Dodge Point, Richardson Lakes, and Days Academy and Sugar Island (Public Reserved Lands) and Kineo and Farm Island (State Park Lands); copy available at refuge headquarters.
- New Hampshire State-wide Comprehensive Outdoor Recreation Plan (SCORP); available online at <http://www.nh.gov/oep/programs/SCORP/documents/scorpsummaryreport.pdf>.
- Maine State-wide Comprehensive Outdoor Recreation Plan; available online at <http://www.state.me.us/doc/parks/programs/SCORP/index.html>.
- Connecticut Lakes Headwaters Plan; available online at <http://www.nhstateparks.org/ParksPages/CLHWF/CLHWFinterminPlan.html>.
- New Hampshire Forest Resources Plan; available online at <http://www.ceinfo.unh.edu/Pubs/ForPubs/NHFRP01.pdf>.

- White Mountain National Forest Plan; available online at http://www.fs.fed.us/r9/forests/white_mountain/projects/forest_plan/.
- Society for the Protection of NH Forests, New Hampshire's Changing Landscape, 2005; available online at <http://www.spnhf.org/research/research-projects.asp#nhcl>.
- New England Forestry Foundation Plan; available online at <http://www.newenglandforestry.org/forestry/rfmp.asp>.
- Northern Forest Canoe Trail plan; available online at <http://www.northernforestcanoetrail.org/>.
- Appalachian Trail, National Park Service, Strategic Plan and other resources; available online at <http://data2.its.nps.gov/parks/appa/ppdocuments/05Strategic%20Plan.doc>.
- GORP Adventure Travel and Outdoor Recreation with information Appalachian trail; available online at http://gorp.away.com/gorp/resource/us_trail/guid_app.htm.
- Rangeley Lakes Heritage Trust; available online at <http://www.rlht.org/index.shtml>.

One source used for regional information



Refuge Establishment Purposes and its Land Acquisition History

The Service established the refuge with its first land purchase in 1992 for the following purposes and under the following authorities:

“... the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions” (Emergency Wetlands Resources Act of 1986, 16 U.S.C. 3901(b));

“... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds” (Migratory Bird Conservation Act, 16 U.S.C. 715d); “... for the development, advancement, management, conservation, and protection of fish and wildlife resources...” (Fish and Wildlife Act of 1956; 16 U.S.C. 742f(a) (4)); and

“... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude” (Fish and Wildlife Act; 16 U.S.C. 742f(b)(1)) .”

Map 1-3 depicts the current refuge boundary. Table 1.1 summarizes the land acquisition history of the refuge.

Table 1.1. Land acquisition history of Umbagog refuge (*as of January 1, 2008)

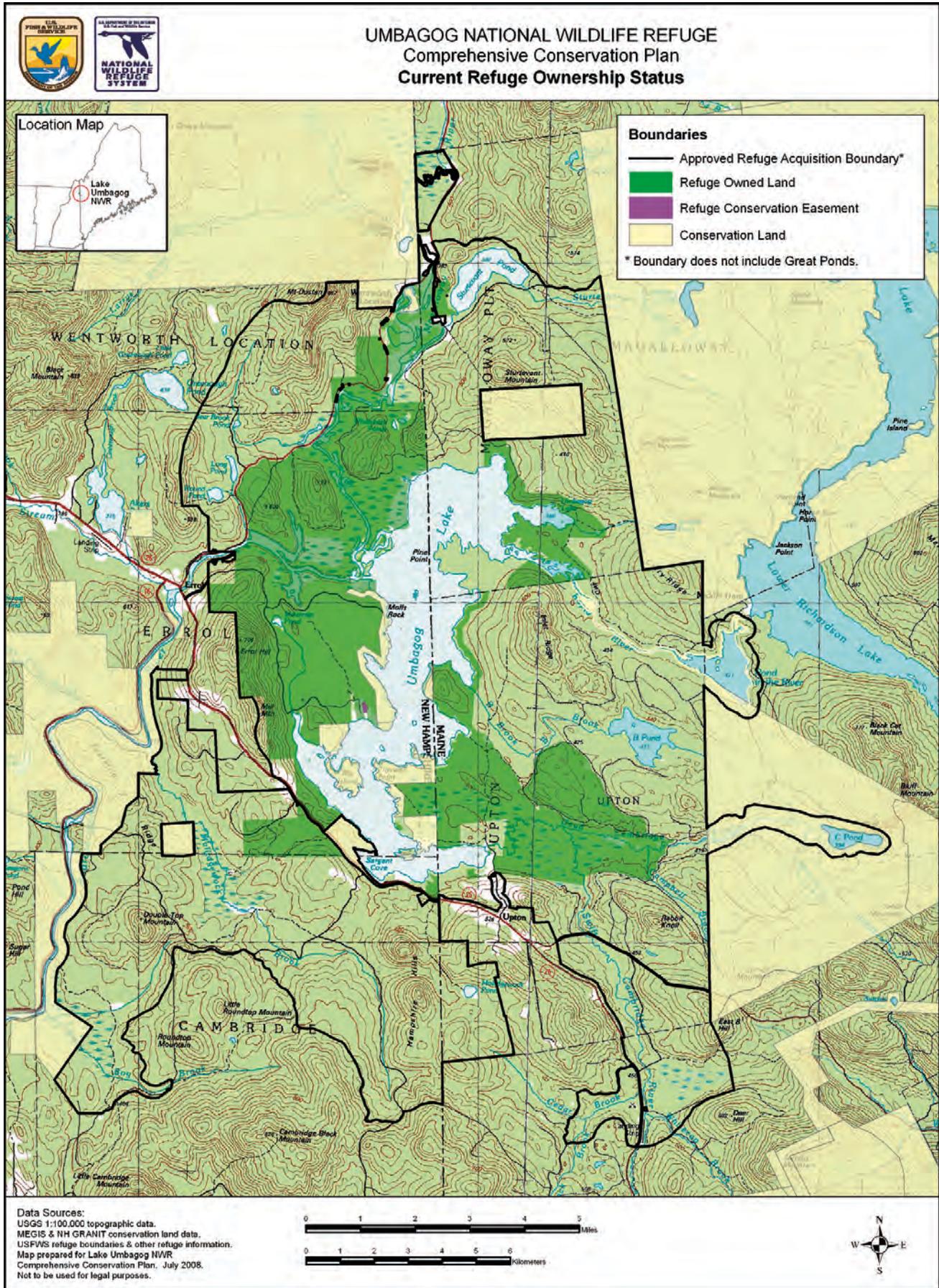
Calendar Year	Acres*	Funding Source#
1992	128	LWCF
1993	41	LWCF
1995	5,986	LWCF, MBCF
1996	203	LWCF
1998	214	MBCF
1999	2,488	LWCF, MBCF
2000	1,309	LWCF, MBCF
2001	8,847	LWCF, MBCF
2002	191	LWCF
2003	1	LWCF
2004	8	LWCF
2005	1,097	LWCF, MBCF
2006	406	MBCF
2007	727	MBCF
Total All	21,650	

Table Notes

* *The Service owns all acreage in full fee simple, except for a conservation easement on 6.01 acres. Acreage is approximate, as numbers are rounded up and it derives from these three sources of varying accuracy: (1) land deeds (2) surveys or (3) GIS digitizing. For ease of presentation, the maps throughout this document do not show Service ownership of the lake bottom, or the road easements outside the approved refuge boundary. However, all summaries of refuge acres, including table 1.1, include that ownership. This acreage is current as of January 1, 2008*

#LWCF—Land and Water Conservation Fund.—funding sources include revenues from the sale of surplus federal real property, motorboat fuel taxes, fees for recreation on federal lands, and receipts from mineral leases on the outer continental shelf.

#MBCF—Migratory Bird Conservation Fund.—the funding source is receipts from the sale of Federal Migratory Bird Hunting and Conservation Stamps.



Refuge Administration

The refuge now has four full-time permanent staff positions: refuge manager, deputy refuge manager, refuge wildlife biologist, and maintenance worker. In addition, the refuge shares a full-time law enforcement officer with the Silvio O. Conte Refuge. Seasonal staff positions will vary between one and ten each year. The Youth Conservation Corps (YCC) program adds an adult crew leader and up to five youths each summer.

Refuge Vision Statement

Very early in the planning process, our team developed this vision statement to provide a guiding philosophy and sense of purpose in the CCP.

“We envision Umbagog National Wildlife Refuge as an essential link in the network of conservation lands in the Northern Forests. We will showcase science-based, adaptive management in a working forest landscape and provide an outstanding center for research. We will achieve this through strong partnerships with State agencies, conservation organizations, land managers, and neighboring communities.

“Our management will perpetuate the diversity and integrity of upland spruce-fir and northern hardwood forests, boreal and riverine wetlands, and lake habitats for the continued health of native fish and wildlife populations. These habitats will provide an important regional breeding area for migratory land birds, waterfowl, and other species of regional significance, such as the common loon and bald eagle.

“Visitors of all ages will feel welcome to enjoy the full complement of priority wildlife-dependent public uses. We will foster their knowledge of and support for conserving northern forest habitats through exceptional outreach and visitor programs. We want all our visitors to return home filled with enthusiasm for promoting and practicing resource stewardship in their own communities.

“We hope residents of neighboring communities in Maine and New Hampshire will value the refuge for enhancing their quality of life. Within the National Wildlife Refuge System, the refuge will be treasured for conserving Federal trust resources and providing inspirational outdoor experiences for present and future generations of Americans.”

Refuge Goals

We developed the following goals after considering that vision, the purposes of the refuge, the missions of the Service and the Refuge System, and the mandates, plans, and conservation initiatives above. These goals are intentionally broad, descriptive statements of purpose. They highlight elements of our vision for the refuge we will emphasize in its future management. The biological goals take precedence; but otherwise, we do not present them in any particular order. Each goal discussion below offers background information on its importance.

GOAL 1:

Manage open water and wetland habitats to benefit Federal trust species and other species of conservation concern.

Background

A rich variety of wetland communities on the refuge supports an array of habitats benefiting widely diverse species of animals and plants. The Magalloway River, Whaleback Ponds, Greater Floating Island, Mountain Pond, Tidswell Point, and Dead Cambridge areas all contain extensive wetlands, some with such rare species as heart-leaved twayblade or bog sedge. Rapp (2003) documented an unusual occurrence of a circumneutral fen at Tidswell Point. The refuge peatlands are among the largest and most diverse in the state (Sperduto et al. 2000).

The Service, other federal and state agencies, conservation organizations, sporting groups, and local residents recognize the importance of those unique wetland and wildlife resources. Protecting the lake and its associated rivers and wetlands was a principal reason for establishing the refuge. Those habitats support threatened and endangered species, waterfowl and other migratory species of federal and state concern and populations of mammals, reptiles, amphibians and fish and rare plants. As we mentioned above, New Hampshire lists the refuge as a priority for protection under the NAWMP, as does the Emergency Wetlands Resources Act of 1986 (USFWS 1991).

The refuge is unique in the region for its diversity of breeding waterfowl. Its marshes and backwaters, forested and shrub wetlands and adjacent forested and cut-over uplands provide important nesting and brood-rearing habitat for such waterfowl as black duck, ring-necked duck, and cavity-nesters, including common goldeneye, wood duck, common merganser, and hooded merganser. Blue-winged teal, green-winged teal and mallard also nest in the area.

Lake levels on Umbagog Lake are managed by the operator of a dam at the outlet of the lake in accordance with a license issued by the Federal Energy Regulatory Commission (FERC). The current license issued by FERC is for the Errol Project (FERC no. 3133). It was issued in 1983 for a 40-year term, and both it and this CCP will therefore expire in 2023. The license is currently held by Florida Power and Light Energy Maine (FPLE). The current license requires that the licensee "...conduct a study to determine the reservoir surface elevation and time of year at which stable waters levels should be maintained for the protection of nesting wildlife at Lake Umbagog." The licensee is further required to "... develop a plan to regulate the level of Lake Umbagog for the benefit of wildlife species and the water users downstream of the Errol Project." In the past, this has meant limiting water level fluctuations during the loon nesting season in June and July. Wetlands management by the refuge must therefore recognize that water level fluctuations are neither entirely natural nor directly controlled by the refuge. The FERC license and related issues are further discussed in chapter 2.

GOAL 2:

Manage floodplain and lakeshore forests to benefit Federal trust species and other species of conservation concern.

Background

The refuge floodplain and lakeshore forests lie next to water bodies and non-forested wetlands, and typically have high species richness with dynamic and complex biophysical processes. These habitats are important for many wildlife species of concern, including nesting and foraging waterfowl, bald eagles, ospreys, and many migratory songbirds. They provide important structural components, including large nest trees for eagles and ospreys and cavity trees for nesting common goldeneye, wood duck, and certain songbirds. These habitats also help control erosion and sediment loading into the lake and its tributaries. Without forested shorelines, stream banks in this area are more susceptible to erosion. The New Hampshire Natural Heritage Bureau (NHNHB) has defined an area along the Magalloway River as a rare type of silver maple floodplain forest community of conservation concern.

Most of the vernal pools on the refuge are embedded in floodplain forested habitats. A vernal pool is a small body of water that lacks a permanent, aboveground outlet. In the Northeast, snowmelt and spring and autumn rains fill vernal pools. They typically dry by mid-to-late summer, or earlier in years of drought. How long water stays in a vernal pool is its hydroperiod, which varies depending on the pool and the year. Maintaining vernal pools with a range of



©Robert Quinn

Purple-fringed orchid



© Robert Quinn

Black-backed woodpecker

hydroperiods is important in sustaining vernal pool biodiversity. Because of that periodic drying, vernal pools do not support breeding populations of fish. The vernal pools on the refuge contribute to its native biodiversity by providing essential habitat for several obligate amphibian species, including blue-spotted salamander, spotted salamander and wood frog.

The restoration of developed floodplain and lakeshore riparian areas involves removing cabins and other structures, purchased from willing sellers, as funding and staffing allows. In 1996, the refuge acquired active cabin leases on lakeshore and floodplain land purchased from the James River, Boise Cascade, and Mead Paper companies. These acquired leases include stipulations to allow their continued use, but requires there be minimal impacts on resources. All leases expire at 50 years.

GOAL 3:

Manage upland forest habitats, consistent with site capabilities, to benefit Federal trust species and other species of conservation concern.

Background

Forests cover 90 percent of the Upper Androscoggin River watershed. The dominant tree species include red spruce, balsam fir, sugar maple, red maple, yellow birch, and white birch. At the landscape level, the matrix forest is a mixed spruce-fir/northern hardwoods forest; although embedded in that matrix, three broad vegetation types are found in varying amounts: spruce-fir, mixed softwoods-hardwoods, and northern hardwoods. The spruce-fir type is dominated by at least 75 percent red spruce and/or balsam fir at higher elevations, above 2700 ft., on thin, rocky soils at mid-elevations and on nutrient-poor soils in valley bottoms. The mixed hardwood-softwood forest type includes varying amounts of the major tree species in the region, depending on site conditions (Publicover and Weihrauch 2003). Bill Leak, a forester with the U.S Forest Service's Northeast Forest Experiment Station, considers a stand with 25 percent to 65 percent softwood a "mixed wood" stand (Leak, personal communication, 2004). White pine, hemlock, white spruce, northern white cedar, tamarack, black spruce, yellow and white birch, and red maple are also present in varying amounts. The northern hardwoods type is a mixture of at least 75 percent sugar maple, yellow birch, and beech on fine-textured soils at lower and mid-slopes.

Forest ecologists believe that the forest in the Upper Androscoggin River watershed of 150 years ago was also a mixed forest matrix; however, it supported more softwoods than we see on the landscape today (Kuchler 1964; Charlie Cogbill, personal communication, 2004). Multiple cycles of timber harvesting during the past 150 years affected forest composition. The selective harvesting of softwoods has converted many spruce-fir stands to mixed stands, and mixed stands to hardwood stands. In the absence of further human disturbance, natural succession and disturbance patterns will shift these forests to a higher proportion of softwood (Publicover and Weihrauch 2003). Our analysis for this CCP confirms that this mixed forest type, with a high proportion of softwoods, has the highest natural potential for growth in our area. That analysis included a site capability assessment using The Nature Conservancy (TNC) ecological land units (a combination of elevation, bedrock geology, and topography), Natural Resource Conservation Service (NRCS) soils surveys, and aerial photo interpretation.

Pre-settlement forests are believed to have been multi-aged with a diverse structure including a variety of tree sizes, many large-diameter trees, multiple canopy layers, deep forest duff, and a "pit-and-mound" forest floor. The canopy, shrub, and herbaceous layers of the mixed forests around the refuge today have varying composition and coverage depending on specific site conditions and disturbance history (Rapp 2003).

The breeding bird survey data over the last 30 years shows the importance of this mixed forest habitat for species of concern such as blackburnian warbler, Canada warbler, and black-throated-green warbler (appendix H). A structurally complex (e.g., vertical diversity, coarse woody debris, large-diameter trees with cavities) mixed forest landscape also supports large, wide-ranging mammals, including marten, fisher, bobcat, and lynx (Ray 2000).

Although no stands of old growth forest are present on the refuge, it contains a few conifer stands with some late-seral characteristics, such as large-diameter trees. Hagen and Whitman (2004) report on the looming loss of late-successional forest in working forest landscapes including northern New England and the negative consequences for forest biodiversity. They note that forests develop along a continuum and, despite a harvest history, a stand can retain and develop such old growth characteristics as large live trees 100–200 years old, large dead trees, and fallen logs. Species associated with those characteristics include mosses, lichens, fungi, and insects.

Natural disturbance regimes affected by long-term climate change and disturbance patterns on the landscape are highly influenced by soil, topography, and forest type (Lorimer 2001; Lorimer and White 2003). Natural disturbance patterns for this region occur at two different scales. Large-scale, stand replacement disturbances from fire and wind occur infrequently, on the magnitude of 1000+ years. Small-scale disturbances, creating single tree-fall gaps, occur frequently (50–200-year return rates) (Lorimer 1977; Seymour et al. 2002). Pure stands of spruce and fir are much more susceptible to windthrow, insect outbreaks, and crown fires than associated hardwood species, because of their shallow root system, prevalence in swamps and on upland sites with thin, stony soils or on upper slopes exposed to high winds. Large areas of mixed spruce-hardwood that typically grow on better soils are rarely destroyed (i.e., stand replacement) by large-scale disturbances (Lorimer and White 2003).

GOAL 4:

Provide high quality wildlife-dependent activities such as hunting, fishing, wildlife observation and photography, as well as camping and boating in support of those activities.

Background

Hunting, fishing, wildlife observation and photography are four of the six priority public uses designated by the Refuge Improvement Act. The other two priority uses are environmental education and interpretation (see goal 5 below). The Act stipulates those six uses are to receive enhanced consideration in refuge planning. Opportunities to engage in them should be provided to the extent compatible with refuge goals and objectives. Our objectives aim at providing high-quality opportunities for each of these four activities in ways consistent and compatible with the priorities of our other refuge programs, including opportunities for the other two priority uses. The Refuge Improvement Act does not establish a hierarchy among the six uses, but provides for refuge managers to determine whether any or all are appropriate and compatible. The ability to fund the management of these activities is also a factor for refuge managers to consider in determining their compatibility. Service policy requires that refuge managers set limits on, and establish stipulations for, any of those activities as warranted to ensure their compatibility.

Each of these activities is already facilitated on current refuge lands; however, we plan to improve current opportunities through new infrastructure and improved access.

GOAL 5:

Develop high-quality interpretative opportunities, and facilitate environmental education, to promote an understanding and appreciation for the conservation of fish and wildlife and their habitats, as well as the role of the refuge in the Northern Forest.

Background

This goal complements goal 4 by recognizing the importance of the remaining two priority public uses: environmental education and interpretation. Its objectives focus on providing informational and educational opportunities about the significance of the refuge and its role in conserving the Northern Forest to audiences of all ages. We strive to foster our visitor's appreciation of wildlife conservation and encourage them to make responsible environmental decisions in the future.

Our proposed future programs will achieve our objectives through increased visitor contacts, on-site programs, and new and improved infrastructure. Our emphasis will be on providing interpretive resources with planned infrastructure (e.g. trails, roadside pullouts, and a visitor contact facility). We will facilitate the use of refuge lands for educational purposes; however, we will look to our state and conservation partners, local and state educators, Friends Group, and/or volunteers to lead the development of educational programs.

One desired outcome of our programs is that participants recognize we manage the refuge to provide a variety of habitats to benefit Northern Forest wildlife, with particular emphasis on migratory birds and wetlands. Through high-quality programs, visitors will gain a better understanding of the unique and important contribution of this refuge to migratory bird conservation and the Refuge System.

GOAL 6:

Enhance the conservation and management of wildlife resources in the Northern Forest Region through partnerships with public and private conservation groups, private landowners, State and local entities.

Background

The Northern Forest stretches from the St. Croix River in Maine westward through New Hampshire and Vermont across the Adirondack Mountains to the Tug Hill plateau in New York. It includes the largest contiguous forest remaining in the eastern United States. Those 26 million acres encompass the most remote, pristine lakes in the Northeast, the headwaters of the Hudson, Connecticut, St. John and other great eastern rivers, and vast tracts of forest that provide habitats for an impressive array of species, including many that are federal-listed as threatened or endangered or regional or state species of high conservation concern. Close to a million people live in that landscape, and many of them depend on the forest to sustain their communities and quality of life.

In the last decade, significant changes in land use have threatened the natural landscape, culture, and communities of the region. Huge forest landholdings, many owned by multinational corporations, are being sold at an accelerated rate.

Many of the large, contiguous tracts are being divided into smaller tracts and sold to developers or institutional investment corporations, including insurance companies and bank trusts, whose interests are purely economic. Those sales raise concerns about the rising trend of unsustainable timber cutting, forest subdivision, and other permanent development, particularly around lakefronts and in secluded forest tracts. In addition to fragmenting the forests, those developments destroy wildlife habitat, restrict public access, degrade water

quality, spoil the remote and scenic beauty of the forest, and undermine the hope of a sustainable, forest-based economy to support Northern Forest communities. More recently, a shift to renewable energy sources may impact forest management on a regional scale. In May, 2007 New Hampshire enacted the Renewable Energy Act, which codified the renewable portfolio standards for the state. This law requires that all suppliers of electricity in the state demonstrate that they are obtaining 25% of their electricity from renewable energy sources by 2025. Included in the list of renewable energy sources are biomass, wind, hydropower, and solar, among others. Since biomass energy production facilities can utilize wood products not traditionally used by the pulp and paper industry, a large-scale shift to electricity production from biomass facilities has the potential of altering forest stand structure, rotation ages, species composition, soil nutrient levels, and wildlife habitat on a landscape scale.

Those concerns underscore the need for partners who will work together to permanently conserve the ecological integrity of the Northern Forest, preserve public recreational opportunities, and promote the economic sustainability of a forest-based economy. Fortunately, an impressive partnership already exists in the region including over a dozen federal, state, non-governmental, and private entities, who share this common mission. In addition, these partners' landholdings collectively create a conservation lands network, as depicted on map 1-1, which provides a basis for further connecting and conserving resources of conservation concern. The Service is a key partner in this effort, and refuge lands are integral to the land conservation network. Appendix A, "Land Protection Plan," presents our vision for expanding our contribution to the partnership and the land conservation network, all in support of sustaining Federal trust resources.

GOAL 7:

Develop the refuge as an outstanding center for research and development of applied management practices to sustain and enhance the natural resources in the Northern Forest in concert with the Refuge System Land Management and Research Demonstration Area program.

Background

In 1999, the leadership of the Refuge System published their vision for its programs and management priorities in a publication titled "Fulfilling the Promise, the National Wildlife Refuge System" (USFWS 1999). Forty-two different recommendations were identified. One of those was to designate Land Management and Research Demonstration (LMRD) Areas. They envisioned LMRD areas as "places where new habitat management techniques and approaches are developed, implemented, and showcased...places where professional land managers and others come to learn about cutting edge habitat management techniques and technology, and carry back with them the information and knowledge which allows them to better manage their own lands." Specifically, the recommendation was to designate areas "to facilitate development, testing, teaching, publishing, and demonstration of state-of-the-art management techniques that support the critical habitat management information needs for fish, wildlife, and plant conservation within the System and other lands" (USFWS 1999).

The implementation of that recommendation has begun. Nationwide, 5 of the 14 LMRD areas approved by the Directorate are now funded and in operation. Those are (1) Hanford Reach National Monument and Saddle Mountain Refuge in Washington, (2) the National Elk Refuge and National Bison Range in Montana, (3) the Rachel Carson and Parker River refuges in Maine and Massachusetts, (4) the Neal Smith and Northern Tallgrass Prairie refuges in Iowa, and (5) the Bosque del Apache Refuge in Arizona. Each of those LMRD areas has a different

habitat management focus. Umbagog Refuge, in partnership with the Moosehorn Refuge and the Nulhegan Division of the Silvio O. Conte Refuge, is another approved LMRD area, but lacks funding to implement programs.

Its focus is the management and restoration of habitats in the working forest landscape of the Northern Forest ecosystem. Research will be implemented in cooperation and coordination with other northern forest research entities, such as universities, Manomet Center for Conservation Sciences, and the U.S. Forest Service Northeastern Forest Experiment Station, Forestry Sciences Laboratory.

Chapter 2



Ian Drew/USFWS

Harper's Meadow with loon

Planning Process

The Comprehensive Conservation Planning Process

Service policy establishes an eight-step planning process that also facilitates our compliance with NEPA (figure 1.1).¹ Details on each step in the process are available on our website at <http://www.fws.gov/northeast/planning/>. We describe below how we followed that process in developing this CCP.

In 2001, we began to prepare for developing this CCP by collecting information on refuge resources and mapping its habitats. We convened our core team, which consists of refuge staff, regional office staff, and representatives of the Maine Department of Inland Fisheries and Wildlife (MDIFW) and the New Hampshire Fish and Game (NHFG). We discussed management issues, drafted a vision statement and tentative goals, and compiled a project mailing list of known stakeholders, interested individuals, organizations, and agencies. We also conducted a wilderness review, evaluated wild and scenic rivers potential, and summarized our biological inventory and monitoring information. We initiated all of those steps as part of “Step A: Preplanning.”

In August 2001, we initiated “Step B: Initiate Public Involvement and Scoping” by distributing a newsletter to announce that we were beginning the planning process and ask if people wanted to be on our mailing list. In June 2002, we distributed approximately 1,000 copies of a Planning Newsletter and Issues Workbook to everyone on our mailing list. Those workbooks asked people to share what they valued most about the refuge, their vision for its future and the Service role in their community, and any other issues they wanted to raise. We received 131 completed workbooks.

On July 16, 2002, we formally announced the start of the planning process in a Federal Register Notice of Intent. During that July and August, we held eight public scoping meetings to identify public issues and concerns, share our draft vision statement and tentative goals, describe the planning process, and explain how people could become involved and stay informed about the process. We announced their locations, dates, and times in local newspapers and special mailings. More than 115 people attended. Those meetings helped us identify the public concerns we would need to address in the planning process. We also solicited public issues and concerns at our booth at the August 2002 Umbagog Wildlife Festival (see Figure 2.1).

We worked on “Step C: Review Vision Statement, Goals, and Identify Significant Issues” and “Step D: Develop and Analyze Alternatives” concurrently in 2003 and 2004 in two technical workshops: one on upland forest habitat management and one on wetlands management. We invited resource professionals and scientific experts to share their opinions on the significance of refuge resources, namely, their assessment of the health, diversity, and integrity of its habitats. We also met with elected officials, our state partners, and other Service divisions to apprise them of the status of the project and exchange technical information. For much of 2004 and into 2005, we compiled and analyzed various management alternatives to serve as the foundation for developing the Draft CCP/EIS. In August 2005, we distributed a newsletter summarizing the alternatives in detail and updating our planning timeframes.

Also in 2004 and into 2005, the USGS Fort Collins Science Center helped us develop and implement a stakeholder survey to provide us with information on public satisfaction, preferences, and expectations regarding our current and proposed refuge management. The final survey report provided valuable information for our management proposals. We distributed an Executive Summary of the results in November 2005. You may request the full report from refuge headquarters in hard copy or CD-ROM, or view it online at <http://www.fort.usgs.gov/products/publications/21507/21507.asp>.

¹ 602 FW 3, “The Comprehensive Conservation Planning Process” (<http://policy.fws.gov/602fw3.html>)

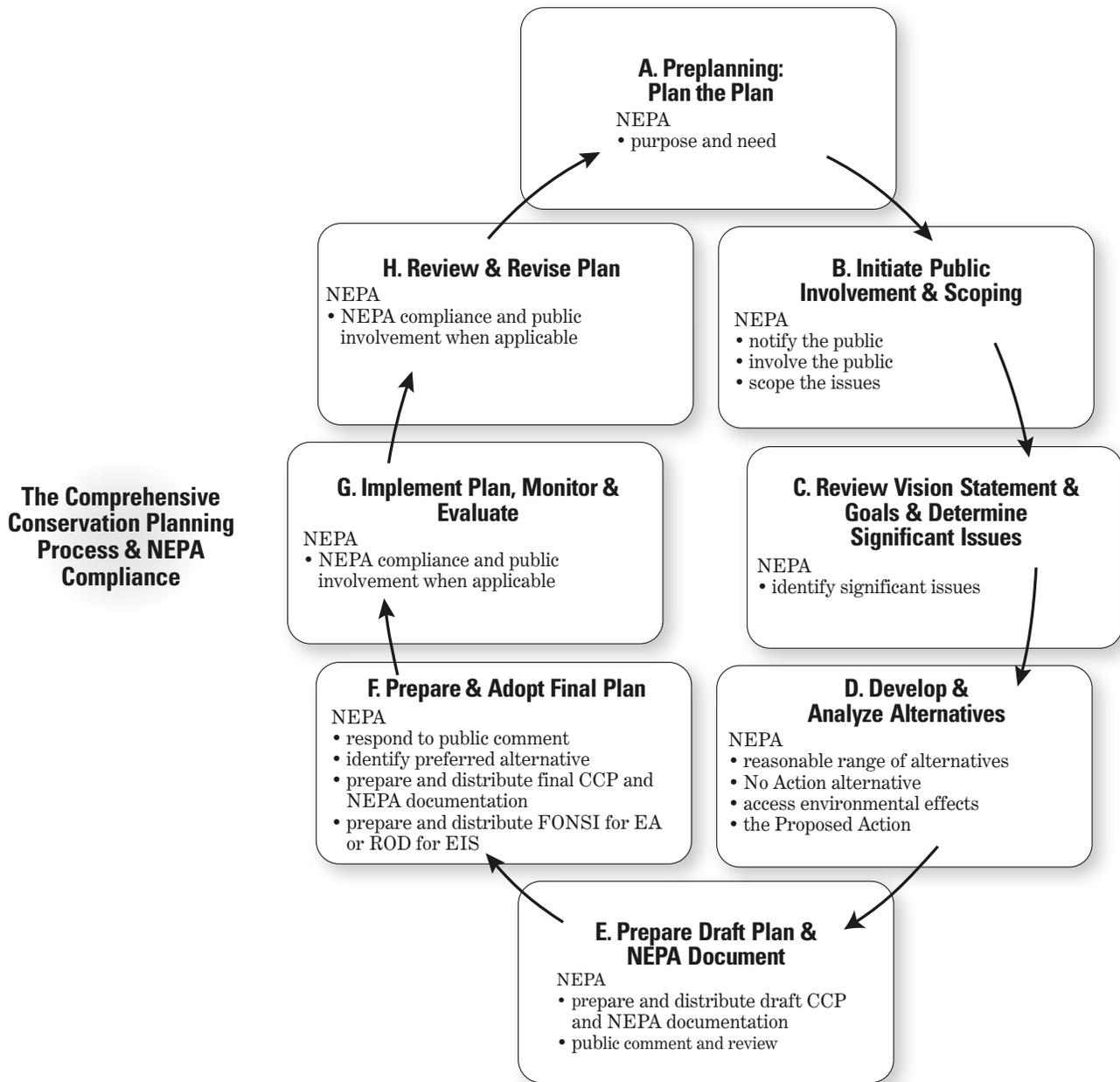


Figure 2.1. The Comprehensive Conservation Planning Process

We completed “Step E: Prepare Draft Plan and NEPA document,” by publishing a Notice of Availability (NOA) in the Federal Register on July 6, 2007, announcing the release of the Draft CCP/EIS and distributing it for public comment. During the 77-day period of public review from July 6 to September 21, 2007, we held public hearings to obtain comments. We received over 14,000 comments by regular mail, electronic mail, and as testimony in those public hearings. We reviewed and summarized all of the comments and developed responses to them. A summary of public comments and our responses to them are presented in appendix O of the Final CCP/EIS.

We released our Final CCP/EIS for a 32-day public review period from. Its availability was announced in a NOA in the Federal Register on December 3,

2008. After the public review period, we then prepared a Record of Decision (ROD) for our Regional Director. He approved and signed the ROD on January 9, 2009, completing the planning process. We then announced the availability of the ROD in another NOA in the Federal Register on March 16, 2009, completing “Step F: Prepare and Adopt a Final Plan.”

We have now begun “Step G: Implement Plan, Monitor and Evaluate.” We will modify this CCP following the procedures in Service policy (602 FW 1, 3, and 4) and NEPA requirements as part of “Step H: Review and Revise Plan.” Minor revisions that meet the criteria for categorical exclusions (550 FW 3.3C) will require only an Environmental Action Memorandum. We must fully revise CCPs every 15 years.

Issues, Concerns and Opportunities

From our Issues Workbook, public and focus group meetings, and planning team discussions, we developed a list of issues and concerns which focused our development and analysis of alternatives evaluated in the draft and final CCP/EIS. We summarize them again below as they remain important to us while we implement the plan.

Significant issues.—Our partners or the public brought these issues to our attention during the scoping process. These discussions generated a wide range of opinions on how to resolve them, summarized below. We applied those in creating the primary distinctions among the objectives and strategies in each alternative in chapter 2 of both the Draft and Final CCP/EIS. Ultimately, their resolution was key in selecting which actions to include in the CCP.

Other issues and management concerns.—These issues are narrower in scope or interest compared to the significant issues, but they still generated a range of opinions.

Issues and concerns outside the scope of this analysis.—The resolution of these issues fell outside the scope of the purpose of and need for action as we described in the Draft and Final CCP/EIS. They are identified below, but will not be further addressed in this document.

Significant Issues

Addressing the 11 significant issues below helped define the actions to best achieve the seven goals above.

1. Which wetland habitats and wetland-dependent species should be management priorities? How will we manage for them on the refuge?

Because one of the purposes for establishing the refuge is to conserve wetlands, addressing this issue is a high priority. It is also a challenge. The water levels in Umbagog Lake directly influence most of the refuge wetlands. The holder of the FERC license controls those water levels, which fluctuate according to releases at Errol Dam. The current licensee, Florida Power and Light-Energy (FPLE), meets with the Service annually, as required by its license, to agree on water levels in June and July when birds are breeding and nesting.

To offset our limited direct influence on water levels, some input we received recommends we manage refuge wetlands by planting wild rice, promoting beaver activity, reducing or eliminating external threats of erosion or pollution, controlling access to wetlands, and eliminating invasive species. We believe, as do wetland experts who provided input on this issue, that managing water levels more effectively throughout the year would improve habitat quality for species of conservation concern and other wetland-dependent native species, and sustain such unique wetland types as the Floating Island National Natural Landmark (FINNL).

Those recommendations vary considerably on the timing, extent, and focus of wetlands management. Some suggest we establish more baseline biological information before we manage the refuge wetlands. Others suggest we first work with the current holder of the FERC license, to discuss a year-round regime of water levels that will be more beneficial for wildlife and wetlands. As in any aspect of refuge management, our decisions on managing refuge wetlands could benefit one species of conservation concern, but adversely affect another.

2. Which upland forest habitats and forest-dependent species should be management priorities? How will we manage for them on the refuge?

The decision document establishing the refuge (USFWS 1991) also recognizes that its upland forests play a crucial role in conserving the lake, its rivers and associated wetlands. This document recognized that the refuge was part of a larger conservation partnership to protect and manage timber, wetland, and wildlife resources of the Umbagog area. Conservation easements held by the State of New Hampshire on some of the upland portions of the refuge specifically granted timber management rights.

Uplands compose at least 58 percent of the refuge. During the last 10 years, we acquired much of that upland forest from timber companies who harvested it intensively before selling it to the Service. The vegetation now growing back on some of those areas lacks the natural species diversity, age-class distribution, and structural components of healthy native forests in the Upper Androscoggin River watershed.

Only in the last 5 years have we acquired enough contiguous forested upland to form efficient management units. Primarily for that reason, we have not managed the vegetation on those lands. During our public scoping, many people encouraged us to manage those areas to bring them into a more natural, healthy forest condition. Some would like us to manage the upland forests on the refuge exclusively as working forests to promote tree growth and productivity for commercial purposes. Others would like us to initiate some action to get those areas on a natural path sustainable without further human intervention. Some suggested we focus our management on benefiting species that depend on upland forest habitats, particularly, migratory songbirds that regional and state conservation plans have identified as conservation concerns in the last 5 years. Some of those species require mature forest stands, while others prefer a mix of age classes and types. Again, our management decisions could benefit one species of conservation concern but adversely affect another.

Other individuals and organizations encouraged us to expand the refuge as a means of conserving large areas of undeveloped forest lands to benefit species that require contiguous interior forest habitats. Still others expressed an interest in our conducting very little to no active vegetation management in the uplands. Some believe “nature should take its course,” and that the forested areas will recover without our help.

3. What is the appropriate level for each of the six priority public use programs on the refuge? What means of access will we allow for those activities?

The Refuge Improvement Act does not establish a hierarchy among its six priority, wildlife-dependent compatible uses. At times, they may conflict. At other times, the refuge may lack sufficient resources to promote all of them equally. Some people expressed concerns that we may allocate refuge resources disproportionately toward one use to the detriment of another. Service policy authorizes the refuge manager to allocate time and space for those uses to reduce

conflict, or terminate or disallow one or more of them. The refuge manager must evaluate, among other things, which use most directly support the long-term attainment of refuge purposes and the Refuge System mission.

During the public scoping process, we heard from many people concerned about a rising number of conflicts between visitors in motorboats and visitors in canoes and kayaks. Both groups typically are involved in priority public uses such as fishing and wildlife viewing. Those promoting motorboats suggest limits on the number of kayakers and canoeists or the size of groups, because the increase in large group trips affects the ability of motorboats to maneuver on the river corridors. Those promoting kayaks and canoes voice their concern over the noise and speed of motorboats disturbing wildlife and affecting viewing opportunities. They also express concern about their own safety, because of the wakes motorboats create. Some motorboat operators suggest that kayakers and canoeists could create more wildlife disturbance by their access to small, quiet coves where some wildlife hide or rest.

Unfortunately, we get reports each year of verbal confrontations between users of motorized and non-motorized boats. Although we cannot prevent all such encounters, our enforcement focuses on people operating boats in a reckless manner, or in a manner that endangers or is likely to endanger any person, property or wildlife.

An additional challenge for the refuge manager and our state partners is determining the capacity of the refuge and the lake to support these priority compatible uses and still provide visitors with a quality experience. We also need to be aware of their impacts on adjacent lands. Several landowners expressed concern that increased boating has increased trespassing onto private land. Boaters have left behind trash and human waste, and have parked or camped where they do not have permission.

4. How will we manage furbearer populations?

The term “furbearer” includes all mammals that possess some form of hair (TWS 2001). However, we use the term to identify species hunted or trapped for their fur, including carnivores and rodents. Beaver, bobcat, coyote, fisher, fox, marten, mink, and muskrat are common furbearers on the refuge. Furbearer populations are dynamic; many are capable of doubling their populations in a single year, while others are more subject to limiting habitat factors. For example, muskrat populations can fluctuate dramatically each year. They can decline by 75 percent in the winter and rebound completely by the next fall (TWS 2001). As land managers, we become concerned when furbearer populations meet or exceed the biological carrying capacity of refuge habitats.

The complex subject of furbearer management is also controversial at the national and state levels. Most of the controversy surrounds regulated trapping. We heard from people who object only to certain trapping methods, particularly the foothold trap on land. However, other opponents have moral and ethical objections to killing animals, and do not support any form of trapping.

We also heard from proponents of regulated trapping who believe it provides an important, effective method for managing furbearer populations, is a sustainable use of wildlife resources, and allows for a rural, self-sufficient, subsistence lifestyle of historical significance in the Northern Forest. Supporters acknowledge the Refuge System mission to conserve, protect, and enhance viable populations of native wildlife such as furbearers, but contend that harvesting some furbearers does not threaten the continued survival of their populations

(TWS 2001). They often compare it to our hunting and fishing programs in that regard. However, trapping is not one of the six priority public uses in the Refuge Improvement Act.

5. How will we manage compatible, non-priority recreational uses on the refuge?

We heard from people supporting certain non-priority uses that they claim have historic precedence in the area. Others expressed opposition to these same uses. Most frequently discussed during public scoping were (1) snowmobiling, a very popular recreational activity, and increasingly important to the local economy; and, (2) furbearer trapping, a recreational activity with cultural and historic roots in the region. Other activities mentioned were bicycling, horseback riding, dog-sledding, and collection of antler sheds.

All uses on a refuge are subject to a finding of appropriateness and a compatibility determination by the refuge manager before they can be allowed. For non-priority activities to be allowed, they would also have to be managed so they do not conflict with the goals and objectives for biological and visitor services priorities in the CCP, are consistent with laws and policy, ensure public safety, and are manageable within the limitations of the refuge budget and available staff. If a priority and non-priority public use conflict, the priority public use will take precedence (603 FW 2). Some people we spoke with argued that these non-priority uses activities detract from our ability to provide priority public uses. They pointed out the limited refuge staff and annual funding of recent years, and did not believe we can manage these activities properly in addition to higher priority programs. Others simply stated they do not believe these activities are appropriate for a national wildlife refuge. That opposition ranged from those opposed to certain activities on ethical and moral grounds, to those concerned with visitor safety and those concerned with direct impacts on wildlife and habitats. We also heard from individuals who support many of these activities.

Snowmobiling on the refuge



Marvin Moriarty/USFWS

6. How will we manage camping in remote areas on the refuge?

A developed campground in Umbagog Lake State Park on the south end of the lake is accessible by car from Route 26. The park also includes 30 remote camping sites around the lake, all seasonally open and administered

by the State of New Hampshire Department of Resources and Economic Development (NHDRED), Division of Parks and Recreation. Fourteen of those camping sites are on refuge lands; of which 12 are on the lake, and 2 are on rivers. Our ongoing partnership with the state to conserve Umbagog Lake is a very successful, valuable relationship that facilitates wildlife conservation and provides unique recreational opportunities in the Northern Forest. The remote camping sites are extremely popular, and are consistently occupied during the open season. We hear from many people that the highlight of their trip is the opportunity to hear and see loons calling near the campsites at dusk and dawn.

Although we heard from individuals who advocate maintaining camping at its current level, we did not hear from anyone who recommended increasing the number of sites. Some, who expressed support for camping in general, would like to see a reduction in the total number of sites because they are concerned about the total number of visitors to the area, and believe camping encourages group activities. Others felt that continuous use had adversely affected some of the sites, and would like to see them restored.

Some people told us that they do not believe camping is appropriate in a national wildlife refuge, especially if site development or intensive use adversely affect natural habitat. Others expressed concern that the remote sites only encourage inexperienced boaters to get out onto the lake and jeopardize their safety and that of others.

7. How will we manage outfitters and guides on the refuge?

We heard a range of opinions about the desirability of the current level of guided or group tours which occur on adjacent ownerships. Several individuals expressed concern that guided tours have increased over the last five years, but do not appear to be regulated by any agency. Some of the same people believe that outfitting and guiding is already at its capacity, and opposed group tours because they facilitate getting more visitors to the lake and its surroundings. Others supported guiding as an activity, because it was their livelihood, or because they believe it enhances visitors' experiences by providing safe and successful opportunities for viewing wildlife, photographing nature, hunting, or fishing.

According to Federal regulations and Service compatibility policy (603 FW 2), we may only authorize public or private economic uses of the natural resources on any national wildlife refuge in accordance with 16 U.S.C. 715s and 50 C.F.R. 1(29.1) when we determine that the use contributes to the achievement of the refuge purposes or the Refuge System mission. We may authorize an economic use, such as commercially guided trips, by special use permit only when the refuge manager has determined the use is appropriate and compatible. The permit must contain terms, conditions, and stipulations to ensure compatibility.

Our authority to administer these activities on Umbagog Lake is limited to the lands and waters where the Service has an ownership interest. We have not evaluated these activities because we have had no requests to do so. Once a request is received, we will evaluate the use for appropriateness and compatibility.

8. What should be the refuge role in conserving land in the Upper Androscoggin River watershed? Should we pursue a refuge expansion?

Goal 6 describes significant changes in land use in the Northern Forest and our role in the existing collaborative partnership helping to conserve important

habitats, maintain outdoor recreational opportunities, and sustain a viable economic and social quality of life. Our partners and we will continue to use many tools and techniques for accomplishing this mission which range from outreach and education, research and demonstration areas, private lands assistance programs, cooperative management agreements, conservation easements, and land acquisition. Each of those is a tool, although our ability to use these effectively will depend on other factors previously discussed, such as refuge staffing, funding, and the continued strength and collaboration of our partnerships.

In that list of potential methods, land conservation garners the most public attention and interest. We heard a wide range of opinions on whether the refuge should continue to expand. Some people expressed concern that federal ownership will result in a greatly diminished local voice in how those lands are managed and used, and they expect the result will be additional restrictions on non-priority public uses, which they view as “traditional” uses. They believe the Service will not be responsive to local concerns, and that the lands will no longer be subject to local influences. Many people specifically fear a significant loss of commercial timber harvest and its potential impacts on the local economy. Others are concerned about the loss in property taxes, because the Federal Government does not pay property taxes.

However, many expressed support for land conservation for the reasons identified in goal 6 above, including the fact that owners are selling huge landholdings and subdividing them into smaller tracts at an alarming rate. Some people expressed the opinion that state agencies, local governments, or non-governmental entities should take the lead in land protection, and that the Service should play only a supporting role. Others suggested that the Service pursue conservation easements and private lands cooperative management agreements instead of fee simple purchases as a means of protection. They mentioned that this would also alleviate concerns about the impact on local property taxes.

On the other hand, we heard from many people that Service acquisition of fee title lands was the only way to guarantee the permanent conservation and management of the lands to support native wildlife. Some recognized the importance of the land conservation partnership and lands network that exists and encouraged our continued active involvement, including support for a refuge expansion. They mentioned the benefits of permanently conserving important habitats, the increased opportunities for public access and recreation in areas either not currently open or not guaranteed to be open long-term. Finally, they pointed out that expanding the refuge would maintain the rural character and quality of life so important to many.

9. How can the refuge and its staff be an asset for local communities and support their respective vision and goals for the area?

Our goal is to become an integral part of the economic and social health and vitality of local and regional communities. The challenge for us is to understand the visions of the respective communities and our role in them while staying true to our mission. We need to determine how best to cultivate relationships in the area, reach out to raise our visibility, and identify the resources we have to contribute. During public scoping, the comments we heard and the results of our stakeholder survey indicate some disappointment in the level of communication from refuge staff, and various levels of mistrust of what our agency does communicate.

Others mentioned that this situation is improving, but could be better. Several individuals requested a more transparent planning process with frequent opportunities to participate and share information. Others felt well informed about refuge activities, and valued the contribution of the refuge to their quality of life. Gaining community understanding, trust, and support for refuge programs is very important for our success in managing the refuge and contributing to conservation in the Northern Forest.

10. What staffing, budgets, and facilities are needed to effectively administer the refuge? Where should they be located?

Many people expressed concern about our ability to maintain existing and proposed infrastructure and implement programs on this refuge, given its current levels of staffing and funding. Some told us they recognize the logistical challenges for our four field staff in trying to manage the refuge land base, which straddles two states, is difficult to access in some places, and is significantly affected by Umbagog Lake and Errol Dam, neither of which falls under the direct authority of the Service. Fortunately, our strong partnerships with natural resource agencies in New Hampshire and Maine allow us to resolve most concerns expeditiously.

Some people expressed the opinion that the refuge needs a presence directly on the lakeshore to facilitate administration, outreach, and education of visitors on safety, lake use etiquette, and resource protection.

We also heard interest in insuring that there is adequate law enforcement capability on refuge lands. That is increasingly becoming a concern to many as public use on the refuge and adjacent lands increases. Our hope is that our new half-time refuge law enforcement officer and a full-time law enforcement zone officer shared among the refuges in Maine, northern New Hampshire and Vermont will meet our law enforcement needs and public expectations.

Some people are concerned that any new proposals in this CCP will fall substantially above current budget allocations, thus raising unrealistic expectations. One individual emphasized the point that our budgets can vary widely from year to year because they depend on annual Congressional appropriations. Other people supported our pursuit of new management objectives and strategies in the hope that the CCP results in new partnerships and sources of funding. In fact, several people made specific recommendations on sources of grants or ways to collaborate in certain programs or fund new infrastructure and other projects.



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Whaleback Pond

11. What actions can Service staff implement on refuge lands to minimize the projected impacts from global and regional climate change?

Climate change is an issue of increasing public concern because of its potential effects on land, water, and biological resources. The issue was pushed to the forefront in 2007 when the Intergovernmental Panel on Climate Change

(IPCC), representing the world's leading climate scientists, concluded that it is "unequivocal" that the Earth's climate is warming, and that it is "very likely" (a greater than 90 percent certainty) that the heat-trapping emissions from the burning of fossil fuels and other human activities have caused "most of the observed increase in globally averaged temperatures since the mid-twentieth century" (IPCC 2007). The Northeast is already experiencing rising temperatures, with potentially dramatic warming expected later this century under some model predictions. According to the Northeast Climate Impacts Assessment team, "continued warming, and more extensive climate-related changes to come could dramatically alter the region's economy, landscape, character, and quality of life" (NECIA 2007).

Other predicted climate-related changes, beyond warming temperatures, include changing patterns of precipitation, significant acceleration of sea level rise, changes in season lengths, decreasing range of nighttime versus daytime temperatures, declining snowpack, and increasing frequency and intensity of severe weather events (TWS 2004). Since wildlife species are closely adapted to their environments, they must respond to climate variations, and the subsequent changes in habitat conditions, or they will not survive. Unfortunately, the challenge for wildlife is all the more complicated by increases in other environmental stressors such as pollution, land use developments, ozone depletion, exotic species, and disease. Wildlife researchers and professionals, sportsmen, and other wildlife enthusiasts are encouraging positive and preemptive action by land managers. Some recommendations for action include: reducing or eliminating those environmental stressors to the extent possible; managing lands to reduce risk of catastrophic events; managing for self-sustaining populations; and, looking for opportunities to ensure widespread habitat availability (TWS 2004).

Many wildlife professionals and conservation organizations recommend we manage refuge lands using an adaptive management framework, and increase biological monitoring and inventories. These two actions are critically important for land managers to undertake in order to effectively respond to the uncertainty of future climate change effects. Ultimately, we hope management will reduce environmental stressors, provide support for self-sustaining populations, and ensure widespread habitat availability through land protection and conservation.

Other Issues

Management objectives and strategies in the CCP were also developed to address the following issues which tended to have a narrower range of divergent opinion on how to deal with them.

- What should be the Service role in protecting national and local landmarks, and cultural resources in the Umbagog Lake area?
- What is the refuge role with respect to water level management in Umbagog and associated lakes?
- How can the refuge promote responsible use of Umbagog Lake in cooperation with other jurisdictional and management agencies?
- How will existing camp lease agreements, under special use permits (SUPs), be affected by the CCP process?
- How will we protect and manage deer winter yards?
- How will we coordinate resource management with other state and federal agencies in the Upper Androscoggin River watershed?

- How can we work with other agencies to manage invasive plants and animals (e.g. small mouth bass and milfoil) on the lake?
- How will we manage fires (management-prescribed burns and wildland fires) on the refuge?

Issues Outside the Scope of this Analysis or Not Completely Within the Jurisdiction of the Service

1. Changing the timeline for FERC re-licensing of Errol Dam or changing the terms and conditions of the license

Some people expressed concerns with water level management in Umbagog Lake, namely due to the management of Errol Dam. We heard concerns with water levels being too high, affecting waterbird breeding and nesting habitat. Others mentioned concerns with low water levels during the summer, exposing mudflats and affecting shoreline access to open water. Yet others indicated that if the Service or states had more control over water level management, habitat conditions for species of concern, and wildlife-dependent recreational opportunities, could be enhanced throughout the year.

Water levels are controlled, as noted above, by the holder of the license issued by FERC for the Errol Project (currently FPLE). Once FERC has issued a license, any party wanting FERC to change the terms must petition FERC to reopen the license in order to effectuate any change in its terms. The procedure for doing so requires the petitioner to supply a detailed administrative record justifying a change in the license terms, sufficient to convince FERC that the analysis it did in issuing the license is no longer accurate, and that a change in the license terms is necessary. The licensee has a right to full administrative process under FERC regulations before its license can be changed by that agency. Such a challenge falls outside the scope of this CCP. Its purpose is to provide the Service with detailed goals and objectives for managing refuge lands, not to provide guidance to the Service concerning matters within the jurisdiction of a different federal agency. However, we plan to continue to meet annually with the licensee to discuss current terms and conditions of the license that relate to wildlife management during the breeding and nesting seasons and to discuss opportunities for habitat enhancement throughout the year.

The timeline for FERC re-licensing is also beyond the control of the Service, and hence beyond the scope of the CCP. The current FERC license for the Errol Project is due to expire in 2023, at approximately the same time the CCP is scheduled for revision. Prior to 2023, the Service will begin the CCP revision process and be involved in the process for a renewal of the FERC license (assuming the licensee pursues this). This CCP is not intended to control either the Service’s opinions in the next planning cycle or its position before FERC in re-licensing, although actions taken under the CCP may affect environmental baseline conditions for both processes.

2. Giving or transferring refuge lands back to private or town ownership

We heard people express the opinion that the Service should give back, trade, or sell refuge lands to an entity more amenable to the local culture and history. The USGS stakeholder survey (Sexton et al. 2005) indicates that some local respondents do not trust the Federal Government to manage lands on their behalf. Issue 8 above identifies other concerns people expressed about Service ownership.

We established the refuge in 1992 with the first purchase of land after producing a draft and final EA (Service 1991). Both of these documents extensively evaluated the proposal to create the refuge, and alternatives to that proposal, and included public review and comment. We based that proposal on a strong

federal-state partnership to cooperatively protect and manage nationally significant habitats in the area, with strong collaboration among the Service, New Hampshire and Maine state agencies, conservation organizations, and three principal landowners: the James River Company, Boise Cascades Paper Group, and Seven Islands Land Company. We agreed the Service was to take the lead in establishing the refuge on core lands, and New Hampshire and Maine were to take the lead in acquiring conservation easements in adjacent agreed-upon areas.

In addition to the 1991 Final EA establishing the refuge, our 2001 Regional Director's decision to further expand the refuge addressed public and partner comments on land acquisition. Both decisions required the Regional Director to prepare a Finding of No Significant Impact (FONSI) to disclose that the proposed land acquisition complies with federal laws and does not have a significant effect on the human environment.

The purchase of lands within the approved acquisition boundary represents the Service commitment to honor its responsibilities agreed to in the final decision. Although the Service can exchange refuge land for other land of equal or higher conservation value, a lack of trust in the Federal Government does not constitute a basis for transferring refuge lands to private or town ownership.

Chapter 3



Ian Drew/USFWS

Vernal pool

Affected Environment

Introduction

This chapter describes the physical and socioeconomic settings of the refuge in both a regional and local context. We first describe the regional landscape, including its historical and contemporary influences. Next, we describe the refuge and its resources in a local context.

The Upper Androscoggin River Watershed and the Northern Forest

The Landscape Setting

The refuge lies in the Upper Androscoggin River watershed, in a broad valley near the rugged White Mountains, where dozens of peaks rise more than 3,500 feet in elevation. Mount Washington lies to the south at 6,288 feet. It is the highest peak in the Northeast (Publicover and Weihrauch 2003). These lands, clothed in trees, are part of the 26-million-acre region known as the Northern Forest, which stretches from eastern Maine through northern New Hampshire, Vermont, and New York (Northern Forest Lands Council 1994).

Maine and New Hampshire are the most heavily forested states in the Nation, and the Northern Forest one of its largest contiguously forested regions. Those forests, waters, and wildlife profoundly influence the culture and economies of the northern reaches of the two states. The refuge lies in the transition zone between the vast spruce-fir, boreal forests of Canada and the maple-beech-birch northern hardwoods to the south. That mixing of forest types, combined with the rugged terrain, diverse geology, and myriad lakes, bogs, and other wetlands supports a richness of flora and fauna (Dobbs and Ober 1995).

The Northern Forest produced more timber than any place in the world during the 1800s (Dobbs and Ober 1995). Until the 1980s, nearly 85 percent of the Northern Forest was privately owned: much of that by large paper companies. The culture of the region is rooted in the traditions of hunting, fishing, and working in the woods. By the 1980s however, 75 million people lived within a day's drive of the region, and the expanding global economy was putting pressure on the large commercial landowners. In 1988, 1 million acres of land formerly owned by Diamond International Corporation went on the market. That marked the beginning of major shifts in land ownership patterns that continue today (Northern Forests Lands Council 1994).

The Historical Picture

Glaciation

The Earth has experienced several glacial periods; the last, known as the Pleistocene Ice Age, began about 2 million years ago. Glaciers advanced and retreated over time as temperatures fluctuated. The most recent period to affect Northern New England was the Wisconsin Glaciation, which reached its maximum extent about 18,000 years ago. A one-mile-thick sheet of ice, known as the Laurentide Ice Sheet, covered the region until its retreat from the Upper Androscoggin River watershed 10,000 years ago.

As glaciers retreat, they leave behind piles or layers of sediments, rocks and other debris known as glacial drift. These surficial deposits over bedrock come in two types in our region: glacial till and glacio-fluvial. Glacial till is a mixture of sand, silt, clay, and rock ground up by the glacier and dropped as it retreated. It covers most of our region, deepest on lower slopes, and thin or absent on mountaintops and ridges. Glacio-fluvial drift develops from the transport, sorting, and deposit of material by flowing glacial meltwater. Larger gravels and stones settle out at higher gradients, while finer silts, sands, and clays settle out at as the waters slow at valley bottoms (Sperduto and Nichols 2004).

After the Ice Age

Ten thousand to 12,000 years ago, the retreating ice sheet scraped and molded the valleys, slopes and mountaintops, leaving behind a landscape bare of

vegetation. However, at the southern edge of the glacier, plants survived and immediately began to re-colonize the newly exposed soils (Marchand 1987). Large mammals, including mastodons, wandered the spruce parkland and grassy savanna, but disappeared quickly at the same time as the glacier receded and humans advanced across the region. Thirty-five to 40 large mammal species became extinct 9,000 to 12,000 years ago, while other mammals that were around then, such as timber wolf and white-tailed deer, are still present today (Pielou 1991; Askins 2000).

Continual weathering and erosion of rock over time released nutrients and created new soils for plants to grow. Sedges and dwarf shrubs dominated the tundra-like landscape for several thousand years. As the climate warmed, these plants and animals followed the glacier as it receded north. The tundra continued to retreat, eventually restricted to the highest mountaintops (Davis 1983; Marchand 1987).

Hardwood and softwood tree species advanced independently of one another, creating different forest communities through time (Davis 1983). Graham (1992) reported a similar individualistic response by mammals to the post-glacier climate changes. Spruces were the first trees to colonize, nearly 2,000 years after the ice melted. Pollen records show balsam poplar and dwarf birch in the mix with spruce (Davis 1983). The sequence of plant species arrivals as the glacier receded was different at different sites (Davis 1981). In Northern New England, northern hardwoods—American beech, sugar maple, and yellow birch—established their dominance 2,000 years ago, while spruce regained dominance on the middle slopes, following an earlier dieback (Davis 1981, 1983; Marchand 1987; Pielou 1991).

Native People

Evidence from archaeological sites in the region documents human habitation in the Umbagog Lake area as far back as 11,000 years ago (Hanson 1996). Those early inhabitants traveled along the region's waterways and camped at numerous sites along headwaters of the Androscoggin River watershed (Hermes and Pollock 2001; Gramly 1982, 1984). Native American influences on the spruce-hardwood forests of northern New Hampshire, however, were thought to be minor compared to those of indigenous populations further south. They used fire to clear land for agriculture, improve habitat for game, or facilitate travel through the forest in the drier hardwood forests of southern New England (Cronin 1983). The more sedentary, concentrated populations in coastal southern New England likely set repeated fires that had a more lasting impact on the landscape. In interior and northern New England, native people were more mobile, traveling by boat rather than on foot, gathering food from rivers and the sea rather than by farming, and rarely using fire. Wild foods, including fish, game, roots, and berries were abundant, and the local climate was unsuitable for growing crops (Patterson and Sassaman 1988).

Human Land Use Last 200 Years

Farming, harvesting timber, building dams, and developing land are the primary forces that have shaped the Upper Androscoggin River watershed region in the past 200 years.

The first explorers did not reach this region until the 1780s. Early pioneers arrived in Errol in 1806, and by 1831 there were enough inhabitants to hold the first town meeting (Annis et al. 1999). The first residents settled along the river, where they cleared land for agriculture. Many families brought cows, sheep, and pigs from their previous homes, and needed to raise feed for the livestock as well as grain for their own use (Littlehale et al. 1975).

Agriculture remained the primary land use of the fertile floodplain soils well into the twentieth century, as evidenced by the presence of open fields in the major valleys today. Horse logging required hay and grain to maintain the logging company teams from the late 1800s into the 1930s, when diesel engines began to

take over. Dairy herds were introduced during the 1940s, but many farms were abandoned as people sought other work (Annis et al. 1999; Littlehale et al. 1975), and some of the agricultural lands have reverted to forest.

Timber harvesting

In the 1820s, commercial logging began in earnest as mills were built in the towns along the Androscoggin and Magalloway rivers to facilitate the transport of logs. Early loggers used hand axes and crosscut saws, skidded the logs using horses, and floated the logs to the mills on the rivers. That was the typical practice until the Great Depression in the 1930s. Thereafter, chain saws, motorized skidding, and overland hauling of logs replaced axes, horses, and most of the river drives. The railroad arrived in Gorham in 1851 and in Berlin in 1855. The last long-log river drive on the Androscoggin River occurred in 1937, although pulpwood was moved downriver until the early 1960s (Publicover and Weihrauch 2003). The boom piers visible in the river north of Berlin are stone and wood structures used until the mid-1960s by the two large paper companies, International Paper Company and Brown Company, to separate their respective logs traveling downriver. The boom piers were also used to separate long lumber logs from the shorter length pulpwood (Northern White Mountain Chamber of Commerce, 2005).

White pine was harvested for local building material and, eventually, for export downriver. Those trees, up to 7 feet in diameter, grew abundantly along the shores of lakes and rivers (Wood 1961). The New Hampshire Legislature chartered a toll dam in Errol in 1837, and incorporated the Androscoggin Boom Company in 1851 to control the rafting of pine logs down the river. The use of red spruce for lumber began in 1845 on the Penobscot River, and spread to the headwaters of the Kennebec in 1850. Although not as massive as the pines, spruce trees grew to diameters of 2 feet. The abundant spruce of the Magalloway region impressed the crews surveying the Maine-New Hampshire boundary during the 1850s, and the first drive of spruce logs on the Androscoggin River occurred in the 1860s. Other tree species used included hemlock bark for tanning, tamarack for ship knees, northern white cedar for shingles, and balsam fir for boxes (Foss 2003).

The demand for lumber increased dramatically after the Civil War (Whitney 1994). That increased logging pressure depleted the growing stock of large pine, and spruce had become the primary lumber species by the 1890s. The pulp and paper industry began during the 1870s and 1880s, providing a market for smaller diameter spruce trees. The consolidation of family businesses and local cooperatives led to the formation of large industrial logging companies in the late 1890s, and the rate of harvest continued to increase. Berlin Mills Company and International Paper Company began to buy up land and control the harvest in the Androscoggin River valley (Smith 1972). By the first decades of the twentieth century, little virgin forest remained in the Northeast.

Harvesting declined following the boom years of the mid-1800s to the early 1900s, but started up again in the economic expansion following World War II. The early twentieth century saw the emergence of silviculture: the application of forest management principles to the growing and harvesting of trees to sustain a wood flow over time. New and bigger mechanized equipment was introduced to the forest, allowing more trees to be harvested in a shorter time, providing additional flexibility in applying silvicultural practices, and improving worker safety. Today, sustainable forestry and the global economy are the driving, and sometimes opposing, forces behind the timber industry in the Northern Forest (Publicover and Weihrauch 2003).

Dam Building

For hundreds of years logging has been a central part of the region's economy. Prior to the mid-1800s logs were floated downriver without the aid of dams to control water levels. Log drives were limited to spring flood events and took up to four years to reach their destination. The desire to move logs more quickly led

to the first dams built on the Rangeley Lakes by the mid-1800s. The power of flowing water aided the onset of the Industrial Revolution. Greater demands for power led to rebuilding the dams to allow larger volumes of water storage. Union Water Power Company incorporated in 1878 and took over management of the dams in the Rangeley chain of lakes with an interest in power generation. Today, water flows are regulated to generate electricity for paper mills and other uses, control the impacts of flooding, create recreational opportunities, and manage community wastewater treatment systems (FPLE undated).

Errol dam



Ian Drew/USFWS

The first dam in the Upper Androscoggin River watershed was built in 1836 on Rangeley Lake. Over the next 75 years, several more dams were built on the lakes and rivers in the watershed. The major water users of the time signed an operating agreement in 1909 that regulated water flow and storage; the agreement was modified in 1983, and still largely governs the region today. In 1999, FPLE purchased the rights to operate the dams and manage the reservoir storage in the headwaters of the Androscoggin River. They are the current holder of the FERC license for the Errol Project. FPLE regulates water levels through a series of dams on the Androscoggin River (Errol Dam), Lower Richardson Lake (Middle Dam), Upper Richardson Lake (Upper Dam), Rangeley Lake, and Aziscohos Lake (FPLE undated). Map 1-1 includes the locations of major dams on those waterways.

The 1909 Androscoggin River Improvement Company agreement, as it is known, states that the river flow at Berlin should be maintained at “as high a point above the minimum as shall be consistent with proper and economical use of the stored water.” FLPE keeps the Berlin flow above 1,550 cubic feet per second (cfs) when possible. In 1998, a cooperative agreement among the power company, state and federal agencies, and conservation groups as part of the FERC license was signed to further guide the water levels and flows specifically to protect fish and wildlife.

Development

The Upper Androscoggin River watershed is still a largely undeveloped region; at least it was until the building boom of the 1980s opened the region to speculators and second home development. In the early decades of settlement, homes were clustered around towns and sparsely scattered along the rivers and lakes. With logging roads and bridges still the dominant features in the forested uplands and hinterlands, development along rivers and lakeshores has steadily increased in the past two decades. In just the past few years, more large landholdings were sold and subdivided, and homes are creeping up the hillsides.

Much of the shoreline of the Androscoggin River south of Milan, New Hampshire, has some low-density rural development, as does the shoreline of Rangeley and Mooselookmeguntic Lakes in Maine. The shorelines of Umbagog, Aziscohos, and Richardson lakes remain largely undeveloped (Publicover and Weihrauch 2003). The spurt of development that began in the 1980s prompted conservation groups to pursue permanent land conservation in the region, including supporting the creation of the refuge (Dobbs and Ober 1995).

Climatic Effects and Natural Disturbances

“It is said that nowhere else at the same latitude in the northern hemisphere is it as cold as in the Northeast, except perhaps in northeastern China and Hokkaido, Japan” (Marchand 1987). The reason for the region’s cold climate is partly a result of the pattern of atmospheric circulation in this hemisphere. Low-pressure systems all converge on New England regardless of their origin, and

pull cold Canadian air in behind them as they pass over the Northeast (Marchand 1987). New England weather conditions are influenced more by the North American landmass than by the Atlantic Ocean except along the coastline (Taylor et al. 1996).

Natural disturbances vary across New England, depending on geographic location, forest type, and local conditions. For example, hurricane damage is greater on exposed versus sheltered slopes, lightning fires are more frequent on exposed ridges and on sandy versus loamy soils, and shallow root systems make softwoods vulnerable to wind-throw, particularly on shallow and poorly drained soils.

In general, historically, a gradient of decreasing disturbance frequencies extends from coastal regions to interior uplands and mountains. In pre-settlement times, coastal oak-pine regions likely had >10 percent in early successional forest conditions, while interior northern hardwoods had 1 percent to 3 percent of young forest. The proportion of young forest in spruce swamps and spruce flats may have been as high as 7 percent. Northern hardwood and mixed woods may have higher proportions of early successional stages today than historically, based on disturbance patterns (Lorimer and White 2003).

Native insects and disease, ice storms, droughts, floods, landslides, and avalanches have caused minor and major disturbances. For example, spruce budworm periodically affects millions of acres of spruce-fir forest in northern New England and southern Canada, and the 1998 ice storm damaged forests, particularly hardwoods, across 12 million acres in northern New England (DeGraaf and Yamasaki 2001). Lorimer and White (2003) depict hurricane frequencies as varying from 85 years in southeastern New England, 150 years through central Massachusetts and the southeast corner of New Hampshire, to 380 years or more in northern New England. Lorimer (1977) estimated catastrophic disturbances from fire and wind throw at intervals of 800 and 1,150 years, respectively. In contrast, small gap disturbances were frequent in our forests, and may have occurred at scales smaller than what are currently delineated as “stands” today (Seymour et al. 2002).

Although called “spruce budworm,” this native insect has a significant impact on balsam fir during periodic outbreaks that are part of the natural cycle in northern forests. Records dating back to the late 1500s indicate that budworm outbreaks occur on about a 40-year cycle. The last in northern New England occurred in the 1970s and 1980s. Large areas of balsam fir and white spruce are defoliated, followed by high tree mortality, then re-growth and recovery of the forest through seedling and sampling release in the newly opened canopy (Boulanger and Arseneault 2004).

Global climate changes will affect natural disturbance patterns over time (Lorimer 2001). The greatest effects of climate change will be on regional air and water temperatures, precipitation patterns, storm intensity, and sea levels. These effects are predicted to influence natural disturbances by resulting in an increase of freeze-free periods, decreased snow cover and lake ice duration, increased storm intensities and frequencies, increased likelihood and frequency of droughts, damaging ozone, and an increase in the spread of invasive species and disease (NH WAP 2005). The resulting effects on wildlife and habitats are expected to be variable and species-specific, with a predicted general trend of ranges shifting northward. Impacts will likely be most severe for habitats with narrow temperature and water level regimes, such as alpine, high and low elevation spruce-fir forests, coastal islands, vernal pools, and aquatic habitats (NH WAP 2005). The uncertainty about the future effects of climate change requires managers to use an adaptive management approach to maintain healthy ecosystems in light of that unpredictability (Inkley et al. 2004).

Wildlife Changes

Wildlife populations ebb and flow as habitat conditions vary in space and time. Change is inevitable and natural, although human activities in the last 200 years have significantly altered the landscape compared to the previous 10,000 years when humans first colonized the Northeast (Foss 1992).

The 1800's witnessed the demise of many forest wildlife species in New England from the loss of habitat (forest clearing), bounty and market hunting, millinery trade, and natural history specimen collecting (Foster et al. 2002). Mountain lion, gray wolf, elk and caribou were extirpated by the mid-1800s or early 1900s, and only the gray wolf recently returned to the region in small numbers in Maine. Other forest species declined, including moose, black bear, beaver, wild turkey and pileated woodpecker. Heath hen, passenger pigeon, great auk, Labrador duck, and sea mink became extinct at the hand of humans during the same period (DeGraaf and Yamasaki 2001; Foster et al. 2002). In contrast, grassland species such as meadowlark, bobolink, upland sandpiper, and woodchuck increased as hayfields and pastures expanded during the early 19th century (Foss 1992; Foster and Motzkin 2003).

After farm abandonment escalated in the early 1900s, grassland species ebbed, while species of thickets, brush lands, and young forests surged (Litvaitis 2003). Populations of black bear, bobcat, and broad-winged hawks increased. At the same time, intense logging followed by intense fires and heavy rains continued to wreck havoc on forest habitat and associated wildlife species in northern New England (Foss 1992; DeGraaf and Yamasaki, 2001). The young hardwood forests that emerged in the 1920s and 1930s, after the old-field pine harvests, provided premier habitat for ruffed grouse and American woodcock (DeGraaf and Yamasaki 2001). Continued forest maturation caused those early successional species to decline to levels approaching pre-settlement levels (Litvaitis 2003).

Moose are common on the refuge



J. & K. Hollingsworth/USFWS

Nearly all the forest species that were extirpated or decimated have re-colonized the region. Some species arrived for the first time more recently. Eastern coyotes were first sighted in northern Maine in the 1930s, in Vermont and New Hampshire in the 1940s, and in Massachusetts in the 1950s (DeGraaf and Yamasaki 2001). DeGraaf and Yamasaki (2001) reported three major trends in New England's wildlife: forest species are increasing (e.g., bear, beaver, deer, wild turkey, pileated woodpecker), grassland and shrubland species are declining (e.g., bobolink, upland sandpiper, whip-poor-will), and many southern species are expanding their ranges northward (e.g., Carolina wren, northern cardinal, mockingbird, Virginia opossum). A few species, such as raven, fisher, and moose are expanding

southward. A group of species remains regionally extirpated, including wolverine and mountain lion, although lynx have returned to northern Maine and New Hampshire (DeGraaf and Yamasaki 2001).

Current Conditions

Climate

The climate of the Upper Androscoggin River watershed is temperate continental, with warm summers, cold winters, and a relatively even distribution of precipitation throughout the year. The region has four distinct seasons. Winter temperatures, December through February, average only 14° F, with minimum temperatures as low as -34°F. The summer months, June through August, average 62°F, reaching highs of 96°F or more. In Errol, the town closest to the refuge headquarters at Wentworth Location, summers average about 60°–70°F. Precipitation in the watershed varies from 33 inches to more than 80

inches per year; most towns in the watershed receive 40 inches to 45 inches per year. The average precipitation in Errol is 36 inches per year (Publicover and Weihrauch 2003).

Generally, Umbagog Lake freezes in December or January, and “ice-out” typically occurs in May. Ice on the lake can reach depths of 18–24 inches or more. Areas near river inputs and outputs can remain open throughout the year. The rivers associated with Umbagog Lake also freeze intermittently in the winter.

Hydrology

The Upper Androscoggin River watershed is part of the larger Gulf of Maine watershed: the latter being the geographic area from which all water drains into the Gulf. It is an immense area, extending from eastern Quebec to Cape Cod, Massachusetts, with a land base of 69,115 square miles and a water surface of 33,054 square miles. Maine is the only state located entirely within its boundary.

The waters of the Androscoggin River begin their journey in Maine along the Canadian border. Rainfall and snowmelt gathers in small streams that eventually join to form the northern tributaries to the Androscoggin River: the Swift and Dead Diamond, Magalloway, Cupsuptic, and Kennebec. Those rivers flow into these lakes of the Rangeley Lake chain: Rangeley, Mooselookmeguntic, Cupsuptic, Upper and Lower Richardson, Aziscohos and Umbagog lakes. The Androscoggin River begins at Umbagog Lake and flows south, then turns east back toward Maine. Many other tributaries flow into the Androscoggin River as it continues its journey through Maine before finally meeting the Kennebec River in Merrymeeting Bay and emptying into the Gulf of Maine (Publicover and Weihrauch 2003).

Water Quality

Historically, the Androscoggin River experienced a period of degradation followed by recovery. Even as late as 1970, the river was considered one of the most polluted in the United States. Untreated effluent discharged into the river from the large paper mill was sufficiently noxious before the middle of the 20th century to produce fumes “rumored to peel the paint off houses.” Low dissolved oxygen in the river made it unsuitable for most aquatic life, while foam and dark colors made it unappealing. The river made a remarkable recovery after the passage of the Clean Water Act in 1972, which forced the cleanup of point source pollution sources, including wastewater treatment plants and paper mills (Publicover and Weihrauch 2003).

Under the Clean Air Act, the Environmental Protection Agency (EPA) sets standards on a set of “criteria pollutants”: carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), sulfur dioxide (SO₂), particulate matter (PM₁₀ and PM_{2.5}), and lead (Pb) (EPA 1993). Those standards are referred to as the National Ambient Air Quality Standards (NAAQS). Areas that do not meet the standard for a particular pollutant are considered “non-attainment areas.” The states of Maine and New Hampshire also have standards on other toxic pollutants. The only non-attainment areas in Maine and New Hampshire are in their southern portions, around more urban areas for ozone and in New Hampshire for small particles (PM_{2.5}). Coos County in New Hampshire and Oxford County in Maine meet the standards for all six criteria pollutants (US EPA 2005).

Evers (2005) documents a growing concern over mercury emissions and accumulation in aquatic and terrestrial systems in the Northeast. Mercury is emitted into the air as a byproduct from coal-burning power plants, incinerators, and other industrial plants. Once emitted into the air, mercury can travel for days before deposition through dry gases and particles, rain, or snow. The impact of mercury on humans and the environment depends on whether it converts into

the toxic form of methylmercury. That form, if consumed, bioaccumulates as it moves up the food chain, causing various reproductive and neurological problems for fish and wildlife. New models indicate that the greatest amount of mercury is deposited in forested and mountainous terrain, and scientists detected mercury accumulation in birds of mountain areas (e.g., Bicknell's thrush) as well as at lower elevations (e.g., northern waterthrush). Evers (2005) reports a suite of "biological hotspots," where mercury concentrations are elevated in fish and wildlife, which included the Rangeley Lakes region. All surface waters in New Hampshire and Maine are impaired for fish and shellfish consumption due to elevated levels of mercury in tissue (NHDES 2004; MDEP 2004).

Several water bodies in the Upper Androscoggin River watershed are listed as impaired waters that do not meet one or more of their uses, with the added condition that they require a total maximum daily load study. This study is designed to identify and reduce pollutants that are present in a lake or stream in order to attain an acceptable water quality standard. The Upper and Lower Richardson Lakes, parts of the Azicoshos Lake, Signal Pond, and the Androscoggin and Diamond rivers are in this category (NRCM 2005).

Air Quality

EPA regulates six criteria pollutants under the Clean Air Act of 1990 (CAA): ozone, carbon monoxide, nitrogen dioxide, particulate matter, sulfur dioxide and lead as well as hazardous and other toxic air pollutants, including mercury, under the CAA Amendments of 1990. States, tribal governments, and some local governments manage air quality in their administrative jurisdictions. The New Hampshire Department of Environmental Services (NHDES), Air Resources Division and the Maine Department of Environmental Protection (Maine DEP), Bureau of Air Quality regulate criteria pollutants emitted in or transported into their respective states.

For each criteria pollutant, EPA has established a maximum concentration above which adverse effects on human health may occur. These threshold concentrations are called National Ambient Air Quality Standards (NAAQS). Areas of the country where air pollution levels persistently exceed the NAAQS may be designated "nonattainment." When an area does not meet the air quality standard for one of the criteria pollutants, it may be subject to the formal rule-making process to designate it as nonattainment. The Clean Air Act further classifies ozone, carbon monoxide, and some particulate matter nonattainment areas based on the magnitude of an area's problem. Nonattainment classifications may be used to specify what air pollution reduction measures an area must adopt, and when the area must reach attainment (40 CFR 81).

September 2005 data indicate that southern NH and coastal ME are nonattainment areas for ozone but the refuge counties of COOS County, NH and Oxford County, ME are in attainment for all criteria pollutants. Of recent concern, however, in the refuge area are ground-level ozone and fine particulate matter (PM_{2.5}). Both are respiratory irritants (text box) that can cause serious health effects in susceptible individuals; though ozone is a concern in the Umbagog area only during the warmer months (text box).

Air quality monitoring records for Coos County, NH and Oxford County, ME (EPA 2005) indicate that ozone and PM_{2.5} have recently exceeded levels considered safe for sensitive subgroups. Air quality index measures show that in 2004, O₃ exceeded safe levels on 3 days and PM_{2.5} exceeded safe levels on 2 days in Coos County. Oxford County had a single day in 2004 with unhealthy PM_{2.5} levels. Monitoring in 2005 through September indicates O₃ and PM_{2.5} levels in the moderate range just below unhealthy levels.

A related concern in the region is the effect of air pollutants on visibility. Visibility is affected by ozone and by fine particulate matter (PM_{2.5}) which manifests as regional haze in rural areas and is of particular concern in the Class I areas of designated wildernesses (text box), including the nearby Great Gulf Wilderness and Presidential Range –Dry River Wilderness, located about 50 miles south of Umbagog NWR in the White Mountains NF (USFS 1991).

On a global scale, carbon emissions and other greenhouse gases (GHG) are recognized as contributing to global warming. Carbon sequestration, creation of complex organic matter through photosynthesis, locks up carbon organically in forest and other biomass “sinks” such as peat soils. The potential for managing carbon levels through forestry is significant. The Intergovernmental Panel on Climate Change’s (IPCC) Second Assessment Report found that during the period 1995–2050, slowing deforestation, promoting natural forest regeneration, and encouraging global reforestation could offset 220–320 billion tons of CO₂ (12– 15%) of fossil emissions. Carbon sequestration may be accomplished through forest preservation to reduce deforestation; forest management techniques to enhance existing carbon sinks; creating new carbon sinks by planting on pasture, agricultural land, or degraded forest sites; and storing carbon in wood products (Dayal 2000). In the refuge area, acquiring forested lands that might otherwise be developed would allow preservation of forest cover, managing refuge forest lands for older-age stands would lock up more carbon for a longer time, and using tree plantings to restore old logging roads and camps would create additional forested land.

The ability of forests to serve as carbon sinks is related in turn to air quality. The forests of the New England region currently store 20 million metric tons of carbon per year, but poor air quality adversely impacts potential photosynthetic capacity, especially in sensitive species. Exposure of white pine to ozone in excess of 60-80 ppb, will result in a 15-20% reduction in annual wood production. If air quality can be improved for the region, wood production (carbon sequestration) would increase. Reducing CO₂ and NO_x emissions by improving gas mileage and reducing automobile traffic would effectively reduce ground-level ozone, and thus improve the carbon sequestration capabilities of regional forests (NERA 2002).

Conserved Lands Network

About 25 percent of the Upper Androscoggin River watershed is under some form of permanent conservation (map 1-1). This includes more than 200,000 acres owned in fee simple by federal and state agencies or conservation groups, and about 165,000 acres covered by conservation easements (Publicover and Weihrauch 2003). In addition to the refuge, the primary conservation lands in the Upper Androscoggin River watershed include the White Mountains National Forest, Appalachian Trail, Connecticut Lakes Headwaters, Pond of Safety,

The CAA Amendments of 1977 established a program for the prevention of significant deterioration of air quality. Certain wildernesses and National Parks established before August 1977 were designated by the CAA as mandatory Class I areas. A Class I designation allows small increments of additional air pollution above baseline levels within the area so long as the national ambient air quality standards are complied with and the Air Quality Related Values (AQRVs) of the Class I area are not adversely affected. (USFS, 1991) Class I areas in the New England states are shown here:



Regional and Local Economic Setting

Connecticut Lakes Headwaters, Maine Bureau of Parks and Lands, Rangeley Lakes Heritage Trust lands, and Pingree Forest Partnership easements.

We have taken the following information from a U.S. Geological Service, Fort Collins Science Center report (Koontz et al. 2006), which we funded as part of the CCP/EIS process. Appendix G of the Final CCP/EIS holds the entire report.

Regional and local demographics

The refuge is located in Coos County, New Hampshire, and Oxford County, Maine. Table 3.1 shows the population estimates and trends for the regional area and communities near the refuge. Although Coos is the largest New Hampshire county in total land area, it is the smallest in population, accounting for less than 3 percent of New Hampshire's total population in 2000 (U.S. Census Bureau 2000). From 1990 to 2000, New Hampshire's overall population increased by 11.4 percent, while Coos was the only county to lose population, decreasing by 4.9 percent over the same period. According to High et al. (2004), Coos County has not been able to benefit from population growth that accompanies economic development or interstate access to the same extent as counties in south and central New Hampshire.

In 2000, Oxford County accounted for approximately 4 percent of Maine's total population (U.S. Census Bureau 2000). From 1990 to 2000, the population growth rate for Oxford County was approximately 4 percent, which was similar to Maine's overall population increase (table 3.1).

The towns of Upton and Bethel in Oxford County and the towns of Errol, Berlin, Gorham, and Colebrook in Coos County are the primary communities near the refuge. Errol and Upton are closest to the refuge, and are the smallest communities in the area near it. The town of Errol is close to the western side of the refuge, and is the town nearest the refuge headquarters. In 2000, the population of Errol was 298 residents, averaging 4.9 persons per square mile. Upton is a very small community near the southern end of the refuge, with a population of 62 residents averaging 1.6 persons per square mile. Berlin is the northernmost city in New Hampshire, and is located approximately 30 miles south of the refuge near the White Mountain National Forest. The town of Gorham is located just south of Berlin. Colebrook is approximately 25 miles northeast of the refuge in northern Coos County, at the junction of the Connecticut and Mohawk rivers. Bethel is located approximately 35 miles southeast of the refuge on the Androscoggin River.

Ozone (O₃) (ground-level) – A colorless gas formed in chemical reactions between oxygen, volatile organic compounds (VOCs), and oxides of nitrogen (NO_x) is the major constituent of photochemical smog. Sources include vehicles, factories, landfills, industrial solvents, gas stations, lawn equipment. Irritates the respiratory tract; impairs lung functions such as ability to take a deep breath; causes throat irritation, chest pain, cough, lung inflammation, and possibly susceptibility to lung infection; aggravates existing respiratory conditions like asthma in certain individuals; may reduce yield of agricultural crops and injure forest and other vegetation. Ground-level ozone, more commonly called summertime smog, is measured in parts per billion (ppb). The federal health based standard for an 8-hour concentration is set at 80 ppb so levels above this standard are considered to be unhealthy. Ozone is a summertime pollutant so wintertime monitoring is limited and no wintertime forecast is provided. Full monitoring, reporting, and forecasting for ozone occurs from April through September.

Particulate Matter (PM) – Solid matter or liquid droplets from smoke, dust, fly ash, and condensing vapors from burning of wood, diesel and other fuels; industrial plants; agriculture (plowing, burning off fields); unpaved roads and construction. Causes nose and throat irritation, lung damage, bronchitis, and possibly premature death. Children, the elderly, and people suffering from heart or lung disease are especially at risk. Also damages paint, soils clothing and furniture, and reduces visibility. Particulate pollution (small particles) consists of both solid and liquid particles that are less than 2.5 microns in diameter (a micron is a millionth of a meter). Particle concentrations are measured in micrograms per cubic meter (ug/m³) and levels above 40 ug/m³ over 24 hours are considered to be unhealthy. Monitoring and reporting of small particles occur year-round.

(Source: NH DES 2005)

Table 3.1 Local and regional population estimates and characteristics

	Population in 2000			% Population Change	Projected % Population Change
	Residents	Persons per Square Mile	Median Age	1990 to 2000	2000 to 2010
New Hampshire	1,235,786	137.8	37.1	+11.4	+12.7
Coos County, NH	33,111	18.4	41.5	-4.9	-6.0
<i>NH Communities near refuge</i>					
Berlin	10,331	167.4	42.5	-13.0	-7.0
Colebrook	2,321	56.6	41.2	-5.3	-6.4
Errol	298	4.9	47.2	+2.1	-7.1
Gorham	2,895	90.7	42.0	-9.5	-6.7
Maine	1,274,923	41.3	38.6	+3.8	+4.6
Oxford County, ME	54,755	26.3	40.2	+4.1	+3.5
<i>ME Communities near refuge</i>					
Bethel	2,411	37.2	40.8	+3.2	+2.6
Upton	62	1.6	56.0	-13.9	+16.1

Source: U.S. Census Bureau (2005), Maine State Planning Office (projections compiled Dec. 2001 based on past trends), and New Hampshire Office of Energy and Planning (projections compiled Sept. 2004 based on past trends).

Economic Sectors, Including Timber and Tourism

According to the U.S. Department of Commerce, most jobs in Coos and Oxford counties were in the industries of manufacturing, health care and social assistance services, retail trade and government agencies. Compared to counties in southern New Hampshire and Maine, Coos and Oxford Counties have slower economic growth and a greater dependence on traditional natural resource based manufacturing activities (High et al. 2004). According to the New Hampshire Economic and Labor Market Information Bureau (2003), Coos County employment projections for 2000 to 2010 suggest most new jobs will be in service-related industries, especially in the fields of health services, amusement and recreation services, and business. Timber and tourism, the prominent natural-resource-based industries with ties to the refuge, are described in more detail below.

Timber Harvesting and Production Industries

Forests cover 95 percent (17.7 million acres) of Maine and 84 percent (4.7 million acres) of New Hampshire (NEFA 2004a, 2004b). Maine is the major timber producer of the larger North East State Foresters Association (NEFA) region (Maine, New Hampshire, Vermont, and New York), accounting for roughly half of wood produced annually (NEFA 2004a). In 2003, Maine harvested 5.9 million cords and processed almost as much (5.6 million cords) in-state (MDOC 2004). According to NEFA (2001a), imports to Maine in 2001 were dominated by pulpwood, and nearly 67 percent of its exports were high-value softwood sawlogs. In 2003, Oxford County accounted for 8 percent of the total amount of timber (sawlogs and pulpwood) harvested in Maine, ranking sixth in the state (MDOC 2004).

In contrast to the timber industry in Maine, New Hampshire is cutting much more timber than it is processing (High et al. 2004). In 2001, the amount of timber processed in New Hampshire accounted for approximately 83 percent of the amount harvested within the state (NEFA 2001b). However, part of that difference could be due to the brief closing of the primary pulp mill near Berlin from October 2001 to June 2002. In 2002, Coos County accounted for 16.5 percent of the total timber harvested in New Hampshire, ranking second in the state to Cheshire County (USFS 2002).

In 2001, forest-based industries employed more than 21,600 people in Maine and 9,800 in New Hampshire, and generated more than \$1 billion in income in Maine and \$333 million in income in New Hampshire (NEFA 2004a, 2004b). According to NEFA, each 1,000 acres of forestland in New Hampshire supports 2.0 forest-based jobs, while 1,000 acres of forestland in Maine supports 1.2 forest-based jobs.

The New Hampshire Economic and Labor Market Information Bureau (2003) identifies the lumber and paper products industries as the mainstay of employment in Coos County. One integrated pulp and paper mill in the region is located between Berlin and Gorham. When the mills shut down between October 2001 and June 2002, they reopened under the ownership of Nexfor, Inc., of Toronto, Canada, and now employ about 500 union workers and 100 salaried workers (USFS 2005).

Pulp and paper industries accounted for the largest portion of regional forest related output (67 percent) and employment (44 percent), followed by the timber harvesting and logging industries, which account for approximately 15 percent of output and 24 percent of employment. Four thousand one hundred forty-eight jobs link directly to forest related industries, and account for 9.5 percent of the overall employment (43,570 jobs) in Coos and Oxford counties. This picture has changed in recent years.

In recent years, employment in the lumber and paper industries has declined (Maine State Planning Office 2005; New Hampshire Economic and Labor Market Information Bureau 2003). Coos County employment projections for 2000 to 2010 suggest the lumber and paper industries will continue to decline, possibly by a substantial amount, with workforce decreases of nearly 24 percent in paper industries and 39 percent in lumber industries (New Hampshire Economic and Labor Market Information Bureau 2005). Although employment and the number of mills in operation has decreased, the remaining mills maintain a production output for the region that is almost as large as it was four decades ago, due to improved machinery and greater yield from each log (NEFA 2004a, 2004b).

According to High et al. (2004), the increasing pressure from the global paper industry, increasing recycling of wastepaper, increasing efficiency in the pulping process, and the increasing loss of market share to other regions has contributed to the slower than expected growth in the regional pulpwood market. Trade agreements such as the North Atlantic Free Trade Agreement of 1994 also have affected trends in the regional timber market by creating opportunities for international trade, resulting in increases in exports from Maine and New Hampshire to Canada, while at the same time allowing new competitors into local markets (Innovative Natural Resource Solutions 2005; High et al. 2004).

Resource-based Recreation and Tourism

The travel and tourism industry continues to be a significant, growing contributor to the economies of Maine and New Hampshire. A survey of Maine visitors in 2003 estimated resident and nonresident visitors spent \$6.1 billion in Maine, which directly and indirectly (i.e., the multiplier effect as initial spending is recycled through the economy) generated: \$13.4 billion in sales of goods and

services; 173,181 jobs; \$3.8 billion in income; and \$549 million in state and local tax revenue (Longwoods International 2004). Results suggest overnight visitors come to tour the state (36 percent), enjoy Maine's superb outdoors (24 percent), take a beach vacation (12 percent), and attend a special event (10 percent). In 2003, the Maine lakes and mountains region was the primary regional destination for 15 percent, and was visited by 19 percent of those traveling in Maine (Longwoods International 2004).

In New Hampshire, resident and nonresident visitors spent \$3.7 billion in 2002 (an increase of 2.9 percent from 2000): accounting for the multiplier effect, that spending generated \$9.8 billion in sales of goods and services; 88,427 jobs; and \$419 million in state and local tax revenue (Goss 2003). A recent survey of New Hampshire visitors in 2003 and 2004 by the Institute for New Hampshire Studies reports that popular visitor activities include sightseeing, skiing or snowmobiling, shopping, and scenic drives (Thurston 2004). The White Mountain region of New Hampshire was reportedly the most visited region in all seasons, followed by the lakes region (except in winter). Although the White Mountain region includes the southern section of Coos County and extends into Oxford County, the area around the refuge is known as the Great North Woods region. Survey results reported New Hampshire's Great North Woods region was visited by 15 percent of the visitors to New Hampshire during the summer and fall, 10 percent of winter visitors, and 7 percent of spring visitors (Thurston 2004).

Located within the Northern Forest, Coos and Oxford counties provide abundant year-round recreational opportunities. For example, in Coos County, 271 recreation areas cover nearly 30 percent of the county's total acreage (New Hampshire Office of State Planning 2003). Coos County employment projections indicate the amusement and recreation services industry will contribute 260 new jobs between 2000 and 2010 (New Hampshire Economic and Labor Market Information Bureau 2003).

Popular activities on or near the refuge include hiking, camping, wildlife viewing, picnicking, snowmobiling, fishing, hunting, boating, canoeing, and cross-country skiing. The area is also a nationally recognized destination for fall foliage enthusiasts. Appendix G of the Final CCP/EIS provides details about the economic contributions of wildlife viewing, fishing, hunting, boating, and other recreational activities in Maine and New Hampshire.

Land Values

With approximately 25 percent of the Upper Androscoggin River watershed under some form of conservation protection, some residents in northern New Hampshire have expressed their concern that those conservation ownerships are having an economic impact on land values. The protection of land from development has resulted in a high demand for private lands in the area and a subsequent increase in property taxes. About 75 percent of the shorefront properties on Umbagog Lake are protected from development through state or federal ownership, or through the dedication of development rights to land conservation groups. The limited supply of property available for development means that land in the private sector is in high demand (Personal communication: Mark Danowski 2003; Peggy Gallus 2003; Brian Lessard 2003). The limited supply of property available for development has increased that demand for land, and has led to spin-off development around Akers Pond, northwest of Errol (Personal communication: Mark Danowski 2003; Peggy Gallus 2003; Brian Lessard 2003). Although that new property development has increased local property tax collections, thus helping offset the loss in taxes from state and federal government ownership, it has also raised concerns about habitat fragmentation and the loss of traditional recreational access with future development.

The Refuge and its Resources

Refuge Administration

Establishment

The original proposal to establish the refuge represented a partnership of protective efforts, involving the participation of the states of New Hampshire and Maine, timber companies, conservation organizations, private landowners, and the Service to cooperatively protect important lands surrounding Umbagog Lake. The larger effort was conceived to preserve existing land uses, including wildlife habitat, timber management, and traditional public uses on lands in the vicinity of the lake. The proposal was initiated in response to several events that were occurring in the region.



Bill Hanson FPLE Maine Hydro/USFWS

*Bald eagle chicks
in nest*

In the 1980s, the long standing tradition of timber companies owning the mills and the land shifted, and lands once thought to be held in perpetuity by the large timber companies started to come on the market. Nash Stream State Forest was created in 1988 when Diamond International put 90,000 acres up for sale in northern New Hampshire and Vermont, part of 1.5 million acres of forestland across northern New England and New York split off from the mills by an investor, and resold in smaller parcels for development. At the same time, despite a national economic slowdown, New England was experiencing an unprecedented building boom. Local residents and conservation groups were nervous about the possibility that James River would sell its high value shoreline property to developers and second-home buyers. Residents and environmentalists had stopped earlier threats to the lake, including plans to mine its

shallow bottom, build a floating restaurant, and add a hydro dam with high-tension lines (Dobbs and Ober 1995).

In 1988, a pair of bald eagles started building a nest atop a tall white pine on the edge of Umbagog Lake in Leonard Pond. The following spring, they returned to that nest, built in the same tree that eagles had last nested in 40 years before. The desire of the James River Corporation to ensure the long term protection of the unique characteristics of the Umbagog lake area, and the establishment of a second pair of eagles in 1990, provided significant impetus for creating the refuge. Initially, many local residents strongly opposed federal ownership of the lands around Umbagog Lake. Through many meetings with small groups, the Service garnered the support of many who initially opposed the concept (Dobbs and Ober 1995).

As we mentioned in chapter 1, Congress authorized the establishment of the refuge for the purposes of conserving the unique diversity of wetlands habitats and associated wildlife and protecting water quality in the area. The Service has acquired 21,650 acres as of January 2008. An additional 7,482 acres are approved for acquisition from willing sellers.

Staffing and Budgets

The annual budget appropriation from 1998-2007, shown in table 3.2, has very little available discretionary funding. Operating budgets have increased as staffing levels have increased, and reflect annual funding for special projects, moving costs for new employees, and equipment purchases. Maintenance budgets remained relatively stable over the last 5 years.

Refuge operations and maintenance spending contribute directly to the local economy.

Table 3.2. Umbagog Refuge staffing and budgets, 1998-2007

	Operations (Including Salaries)	Maintenance	Total	Full-Time¹ Staff	Seasonal Staff
1998	\$138,900	\$26,300	\$165,200	3	0
1999	\$232,500	\$0	\$232,500	3	1
2000	\$273,440	\$31,000	\$304,440	4	1
2001	\$264,620	\$33,000	\$297,620	4	1
2002	\$450,890 ²	\$34,400	\$485,290	6	0
2003	\$423,162	\$390,553 ³	\$813,715	6	1
2004	\$416,620	\$169,341 ³	\$585,961	5	0
2005	\$410,926	\$163,906 ³	\$574,832	5	1
2006	\$430,630	\$259,271 ³	\$689,901	5.5	0
2007	\$395,970	\$99,600	\$495,570	4.5	0

Notes

¹ Appendix D depicts staffing positions currently filled and vacant.

² Includes two new staff positions and special funding to conduct wildlife surveys

³ Includes facility construction, building removal, and equipment replacement

Our staff has tracked refuge purchases in the local community for fiscal years 1999 through 2005, shown in table 3.3.

Table 3.3. Local purchases by Umbagog Refuge staff between fiscal years 1999-2005

	Errol/ Wentworth Location, NH/ Wilson's Mills, ME	Berlin/ Gorham/ Milan/ Dummer, NH	Colebrook, NH	Bethel/ Mexico/ Rumford, ME	Oquossoc/ Rangeley, ME	Annual TOTALS
1999						
# Vendors	10	18	2	5	2	37
Total expenditure	\$29,401	\$17,695	\$295	\$2,623	\$8,701	\$58,719
2000						
# Vendors	6	26	1	4	1	38
Total expenditure	\$77,320	\$7,696	\$2,000	\$4,729	\$4,209	\$95,954
2001						
# Vendors	6	26	1	4	1	38
Total expenditure	\$73,927	\$13,442	\$9,973	\$12,030	\$131	\$109,503
2002						
# Vendors	9	27	6	2	1	45
Total expenditure	\$67,361	\$16,995	\$5,257	\$347	\$294	\$90,255

	Errol/ Wentworth Location, NH/ Wilson's Mills, ME	Berlin/ Gorham/ Milan/ Dummer, NH	Colebrook, NH	Bethel/ Mexico/ Rumford, ME	Oquossoc/ Rangeley, ME	Annual TOTALS
2003						
# Vendors	10	27	9	7	1	54
Total expenditure	\$27,201	\$16,140	\$7,416	\$21,282	\$78	\$72,116
2004						
# Vendors	14	26	6	2	1	49
Total expenditure	\$53,270	\$12,002	\$3,638	\$468	\$85	\$69,481
2005						
# Vendors	20	21	8	4	0	53
Total expenditure	\$52,073	\$6,064	\$5,990	\$2,161	\$0	\$66,288

Refuge Revenue Sharing Payments

Land in the refuge is not on the local tax rolls. The Refuge Revenue Sharing Act (16 U.S.C. §715s) offsets the loss of local tax revenues from federal land ownership through payments to local taxing authorities. In both Maine and New Hampshire, those payments go to the townships. The annual payments are calculated on the appraised value for tax purposes, and are reduced proportionally based on the amount appropriated by Congress. For fiscal year (FY) 2005, payments represent 44 percent of the fully funded revenue sharing formula. Our sources of payment funds are revenues or income generated within the Refuge System from such programs as mineral and facility leases, timber harvest and grazing permits. As shown in table 3.4, the Service made the following refuge revenue sharing payments to local townships in recent years.

Table 3.4. Umbagog Refuge revenue sharing payments to towns, 2001-2007

Township	2001	2002	2003	2004	2005	2006	2007
Magalloway, ME	\$5,543	\$5,657	\$5,285	\$5,709	\$5,049	\$5,702	\$5,278
Upton, ME	\$5,911	\$6,828	\$7,079	\$6,804	\$6,018	\$10,376	\$10,936
Cambridge, NH	\$744	\$759	\$709	\$681	\$603	\$681	\$630
Errol, NH	\$11,517	\$11,755	\$22,948	\$22,056	\$19,509	\$25,973	\$24,039
Wentworth Location, NH	\$3,112	\$4,959	\$6,057	\$6,119	\$6,467	\$7,304	\$7,041

Refuge Headquarters and other refuge buildings

The refuge headquarters is located in Wentworth Location on New Hampshire State Route 16, approximately five and a half miles north of the Town of Errol, New Hampshire. The office complex includes an office building, cabin, parking lot, and boat launch on the east side of Route 16, and a parking lot and storage shed on its west side. The office is on the bank of the Magalloway River, a major tributary to Umbagog Lake.

The office building was built in 1996 as the administrative headquarters, including staff offices, a lobby or reception area for visitors, literature and displays, a small meeting room, and public rest facilities. In addition to refuge staff, the office also hosts a Regional Refuge Field Biologist whose duties cover activities throughout the Northeast Region. The office working space is inadequate and cramped for existing staff. The visitor contact area in the front office is also very small with limited room for interpretation and information displays. A small cabin next to the office serves as overflow office space (particularly for seasonal interns), and houses a GIS lab, a biology lab, and storage. Parking for six visitor cars is next to the office building, but staff parking is across Route 16. The refuge places floating docks in the Magalloway River behind the office during ice-free months to moor refuge boats. A public docking area provides lake access for canoes, kayaks, and other boats. A picnic table and small parking area make this a popular stopping place for visitors.

Due to the configuration of the office site, which is on a parcel approximately 80 ft wide, the current office location does not comply with local and state setbacks from the river. The site also provides no room for expansion to alleviate that concern or mitigate its other shortcomings. For example, if the footprint of the building were expanded, parking adjacent to the building would be reduced, forcing most visitors to park across Route 16. That parking area is already a safety concern, as log truck traffic can be quite heavy on this road, which offers poor sight distance.

A maintenance shop that stores all of the refuge's large equipment was built in 2005 at the south end of the lake, off Mountain Pond Road. In addition to the refuge headquarters complex and maintenance building, other refuge facilities include the "Potter Farm" and three houses used as quarters for interns, volunteers, and researchers. The Potter Farm is located on the west central shore of the lake on Potter Cove, and includes a large, deteriorating farmhouse overlooking Umbagog Lake and a large barn. Both the house and barn have been determined unsafe for occupancy in their current condition. The fields associated with this property are used for events such as "Take Me Fishing." The three houses used as quarters are located north of the refuge office on Route 16 in Wentworth Location, New Hampshire, and Magalloway Plantation, Maine. We plan to remove some secondary outbuildings associated with those houses.

Research

Refuge staff, graduate students, conservation organizations, and others have conducted numerous surveys and studies on the refuge. A sampling of those efforts follows. Additional information on these studies can be obtained from refuge headquarters.

Regional amphibian monitoring: Regional study from 1999-2002 to gather baseline data on presence of breeding amphibians. Anuran call counts were conducted at four locations on the refuge: Leonard Marsh, Harper's Meadow/Sweat Meadow, Dead Cambridge River, Magalloway River.

National marshbird monitoring: Regional study from 1999-2005 to gather baseline data on breeding marsh birds. Call playback point counts were conducted at 3 locations on the refuge: Leonard Marsh, Harper's Meadow/Sweat Meadow, Dead Cambridge River.

Loon, bald eagle, and osprey breeding surveys: Annual surveys and reports prepared by various contractors for the refuge.

A study of the vegetation and floristic diversity of two peatland complexes of post-settlement origin in Lake Umbagog National Wildlife Refuge, Coos County, New Hampshire: Conducted by Maire Nazaire in 2005. Master's Thesis, University of Vermont, Burlington, Vermont (Nazaire 2005)

Macro-invertebrate assessment report: Umbagog National Wildlife Refuge. Conducted by Rick Van de Poll in 2004. Ecosystem Management Consultants, Sandwich, New Hampshire (Van de Poll 2004)

Ecological Communities of the Lake Umbagog National Wildlife Refuge: Classification and Mapping with the National Vegetation Classification System. Conducted by Josh Rapp 2003. University of Vermont, Burlington, Vermont. (Rapp 2003)

Inventory of wetland communities around Umbagog Lake. Conducted by D.D. Sperduto in 1999. New Hampshire Natural Heritage Inventory, Concord, New Hampshire. (Sperduto 1999)

Water quality surveys on the refuge between 1979-1995 by New Hampshire Department of Environmental Services, the U.S. Environmental Protection Agency, and the U.S. Fish and Wildlife Services, Ecological Services

Contaminant surveys, primarily focused on mercury in fish and fish-eating birds since the early 1990s. Conducted by the Biodiversity Research Institute, Maine and the U.S. Fish and Wildlife Service, Ecological Services (BRI 1997)

Special Use Permits

The refuge manager issues special use permits on a case-by-case basis after determining whether the use is compatible with refuge purposes. All special use permits have a one-year term. Since 2000, we have issued annual special use permits for such activities as surveying and monitoring wildlife, trimming brush; installing a fire hydrant; accessing private lands on Big Island; and, allowing hunters with disabilities to use ATVs for hunting big game.

Camps

We also issued special use permits for 25 cabins leased on the refuge. Most of the current cabin sites were acquired in an agreement when the original refuge lands were purchased from James River and Boise Cascade companies. With the purchase of lands from the Mead Paper Company in 2000, we agreed to an additional five leases. Most of the leases are located in Thurston Cove; five are in the Chapel Hill Road development; one is in Upton; and one is on Big Island.

Those privately owned cabins are on leased lands owned by the refuge and governed by special use permits. Those leases expire at the end of a 50-year period from when the refuge purchased the lands and include certain conditions, such as (1) the camps must be maintained in a manner compatible with the purposes of the refuge and produce the least amount of environmental disturbance; and, (2) no new permits will be issued for the construction of new camps on the properties. About a third of the lease owners are local residents from the Errol, Berlin, Gorham, and Milan area; a third are from other towns and cities in New Hampshire; and a third are from other states, including Maine, Georgia, and Texas. Approximately 10 leases have changed ownership at least once or twice since the refuge was established in 1992. The remaining camp lots have continued to be leased by the same individual(s) since 1992. Table 3.5 below identifies the annual revenues generated by issuing these camp lot leases. The proceeds from the camp lot leases go into the Refuge Revenue Sharing Account.

Table 3.5. Camp lot lease information and revenues generated, 1996-2007

Year	No. of leases	Range of fees charged	Total lease revenue for year
1996	24	\$50-\$1,881	\$27,461
1997	24	\$50-\$1,515	\$27,032
1998	24	\$50-\$1,515	\$27,077
1999	23	\$70-\$1,650	\$29,289
2000	26	\$1-\$1,650	\$31,603
2001	29	\$1-\$1,650	\$39,944
2002	25	\$1-\$1,650	\$32,524
2003	24	\$1-\$1,650	\$32,530
2004	26	\$1-\$1,650	\$31,160
2005	25	\$1-\$1,650	\$30,248
2006	28	\$1-\$1,650	\$33,773
2007	27	\$1-\$1,650	\$33,703

Status of Step-Down Plans and Compatibility Determinations

As we mentioned in chapter 1, Refuge System planning policy identifies at least 25 potential step-down plans. Although not all on that list are relevant for this refuge, we completed a Hunt Plan in 2007 and a Continuity of Operations Plan in 1999. A Land Protection Plan (LPP) was developed in conjunction with this CCP (appendix A). See chapter 4 for our schedule for completing additional step-down plans.

The following plan is up to date with current management.

- Hunt Plan, 2007; including amended EA and FONSI (USFWS, 2007)

We prepared this step-down plan in conjunction with this CCP.

- Land Protection Plan (LPP) (appendix A)

We have completed compatibility determinations for the special use permits mentioned above and for our hunting program. Appendix C includes new compatibility determinations for our current and future programs.

Refuge Natural Resources

Hydrology

Umbagog Lake is the centerpiece of the refuge, lying in a broad, flat basin along the Maine-New Hampshire border for a linear distance over 7 miles. The westernmost of the Rangeley Lakes chain, Umbagog Lake was only a thousand acres, until in 1851 a dam was built to power a sawmill. As the dam was enlarged and improved, it eventually flooded more than 7,000 additional acres of low-lying forest and floodplain. For more than 100 years, those saturated lands developed into peatlands, cedar swamps, floodplain forests, and lakeshore swamps (Dobbs and Ober 1995). Aerial photographs show a decrease in emergent vegetation in the Leonard Marsh and Harper's Meadow area since the early 1970s, a time when impounded water may have been maintained at lower levels.

Three significant rivers drain into Umbagog Lake. The Magalloway River enters the lake on the northwest side, draining a 300-square-mile area of nearly undeveloped yet actively harvested forest. The Magalloway starts at the Canadian border, flows through Parmachenee Lake, Aziscohos Lake, and Sturtevant Pond in Maine before entering New Hampshire and draining south

Magalloway River



Ian Drew/USFWS

into Umbagog Lake. From the west, the Swift and Dead Diamond rivers are major tributaries to the Magalloway as it enters the Umbagog Lake backwaters. The Rapid River enters Umbagog Lake from the east, draining the entire 500-square-mile Rangeley lakes region of western Maine. The much smaller Dead Cambridge River flows into Umbagog Lake from the southeast. The Androscoggin River forms the outlet, leaving Umbagog Lake near the mouth of the Magalloway River.

The refuge encompasses four small ponds on the New Hampshire side of the lake: Mountain Pond (19 acres), East Whaleback and West Whaleback ponds (8 acres and 9 acres, respectively), and Brown Owl Pond (27 acres). Other small tributaries also feed into Umbagog Lake.

Errol Dam

The Androscoggin River Improvement Company originally built Errol Dam in 1852. The dam controls water flows and levels in Umbagog Lake. Union Water Power Company (UWP) owned and operated the dam from 1878 and was the owner-operator at the time the refuge was established. UWP managed the water levels in Umbagog Lake, along with those in other Rangeley lakes, to maintain flow in the Androscoggin River and provide hydropower under a license issued by FERC. Article 27 of FERC license #3133-001 for Errol Dam requires UWP, in consultation with appropriate agencies, to conduct a study to identify the reservoir surface elevation and time of year at which stable water levels are needed for the protection of nesting wildlife on Umbagog Lake, and to develop a reservoir level management plan (FERC 1983).

UWP developed a water level management plan in consultation with the Service, NHFG, MDIFW, and ASNH, represented by the LPC. One major objective of the plan was to “minimize impacts on fish and wildlife which result from the flow management of the Androscoggin River, while balancing commitments to downstream user, regulating flood flow protection, and maintaining the most expedient water level regime for enhancing fish and wildlife within the Umbagog Reservoir.” The plan also provided for continuing review and input into water

level management through annual meetings of the power company with the state agencies, Service, and LPC.

UWP agreed to maintain water levels based on a level set on June 1, and to restrict change to no more than a six-inch increase or a one-foot decrease. That agreement was amended in 1998 to specify that the water level be maintained at a 1,246-foot mean sea level (msl) elevation as of June 1, and held constant until 75 percent of loon nests were established (generally by June 20). A gradual six-inch drawdown then was initiated over a two-week period. That lower level was to be held constant for an additional month, until after 75 percent of the nests had hatched, or approximately July 20. After July 20, UWP could fluctuate lake levels (Fair 1998; Paul Dunlop, UWP, telephone communication 1998). FPLE manages under the same FERC license as UWP, which require them to limit water level fluctuations during the loon nesting season of June and July, based on the annual conservation partner meetings. The reservoir water level management plan is for the benefit of wildlife species and the water users downstream of the Errol Project.

Over the past 10 years, the river levels at the Errol Dam generally were maintained at 1,245.5 feet to 1,247.5 feet msl from the end of April through early March. Levels are drawn down to 1,243 feet or lower between early March and the end of April. A less pronounced drawdown occurs from mid-September through the end of October. In approximately 1 out of every 5 years, unusually low or high water level “spikes” occur, making it difficult for UWP to manage water levels within the current agreement. Figure 3.1 displays daily Umbagog Lake headpond elevations from 1992 to 2002.

Soils

The Natural Resource Conservation Service completed an updated soil survey on the refuge in 2004 (USDA 2004). Most of the soils that cover the hillsides and upland forests in the refuge area derive from glacial till. The soils formed in alluvium, glacial outwash, lacustrine sediments, or organic materials, though less extensive in area, are significant, as they support diverse habitat types surrounding the lakeshore. Table 3.6 presents the major soil types on the refuge.

Table 3.6. Soils mapped on the Umbagog Refuge

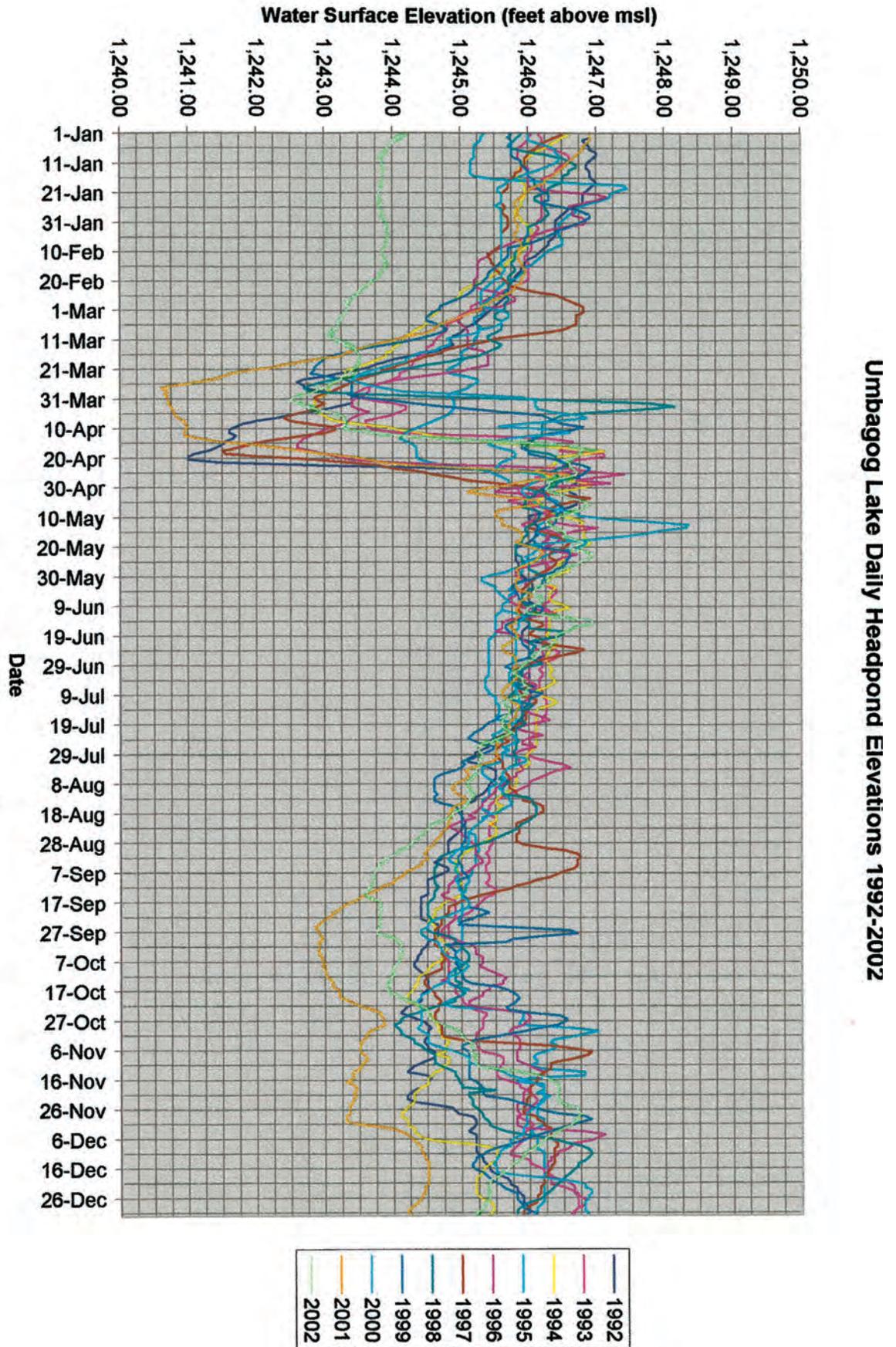
Soil Code	Soil Name, Slope	Origin	Drainage
14B	Sheepscott cobbly fine sandy loam	Glacio-fluvial/outwash	Moderately well drained
27B/C	Groveton fine sandy loam	Glacio-fluvial/outwash	Well drained
28A	Madawaska very fine sandy loam	Glacio-fluvial/outwash	Moderately well drained
36B/C	Adams loamy sand	Glacio-fluvial/outwash	Excessively drained
55C	Hermon sandy loam	Glacial till	Somewhat excessively drained
57D	Becket fine sandy loam	Glacial till	Well drained
59B/C	Waumbek sandy loam	Glacial till	Moderately well drained
61C/D/E	Tunbridge-Lyman-Rock outcrop complex	Glacial till	Well drained
73D	Berkshire very fine sandy loam	Glacial till	Well drained
77C/D/E	Marlow gravelly fine sandy loam	Glacial till	Well drained
79B/C/D	Peru fine sandy loam	Glacial till	Moderately well drained
143C/D/E	Monadnock fine sandy loam	Glacial till	Well drained
169B/C/D	Sunapee fine sandy loam	Glacial till	Moderately well drained

Soil Code	Soil Name, Slope	Origin	Drainage
214B	Naumburg fine sandy loam	Glacio-fluvial	Poorly drained
247A/B	Lyme fine sandy loam	Glacial till	Poorly drained
415B	Moosilauke loam	Glacial till	Poorly drained
470B	Tunbridge-Peru complex	Glacial till	Well drained
523E	Stetson fine sandy loam	Glacio-fluvial	Well drained
549A	Peacham muck	Glacial till	Very poorly drained
559A	Skerry fine sandy loam	Glacial till	Moderately well drained
560C	Tunbridge-Plaisted-Lyman complex	Glacial till	Well drained
567B/C/D	Howland silt loam	Glacial till	Moderately well drained
579B/C/D	Dixmont very fine sandy loam	Glacial till	Moderately well drained
590A/B/C	Cabot gravelly silt loam	Glacial till	Poorly drained
613B	Croghan loamy fine sand	Glacio-fluvial	Moderately well drained
632B	Nicholville very fine sandy loam	Glacio-lacustrine	Moderately well drained
633A	Pemi silt loam	Glacio-lacustrine	Poorly drained
647B/C	Pillsbury sandy loam	Glacial till	Poorly drained
670C	Tunbridge-Berkshire-Lyman complex	Glacial till	Well drained
670D	Tunbridge-Plaisted-Lyman complex	Glacial till	Well drained
995A	Wonsqueak muck	Organic materials	Very poorly drained
A=0%--3% slope; B=3%--8% slope; C=8%--15% slope; D=15%--25% slope; E=25%--30% slope			

The Mixed Forest Matrix and Habitat Types

We define the “forest matrix” as the most extensive, most connected, and most influential landscape type across the Upper Androscoggin River watershed basin. Knowing the matrix is important because it influences ecological processes that may affect biodiversity, including the amount and distribution of wildlife species. In the Upper Androscoggin River watershed, the forest matrix is not dominated by any one forest type, but is a mosaic of many types, and is often referred to at the larger landscape scale as a mixed spruce-fir/northern hardwood forest (Kuchler 1964; Charlie Cogbill, personal communication 2004). As we further delineate the mixed forest matrix, at the refuge scale, we define three predominant forest types embedded in it: spruce-fir; conifer-hardwoods mixed woods; and, northern hardwoods. We refer to these three forest types in this document as “habitat types,” along with eight other habitat types we have management objectives for: fen and flooded meadow, boreal fen and bog, northern white cedar, scrub-shrub wetlands, wooded floodplain, and lakeshore pine-hemlock. Each of those habitat types is found in varying amounts on the refuge and in the surrounding landscape.

Table 3.7 summarizes our classification of those habitat types for the refuge. We derived them from several sources. Our primary source was a cooperative mapping project with the University of Vermont, Spatial Analysis Laboratory, using the NVCS (Rapp 2003). We supplemented those data with aerial photo flights and interpretation generated in 2004 by the James W. Sewall Company of Old Town, Maine. The acreages in the table are approximations based on digital



boundary mapping and photo-interpretation using a GIS database. The column titled “Acres not owned by the refuge” includes the January 2009 approved expansion presented in the LPP (appendix A).

We grouped several natural communities into broader habitat types shown in table 3.7. The habitat groupings provide a coarser, more practical scale for mapping and applying management actions in the field. Wildlife, our main management focus, typically responds to habitat conditions at that broader scale. In addition, many of the natural communities we have grouped under a single habitat type occur naturally together as an ecologically system, often with one community merging into another. Thus, they often function ecologically as one habitat.

The following habitat type descriptions correspond to the list in table 3.7 and to the depictions on map 3-1. In addition, appendix G presents a cross-walk table of NVCS association, and various other vegetation classification systems and their relationship to refuge habitat types.

Table 3.7. Habitat types and acres in the approved Umbagog Refuge Boundary

Habitat Type	NVCS Association (UVM 2003)	Acres owned by the refuge*	Acres not yet owned by the refuge +	Totals
Wetlands				
Fen and Flooded Meadow	Medium fen-wet phase Medium fen Cattail marsh Seasonally flooded mixed graminoid meadow Eastern tussock sedge meadow Spikerush shallow emergent marsh Few-seeded sedge-leatherleaf fen	487	202	689
Boreal Fen and Bog	Leatherleaf poor fen Medium shrub fen Sub-boreal dwarf-shrub fen Circumneutral pattern fen Spruce-fir swamp Black spruce wooded bog Black spruce-larch swamp	1,235	2,851	4,086
Northern White Cedar	Northern white-cedar-balsam fir peatland swamp Northern white-cedar-black ash swamp Northern white-cedar-boreal conifer mesic forest Northern white-cedar peatland swamp Northern white-cedar seepage forest Northern white-cedar wooded fen	829	202	1,031
Scrub-Shrub Wetlands	Speckled alder peatland lagg (Speckled, green) alder shrubland Speckled alder swamp Sweetgale mixed shrub thicket	682	1,125	1,807
Open Water and Submerged Aquatic Vegetation**	Water***	5,033	870	5,903

Habitat Type	NVCS Association (UVM 2003)	Acres owned by the refuge*	Acres not yet owned by the refuge +	Totals
Floodplain and Lakeshore				
Wooded Floodplain	Red maple floodplain forest Red maple-balsam fir floodplain forest White spruce-balsam fir berm woodland Red maple-tussock sedge floodplain woodland Black ash-mixed hardwoods swamp Red maple-black ash swamp	1,140	289	1,429
Lakeshore Pine-Hemlock	Hemlock mesic forest Hemlock-hardwoods forest Hemlock-white pine-red spruce forest Red pine-white pine forest Jackpine/blueberry/feathermoss forest	232	288	520
Uplands				
Spruce-fir	Lowland spruce-fir forest Red spruce rocky summit Black spruce-red spruce forest	2,346	26,517	28,863
Mixed Woods	Aspen-fir woodland Successional spruce-fir forest Red spruce-hardwoods forest	3,859	13,406	17,265
Northern Hardwoods	Early successional aspen-birch forest/woodland Red maple-yellow birch early successional woodland Northern hardwood forest Semi-rich northern hardwood forest Paper birch talus woodland	4,640	8,843	13,483
Other				
Recently Harvested	Recently disturbed	1,058	551	1,609
Fields and Residences	Residential	109	145	254
TOTAL		21,650	55,289	76,939

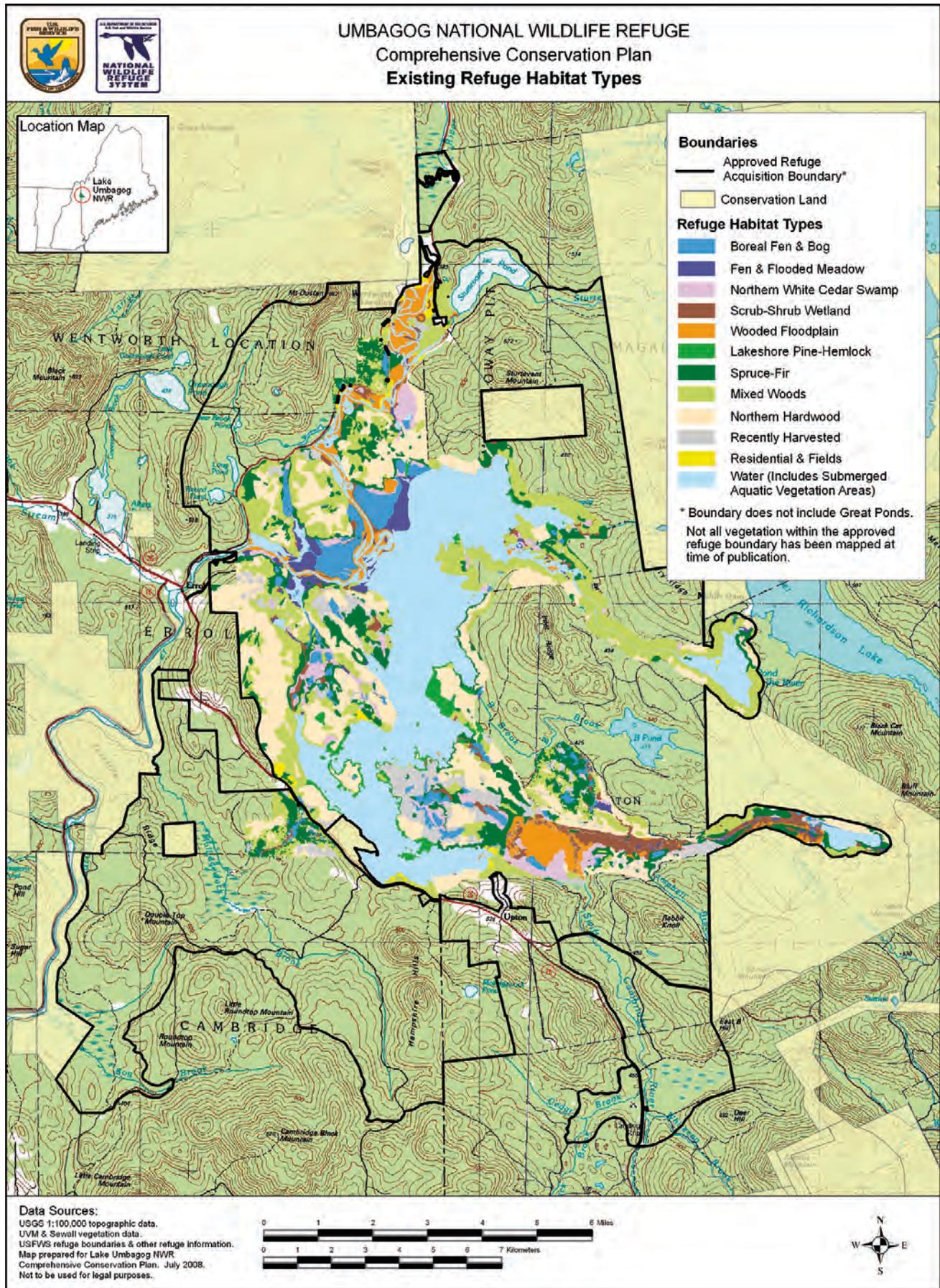
Table Notes

*These values primarily represent Service-owned refuge lands, fee ownership only. The only exception is a 6-acre Service easement in the Potter Farm area that is incorporated into the spruce-fir type. Data sources include a NVCS map created by University of Vermont, Spatial Analysis Laboratory in February 2003, supplemented with a timber stand map created by Sewell, Inc. in December 2003, and additional Service photo interpretation in 2005. The acres are approximations based on digital mapping in a GIS database.

**Water acreage does not include Great Ponds in either state, but does include acres under rivers and other small water bodies. Refuge ownership on Umbagog Lake includes all acquired shoreline extending to the original Great Ponds, which existed before the lake's impoundment.

***Floating-leaved and submerged aquatic vegetation communities have not been mapped, but likely include associations in the following NVCS Alliances: White Water-lily-Yellow Pond-lily species Permanently Flooded Temperate Herbaceous Alliance and Pondweed species-Coontail species-Waterweed species Permanently flooded Herbaceous Alliance.

+ This column includes the January 2009 approved expansion presented in the LPP (appendix A). Lands approved for future fee and easement acquisition are combined in this column.



Wetlands, Floodplains, and Open Water and Submerged Aquatic Vegetation Habitats

Approximately 10 percent of the wetlands in the entire upper Androscoggin River watershed is on the refuge, and those are the most extensive and diverse in the upper watershed (Publicover and Weihrauch 2003). The wetlands, floodplain and lakeshore forest, and open water cover 46 percent (9,555 acres) of the refuge.

Fen and Flooded Meadow

Fen and flooded meadow habitat covers <3 percent (487 acres) of refuge lands. This habitat type encompasses several plant communities defined by NVCS. Those include medium fen, cattail marsh, seasonally flooded mixed graminoid meadow, eastern tussock sedge meadow, spikerush shallow emergent marsh, and few-seeded sedge-leatherleaf fen (Rapp 2003). Fen and flooded meadow is found primarily in the backwaters of the Magalloway River, along the southern and eastern edges of Leonard Marsh, in Leonard Pond, Harper's Meadow, Sweet Meadow, and Chewonki Marsh, along the mouth of the Rapid River, and in the Mountain Pond and Dead Cambridge drainage.

These communities are found on seasonally or temporarily flooded to semi-permanently flooded areas with acidic soils. Depending on the specific community type, sedges, grasses, cattail, and sphagnum are the dominant herbaceous plants. Leatherleaf, sweet gale, and spireas are common shrubs in those communities. Although soil substrate and soil pH vary among these communities, all are located in stream floodplains, beaver meadows or along lake or pond shorelines. Snags are still visible in some areas of the fen and flooded meadow, an area of low-lying forest before the Errol Dam was built and raised the water levels (Little 1974).

Fen and flooded meadow is nesting and brood rearing habitat for American black duck, ring-necked duck, and mallard. Several marsh birds, including pied-billed grebe, sora, Virginia rail, American bittern, and Wilson's snipe, nest in these wetlands. Cavity-nesting wood duck, common goldeneye, common and hooded merganser also forage here with their broods. During fall migration, waterfowl—the nesters as well as migrant scaup, scoters, and snow geese—use the wetlands as secure foraging sites. When water levels are low during spring and fall migration, several shorebird species (e.g., greater yellowlegs, solitary sandpiper, killdeer) stop over at the refuge. Northern leopard frog and mink frog also occur in these wetland habitats.

Rare Plants in the Fen and Flooded Meadow

Meagre sedge is state-listed as threatened (S1) in New Hampshire. That rare plant was detected in the seasonally flooded graminoid meadow and in the circumneutral-patterned fen described below.

Peatlands

Peatlands are a wetland type whose soils are "peat"—partially decayed remains of dead plants. Peatlands are described by topography: flat or level, on slopes, or raised. They also are classified by their water and nutrient characteristics.

Minerotrophic peatlands receive water primarily from underground or surface sources; the water picks up nutrients as it passes through soil and bedrock.

Ombrotrophic peatlands receive their water from precipitation. *Oligiotrophic* peatlands are between the other two in nutrient richness.

A *fen* is a strongly enriched (primarily minerotrophic) peatland, while a *bog* is a rain-fed (largely ombrotrophic) peatland. The northeast supports a range of peatland types, with many different types often occurring together in large peatland complexes (Johnson, 1985).

Boreal Fen and Bog

Boreal fens and bogs cover 5.7 percent (1,235 acres) of the refuge, and include the NVCS communities leatherleaf poor fen, medium shrub fen, sub-boreal dwarf-shrub fen, circumneutral-patterned fen, spruce-fir swamp, black spruce wooded bog, and black spruce-larch swamp. Distinctions among those community types are based upon water levels and pH as well as the extent of shrub layer present, and typically are classified as peatlands (see sidebar).

In addition to the rare and unique plant communities described below, these peatland complexes support many northern breeding species, including rusty blackbird, palm warbler, and mink frog. The peatlands also support diverse amphibians, including spring peeper, gray treefrog, bullfrog, American toad, and northern leopard, green, pickerel frog and wood frog.

On the western side of Umbagog Lake is a large peatland complex encompassing four areas: Leonard Marsh, Sweat Meadow, Harper's Meadow, and Chewonki Marsh. An 860-acre portion of the complex, known as "Floating Island Bog," was designated as a National Natural Landmark in 1972 (Nazaire 2005). We discuss this unique area in more detail below. Leonard Marsh and Harper's Meadow form an extensive acidic fen complex with a pH of 4.0–4.7. Fens differ from marshes and streamside meadows by the absence of mineral soils at the surface and the presence of peat deposits and extensive layer of Sphagnum moss. These areas and associated wetlands form one of the largest peatland complexes in New Hampshire. This acidic fen complex harbors a high diversity of vascular plants, mosses, and liverworts. For example, the NHNH found 16 species of Sphagnum moss at Sweat Meadow (Sperduto 1999).

The Leonard Marsh-Harper's Meadow peatland complex consists of a unique suite of open and wooded types identified by Sperduto (1999):

- extensive, open floating moss lawns dominated by aquatic Sphagnum sp. (e.g., Torrey's sphagnum and Golden Bog-moss)
- moss carpet fens dominated by non-aquatic Sphagnum species (e.g., peat moss) and dwarf and medium-height heath shrubs
- moss carpet fens dominated by sedges (such as few-seeded sedge, quagmire sedge, and other unique "bog plants" such as pod-grass)
- various mixes of black spruce-larch woodlands and sparse woodland fens dominated by heath shrubs and Sphagnum mosses

Nazaire (2005) conducted a floristic inventory and vegetation analysis of the 452-acre Leonard Marsh from 2002 to 2004, documenting 14 community types and several rare plants, including narrow-leaved cotton-grass, heart-leaved twayblade, and creeping sedge. Peat depths in Leonard Marsh ranged from 26 to 92 inches (Nazaire 2005).

Floating Island National Natural Landmark

In 1972, the Secretary of the Interior designated part of the peatland complex at Harper's Meadow as The Floating Island NNL. That designation recognizes the floating bog and wetlands as a significant natural area, one of a very special group of places illustrating the diversity of the country's natural history (Favour 1971). The National Park Service administers the NNL program, which is a voluntary program for landowners (USDOI 1999). We plan to work with NPS to expand the NNL to 2,181 acres (map 4-5).

A rare fen of high regional significance, the circumneutral-patterned fen is found near the center of Tidswell Point. Most of that fen is on land owned by the

State of New Hampshire as part of the Umbagog State Park, and a portion is on the refuge. The pH in the fen ranges from 6.3 to 8.4. Only a few locations in New England of this natural community type are known. Patterned fens consist of long, linear, raised hummocks and intervening low hollows. Circumneutral fens, typically part of larger peatlands, are calcium-enriched from groundwater, supporting a characteristic set of plant species that are often rare. A large, high-quality northern white cedar swamp surrounds the fen (Sperduto 1999).

The patterned fen hummocks are dominated by stunted and heavily browsed northern white cedar. The hollows support several rare plants, including meager sedge, livid sedge, thin-flowered sedge, and moor rush. Other rare and uncommon plants growing in the fen include the state-listed endangered dragon's mouth and the state-listed threatened Pursh's goldenrod, cotton bulrush, orchids rose pogonia, and grass pink (Sperduto 1999).

The southern side of the more eastern Whaleback Pond supports an open floating bog mat dominated by *Sphagnum rubellum*, scattered dwarf heath shrubs, pitcher plants, and several other mosses (Sperduto 1999).

Black spruce wooded bog composes part of the large peatland complexes. Tree canopy cover of black spruce, larch, and hemlock varies from 10 percent to 60 percent. Shrub cover, dominated by Labrador tea and rhodora, reaches 80 percent. *Sphagnum* covers nearly the entire wooded bog. In addition to being part of the Floating Island, black spruce wooded bog occurs around Mountain Pond and Tidswell Point. Black spruce-larch swamp has many of the same species as the wooded bog, although it is not typically part of the large peatland complexes (Rapp 2003).

Northern White Cedar

Northern white cedar forest covers 4 percent (829 acres) of the refuge. The natural communities in this grouping all have northern white cedar (nwc) as a dominant plant. The communities include nwc-balsam fir peatland swamp, nwc-black ash swamp, nwc-boreal conifer mesic forest, nwc-peatland swamp, nwc seepage forest, and nwc-wooded fen. These soils are typically moist to saturated peat or muck, and are highly to moderately acidic. Examples of northern white cedar communities on the refuge are in areas north of Whaleback Ponds, downstream of Mountain Pond, and above the outlet of the Dead Cambridge River into the lake.

Northern white cedar is a boreal species that occurs as far south as Carroll and Grafton counties in New Hampshire. The NHNHB considers northern white cedar swamps a "signature-community" of the north woods, and hence, an important component of the region's biodiversity (Sperduto and Engstrom 1998). The largest northern white cedar swamp in New Hampshire (80 to 100 acres) surrounds the Whaleback Ponds and extends toward the Magalloway River. This wetland basin lies within the refuge acquisition boundary, but only a portion is now under Service ownership. The acidic cedar swamp is large, uniform, and largely undisturbed, with an abundance of *Sphagnum* moss, shrubby understory and slightly stunted canopy cedars, and is 120 to 200 years old (Sperduto 1999).

The NHNHB identified a 20-acre mixed hardwood-conifer seepage swamp in a shallow bedrock basin that empties into Umbagog Lake near Thurston Cove. The seepage swamp contains a large amount of northern white cedar around the margins of a boreal dwarf shrub fen. The swamp shows evidence of past logging, but is currently more than 200 years old (Sperduto 1999).

Several northern bird species use this habitat type year-round, including boreal chickadee, gray jay, and spruce grouse. White-tailed deer find cover and forage in the northern white cedar. A dusky salamander was recorded from a cedar

swamp near Harper's Meadow during a 1999–2002 amphibian and small mammal survey in cedar swamps and riparian habitats. American toads were abundant in that survey, and other amphibians were detected in the cedar swamp, including wood and green frogs, spotted and blue-spotted salamanders, spring peepers, and eastern newts. A diversity of small mammal species were identified in the cedar swamp habitat, including masked, northern water and short-tailed shrews, southern red-backed voles, and several bog lemmings (species unknown).

Scrub-Shrub Wetlands

Scrub-shrub wetlands cover 3.2 percent (682 acres) of the refuge. Scrub-shrub is found in areas that are seasonally flooded, such as riparian areas, floodplains, or around the edges of beaver-flooded wetlands in patches that average 7.5 acres. The natural community types are speckled alder peatland lagg, (speckled, green) alder shrubland, speckled alder swamp, and sweetgale mixed shrub thicket. Shrub cover dominates those areas, with speckled alder, sweetgale, and leatherleaf as the most common species. Trees generally are absent or very sparsely distributed; if present, they typically include balsam fir and red maple. Sphagnum, ferns, dwarf black berry, sedges, and grasses dominate the understory. Soils vary from strongly to moderately acidic.

The largest example of alder shrub land is in the floodplain of the Dead Cambridge River above its confluence with the Swift Cambridge River. Smaller examples are in cut-off oxbows located along the Magalloway, Rapid, and Androscoggin rivers (Rapp 2003).

Beaver, American woodcock, and Canada warbler are wildlife species associated with scrub-shrub habitat.

Open Water and Submerged Aquatic Vegetation

Open water, floating-leaved, and submerged aquatic vegetation habitat comprises approximately 5,033 acres (24.5 percent of current refuge lands). It also includes aquatic beds (submerged lands extending from the current shoreline to the pre-dammed lake shoreline; or, the lake shoreline prior to impoundment), riverbeds and small ponds. Open water or submerged lands of the original Great Ponds in both Maine and New Hampshire are not included and are owned by the respective states.

Umbagog Lake is the second largest lake in New Hampshire. Its average depth is 15 feet. It includes extensive shallow areas with unconsolidated bottom, a reflection of the historical conditions that created much of the lake: that is, the flooding of low-lying forest. Two deeper pools of more than 50 feet lie near the mouth of the Rapid River and off the northern cliffs of Sturtevant Cove (Van de Poll 2004).

Umbagog Lake is largely homothermous—the same temperature from top to bottom—creating warm summer temperatures (Boucher 2005). However, Umbagog Lake is important wintering habitat for native brook trout from the Diamond River watershed (Diane Timmons, NHFG, personal communication, 2004) and from the Rapid River. Smallmouth bass were introduced illegally into Umbagog Lake during the mid-1980s, and have since migrated to other connecting waters, including the Rapid River. Smallmouth bass, introduced into New Hampshire in 1865, are predators and competitors of brook trout (Boucher 2005).

We have very little information on the refuge open water habitat that is composed of the river tributaries and ponds. We have not conducted any bathymetry or water chemistry studies, nor have we conducted any fish or aquatic invertebrate studies. Our only wildlife study in this habitat was a stream salamander survey in



Bill Zimmi/USFWS

Scrub-shrub habitat on refuge

a few locations in 2001 and 2002. Two-lined salamanders were abundant at those sites. A spring salamander was recorded in Bull Moose Stream at the southern end of the lake. A dusky salamander was reported in a stream flowing into Mountain Pond.

Wooded Floodplain

Wooded floodplain covers 5.5 percent (1,140 acres) of the refuge. Found primarily along the Magalloway, Dead, and Swift Cambridge rivers, its natural communities include red maple floodplain forest, red maple-balsam fir floodplain forest, white spruce-balsam fir berm woodland, red maple-tussock sedge floodplain woodland, black ash-mixed hardwoods, and red maple-black ash swamp. Red maple, silver maple, and balsam fir dominate the closed to intermittent canopy along with yellow birch and white spruce. Red maple floodplain forest approaches its northern limit on the Magalloway River.

The entire Magalloway River shoreline offers the best example of the wooded floodplain forest community on the lake. The NHNHB lists it as a good example of a “balsam fir floodplain forest” community type.

The wooded floodplain supports a rich diversity of wildlife, including cavity-nesting ducks (e.g., wood duck, common goldeneye, common and hooded merganser), nesting songbirds (e.g., rusty blackbird, northern parula), and foraging waterfowl (e.g., black duck). Large floodplain trees offer perching sites for bald eagle, osprey, belted kingfisher, and other birds. It also supports a rich diversity of amphibians, including mink, wood, green and pickerel frog, spotted and blue-spotted salamander, American toad, spring pepper, eastern newt, and bullfrog.

Woodplain floodplains also host several bat species, including little brown, hoary, and northern long-eared bats. Those bats roost in tree cavities, under loose bark or dense foliage (DeGraaf and Yamasaki 2001). Other small mammals detected in this habitat were masked, short-tailed and smokey shrews, southern red-backed vole, meadow jumping mouse, eastern chipmunk, and a bog lemming (species unknown).

Lakeshore Pine-Hemlock Forest

Lakeshore pine-hemlock forest covers 1.1 percent (232 acres) of the refuge. Natural communities in this habitat type include hemlock mesic forest, hemlock-hardwoods forest, hemlock-white pine-red spruce forest, red pine-white pine forest, and jack pine-blueberry-feathermoss forest. The canopy layer in each of those plant associations is dominated by varying mixtures of conifers (white pine, hemlock, red pine, red spruce, jack pine); all occur on well-drained to excessively well-drained soils, typically near lakeshores.

Some of the best examples of the lakeshore pine-hemlock natural communities occur along the lake near Tyler Point, Big Island, and Tidswell Point, as pines dominate the eastern shore of Umbagog Lake. The jack pine-blueberry-feathermoss community occurs in small groups or as individuals along the lakeshore.

Jack pine is rare in New Hampshire, where it grows at the southern limit of its range (NH S1 rank). This community is the only low-elevation occurrence of this type in New Hampshire.

A northern occurrence of hemlock mesic (moderately moist) forest is found along the lake on Tyler Point.

Many of the large, mature, “super-canopy” trees are in the lakeshore pine-hemlock habitat. Their size and proximity to open water makes them ideal nest

trees for bald eagle and osprey. Sharp-shinned hawk, merlin, and olive-sided flycatcher are a few of the other species that nest in this habitat.

A little brown bat



USFWS

Upland Habitats

Forests are the dominant landscape type in northern New England, and 90 percent of the Upper Androscoggin River watershed that encompasses Umbagog Lake is a mixed forest matrix as described above. However, it is important to note that the mixed forest matrix of today supports more hardwoods than over the last 150 years (Cogbill, personal communication, 2004). That reflects a forest composition affected by multiple cycles of timber harvesting. Selective harvesting of softwoods has converted many spruce-fir stands to mixed stands, and mixed stands to hardwood stands. In the absence of further human disturbance, these forests, through natural succession and disturbance patterns, will shift to a higher proportion of softwood (Publicover and Weihrauch 2003). That prediction is also consistent with the site capabilities of the refuge expressed through the ecological land units (a combination of elevation, bedrock geology, and topography).

As we mentioned previously, three broad upland habitat types embedded in the mixed forest matrix are found in varying amounts: spruce-fir, northern hardwoods, and mixed wood. These three habitat types encompass 49.2 percent (10,645 acres) of the refuge.

Spruce-Fir

The spruce-fir habitat type covers 10.8 percent (2,346 acres) of the refuge. Natural communities in this habitat type include lowland spruce-fir forest, red spruce rocky summit, and black spruce-red spruce forest.

This spruce-fir habitat type is dominated by red spruce, balsam fir, and paper birch. Other typical plant associates include lowbush blueberry, mountain ash, American fly-honeysuckle, bunchberry, wood sorrel, wild sarsaparilla, and bluebead lily, among others. Logging heavily affected the lowland spruce-fir community type, and large areas now mapped as successional spruce-fir forest or recently disturbed will likely shift to spruce-fir over time. The largest remaining stands grow on gentle slopes and flats in the Mountain Pond, Sunday Cove, Whaleback Ponds, Mile Long West, and Dead Cambridge areas (Rapp 2003).

Red spruce and balsam fir are both late successional, shade tolerant, and shallow rooted. Balsam fir is an abundant seed producer, is highly susceptible to heart-rot, and is at risk from wind damage and uprooting. Fir is the preferred host of spruce budworm, and is affected by balsam wooly adelgid. Spruce budworm outbreaks occur on 40- to 70-year cycles, although outbreaks may have been less frequent historically when balsam fir was less abundant. The life span of fir

ranges between 40 and 70 years, depending on site conditions. Red spruce seeds infrequently, and is highly resistant to decay, resulting in a long life span (300+ years) (Seymour 1992).

The black spruce-red spruce community type is difficult to distinguish from the lowland spruce-fir. It occurs along wetland borders, and is dominated by red and black spruces. The canopy is typically quite dense, with little understory; mosses dominate the forest floor. The “fairy forest” near Sunday Cove is a good example of this type. Disturbed versions of this community type, such as the moose willow

1.5 miles northeast of the refuge headquarters, typically have little spruce, and are instead dominated by balsam fir or larch (Rapp 2003).

The red spruce rocky summit community type is uncommon and restricted to ridge tops and steep, rocky slopes such as in the Errol Hill, Mile Long, and Whaleback Pond areas. Soils are usually acidic, and outcrops are evident. Red spruce is the dominant species, with lesser amounts of balsam fir and paper birch (Rapp 2003).

Lowland spruce-fir is important for a range of wildlife species that depend on it for nesting habitat and winter cover. Softwood-associated bird species include bay-breasted, Cape May and blackburnian warblers. Many other songbirds occur in this habitat including 13 other warblers: magnolia, northern parula, black-and white, Canada, black-throated blue, American redstart, common yellowthroat, Nashville, black-throated-green, yellow-rumped, chestnut-sided, yellow, and northern waterthrush. Other bird species of note that appear here include hermit and Swainson’s thrushes, veery, winter wren, yellow-bellied flycatcher, yellow-bellied sapsucker, and swamp sparrow.

The spruce-fir habitat type supports some of the most important deer wintering areas. Bobcats use the conifer-dominated ridge tops, and martens are common inhabitants of spruce-fir.

Mixed Woods

The mixed conifer-hardwood habitat type covers 17.8 percent (3,859 acres) of the refuge, and includes red spruce-hardwood forest, successional spruce-fir forest, and aspen-fir woodland natural community types. The communities are distinguished primarily by the dominant canopy species that in turn are influenced in large part by specific site conditions and disturbance history.

This habitat type is the most widely distributed habitat type on the refuge, occurring on all but the highest elevations. It is especially prevalent in the Errol Hill, Mile Long, Whaleback Ponds, and Sunday Cove areas. In addition to red spruce, the dominant plant species include yellow birch, red maple, striped maple, and woodfern. Sugar maple and American beech are often present in this mixed woods habitat type. The successional spruce-fir forest type usually develops after disturbance to lowland spruce-fir. It usually has fewer northern hardwood species present with red spruce and balsam fir dominant in the understory. This community will typically succeed to lowland spruce-fir. Aspen-woodland is dominated by quaking aspen and balsam fir. It is most common around Mountain Pond but found in small patches throughout the refuge on lower slopes with well-drained loam soils (Rapp 2003).

This habitat type supports species that depend on a combination of hardwood and softwood tree species such as blackburnian and black-throated green warbler, or utilize a successional stage of this habitat such as Canada warbler and American woodcock. Mixed woods support many of the species mentioned under spruce-fir but in higher numbers.

Northern Hardwood

The northern hardwood habitat type covers 21.4 percent (4,640 acres) of the refuge. The natural community types include northern hardwood forest, semi-rich northern hardwood forest, early successional aspen-birch forest/woodland, red maple-yellow birch early successional woodland, and paper birch talus woodland. These hardwood forests are dominated by sugar maple and yellow birch, with other common species including American beech, red spruce, striped maple, hobblebush, and woodfern.

Northern hardwoods occur on well-drained loam soils at mid elevations. The forests typically have a closed canopy with variable shrub and herbaceous layers depending on local conditions and disturbance history. Most of the northern hardwoods were logged once or more in the past. It is found throughout the refuge, with good examples on the eastern slopes of Errol Hill and Mill Mountain, on Tyler Point, south of the Whaleback Ponds, and at the base of C Bluff cliff. A small patch of the semi-rich northern hardwood forest occurs in the vicinity of C Bluff; small pockets of enriched soils occur within northern hardwoods elsewhere on the refuge (Rapp 2003).

The aspen-birch woodland types become established after logging or some other disturbance. The early successional aspen-birch woodland is dominated by quaking aspen or paper birch with high shrub density including beaked hazelnut and several viburnum species. Occurrences on the refuge include the Dead Cambridge, Tidswell Point, Mountain and Mile Long ponds, areas where logging has occurred in the last 50 years. A similar early successional type is one dominated more by red maple and yellow birch. This occurs in the Whaleback Ponds, Mile Long and Mountain ponds, on Big Island, and near the eastern lakeshore (Rapp 2003).

The paper birch talus woodland is a single occurrence at the base of C Bluff. Paper birch is growing on a stabilized granite boulder talus with slopes between 30 percent and 45 percent. Soils are thin and patchy. Shrub cover is high and dominated by mountain maple. These talus slopes provide denning habitat for mammals including porcupine and bobcat. A peregrine falcon was heard from in the C Bluff area, one of the largest cliffs in the area (Rapp 2003).

The northern hardwood habitat type is important to landbird species of concern such as black-throated-blue warbler, American woodcock, and Canada warbler. Black-throated blue warbler nest in hobblebush and other understory vegetation, while American woodcock and Canada warbler utilize the early successional stages of these same forest types. This type also supports high numbers of many common nesting songbirds, including red-eyed vireo, ovenbird, hermit thrush, winter wren, scarlet tanager, and yellow-bellied sapsucker.

Recently Harvested

Recently harvested, or early successional (disturbed) forest, covers 4.9 percent (1,058 acres) of the refuge. This community is more ephemeral than most others, because it has experienced recent disturbance, usually in the form of logging. One particularly notable example of this type covers much of the upland areas of Tidswell Point. We are not actively managing any of the upland cover types now. These early successional stages, as noted above, are important to a suite of species such as woodcock, chestnut-sided warbler, morning warbler, white-throated sparrow, and snowshoe hare. The latter is an important food source for lynx, bobcat, and other mammals.

Fields and Residences

Fields and residences cover 0.5 percent (109 acres) of refuge lands. These areas are actively maintained for human residential or commercial purposes, including



Marvin Moriarty/USFWS

The former Potter Farm is now part of the refuge

buildings, lawns, and other development. The Potter Farm and the Chapel Hill Road community are two examples. These areas are maintained for administrative purposes and provide little or no wildlife habitat value.

Rare or Unique Habitat Types and Rare Plant Populations

Several rare or unique habitat types and rare plant populations are not displayed in this document because their small size does not show up in relationship to the map scale used for the other habitat types, or because the refuge has not identified all their specific locations. These areas include vernal pools (see discussion below) and other small, uncommon wetlands, cliffs, and talus slopes (see northern hardwoods discussion). In addition, appendix B

lists more than 30 species of rare plant populations known on the refuge and their state status. Digital information on those rare habitat types and plant species we have mapped can be obtained at refuge headquarters.

Vernal Pools

A vernal pool is a small water body lacking a permanent aboveground outlet. In the northeast, vernal pools fill with winter snowmelt, spring rains, and autumn rains. They typically dry by mid to late summer or earlier in drought years. How long water stays in a vernal pool is known as its hydroperiod, which varies depending on the pool and the year. A vernal pool, because of its periodic drying, does not support breeding populations of fish. Vernal pools on the refuge provide essential habitat for several obligate amphibian species, including blue-spotted and spotted salamanders and wood frog, contributing to refuge biodiversity. Maintaining vernal pools with a range of hydroperiods is important in sustaining vernal pool biodiversity. Most of the vernal pools on the refuge are embedded within the floodplain and riparian habitats.

Invasive Plants

We have not carried out any systematic surveys for terrestrial or aquatic invasive plants. However, our staff and interns are continually on the lookout for these plants. We have mechanically treated or hand-pulled Phragmites, purple loosestrife, and Japanese knotweed from localized areas, often where fill has been brought in. Examples of areas we have treated include the refuge headquarters parking lot, the Magalloway River Trail, and skid roads.

We are not aware of any aquatic invasive plants, but continue to be vigilant for the presence of non-native milfoil.

Fish and Wildlife

The refuge's diverse assemblage of upland and wetland vegetation—the lake, the Androscoggin and Magalloway rivers, and many other ponds and streams—hosts a wide variety of terrestrial and aquatic animal species described below.

There are no federally listed species on the refuge, since the bald eagle was de-listed in 2007. Bald eagles nested near Umbagog Lake during the first half of the 20th century, but there was no successful nesting in the area from 1950 through 1988. One breeding pair established a nesting territory on the northern half of the lake in 1989. In 2000, biologists confirmed that a second breeding pair had established a territory on the southern half of the lake (Martin 2001). The refuge and surrounding area also support non-breeding immature bald eagles year-round. This includes some individuals migrating from as far away as

Florida; those were tracked using satellite technology. For more on bald eagles, see below.

Thirteen bird species known to use the refuge are on the Maine or New Hampshire state lists of endangered and threatened wildlife (table 3.8). One species of New Hampshire threatened mammal has been confirmed to occur on the refuge.

Table 3.8. Maine and New Hampshire State-listed species that occur or likely occur on the refuge

BIRDS	STATE STATUS
American pipit	Endangered in ME (proposed breeding population only)
American three-toed woodpecker	Threatened in NH
Bald eagle	Endangered in NH (proposed Threatened), Threatened in ME
Black tern	Endangered in ME
Common nighthawk	Threatened in NH
Common loon	Threatened in NH
Common nighthawk	Threatened in NH (proposed Endangered)
Common tern	Endangered in NH (proposed Threatened)
Cooper’s hawk	Threatened in NH (proposed de-listed)
Golden eagle	Endangered in both NH and ME
Northern harrier	Endangered in NH
Osprey	Threatened in NH
Peregrine falcon	Endangered in NH (proposed Threatened), Endangered in ME
Pied billed grebe	Endangered in NH (proposed Threatened)
MAMMALS	
American marten	Threatened in NH
Northern bog lemming	Threatened in ME
Small-footed myotis	Endangered in NH

Birds

Written documentation on bird populations in the Umbagog Lake area extends back more than 130 years. Noted 19th-century ornithologist William Brewster spent extensive periods studying the birds of the area from 1871 through 1909 (Brewster 1924). Observations from the past 55 years by an increasing number of professional and amateur ornithologists contribute to a general understanding of local bird populations: for example, a series of periodicals published under various names by the ASNH from 1921 to 1982, the National Audubon Society’s Christmas Bird Count data for Errol, New Hampshire from 1958 to 2003, and the New Hampshire Bird Records database from 1982 to 2003. Our refuge bird list includes 229 species that have been observed on the refuge during one or more seasons.

In 1980, the NHFG and the ASNH initiated a statewide cooperative endangered and threatened species bird monitoring and management program (Robinson

1999). The Umbagog Lake area was included in the monitoring particularly for common loon, pied-billed grebe, bald eagle, osprey, peregrine falcon, and northern harrier.

Waterfowl

The refuge is unique in the region for the diversity of waterfowl that breed here. Umbagog Lake marshes and backwaters, forested and shrub wetlands, and adjacent forested and cutover uplands provide important nesting and brood-rearing habitat for such waterfowl as black duck, ring-necked duck, and cavity-nesters including common goldeneye, wood duck, common merganser, and hooded merganser. The refuge supports the highest concentrations of nesting black and ring-necked ducks in New Hampshire (USFWS 1991). Blue-winged teal, green-winged teal, and mallard also nest in the area. It is one of three high priority waterfowl focus areas in New Hampshire (Atlantic Coast Joint Venture 2005). Ducks are most commonly observed in backwaters along the Magalloway and Androscoggin rivers, Leonard Pond, Leonard Marsh, Harper's Meadow, Sweat Meadow, Chewonki Marsh, the outlet of Umbagog Lake and, to a lesser extent, in Tyler Cove and near the outlet of the Dead Cambridge River.

Umbagog Lake is also an important migratory staging area for the waterfowl mentioned above, as well as for greater and lesser scaup, bufflehead, white-winged, surf and black scoters, and Canada and snow geese. The NHFG surveys waterfowl on the refuge annually, just before the duck-hunting season opens. We also conducted a few limited fall waterfowl surveys from 2000 to 2002.

In 1940, the most common nesting waterfowl on Umbagog Lake (in order of abundance) were goldeneye, black duck, common merganser, wood duck, hooded merganser, and blue-winged teal (Provost 1940). That survey reports goldeneye and common merganser as common ducks on the Androscoggin River above the Errol dam, and goldeneye, black duck and wood duck as the most common species in Harper's Meadow. According to Provost (1940), waterfowl were more abundant during the 1920s, when local hunting clubs planted wild rice around the lake. In 1940, emergent vegetation around the lake (presumably Leonard and Chewonki Marshes) produced an average of one duck per 1.5–2 acres (Provost 1940).

Although we have no quantitative data on nesting waterfowl, our observations indicate that the most common species in recent years are black ducks, common and hooded mergansers, and ring-necked ducks. This information is also based partly on waterfowl species observed during a general refuge breeding bird survey by Bob Quinn in 1999 and 2000.

Common Loon

Umbagog Lake supports one of the highest concentrations of breeding common loons in New Hampshire. However, it falls below other lakes in terms of hatching success, chick survivorship, and overall productivity (Taylor et al. 2004). In recent years, the number of territorial pairs on the lake is around 17. Loons arrive on territories as early as mid-May, particularly on the rivers. The nesting season of common loons on Umbagog Lake starts around May 20. In most years, the majority of nests are established between June 1 and June 20. Hatching generally occurs between July 1 and July 20.

The most productive loon territories, located primarily on the north end of the lake, are the Magalloway River, Harper's Meadow, Sweat Meadow, Pine Point and Sunday Cove. Moderately productive sites include Sturtevant Cove, Leonard Marsh, Leonard Pond, and Southeast Arm, at the southeast end of the lake. The least productive sites include Sargent Cove, B Brook, and Thibodeau, south of Sunday Cove.

In 1985, a water management agreement among the owners of the Errol dam and conservation agencies and organizations reduced the rate of water level change during the loon-nesting season (see hydrology discussion, page 3-20). In addition to managing water levels, buoy lines and educational signs are employed to minimize disturbance and promote increased hatching success. Artificial nesting rafts were deployed in the 1970s to increase productivity; however, those have since been removed, with the shift toward natural nesting structures.

The LPC has intensively monitored the loon population since 1976. Productivity was low at that time due to frequent flooding during the nesting season. The number of loon nesting territories increased from 9 in 1976 to 32 in 2000 around the Umbagog Lake and on the Magalloway and Androscoggin rivers. The number dropped to 16 territorial pairs in 2002. Comparable declines were not observed on nearby lakes during the same period. Since then, the numbers have fluctuated around 18 to 20 territorial pairs: in 2003, 19; in 2004, 20; and in 2005, 20. The cause(s) of the 2000 to 2002 decline have not been identified. A dozen or so unpaired adult birds are on the lake each year as well.

Although 20 or more loon pairs establish territories on Umbagog Lake and its tributaries in a given year, 75 percent or less actually nest, and many fewer hatch chicks successfully. In 2005 for example, of 20 territorial pairs, 13 nested. Of those nesting pairs, six pairs successfully hatched a collective eight chicks and only four of those survived. Predation on eggs and chicks was the primary cause of nest failure. Raccoon, mink, fisher, herring gull, bald eagle, and raven are known to prey on loons; mammalian predation is the most prevalent (Taylor et al. 2005).

More than 75 individual common loons were banded and sampled for contaminants between 1993 and 2003 as part of a regional study on common loon reproduction and blood chemistry. Two loons were equipped with radio transmitters in 2003. Both of those birds migrated to the coast of Maine in the fall: one near Saco Bay and the other near Penobscot Bay. Another bird was equipped with a transmitter in 2004, and has also migrated to the coast of Maine to Muscongus Bay. Another 14 loons were captured, banded, and color-marked in 2005, and 12 loons were evaluated for eight different avian diseases (Yates and Evers 2005).

In 2002, the cause of death of three loons in Umbagog Lake was attributed to lead poisoning from ingesting lead sinkers. At least one loon was also infected with the West Nile virus. Blood samples from Umbagog Lake loons were analyzed for methylmercury, and were found to contain moderate levels lower than other reservoirs in the Rangeley Lakes chain. The highest mercury concentrations on the refuge were in loons nesting on the Magalloway River and in the southeastern section of Umbagog Lake (Biodiversity Research Institute 1998). Moderately high levels were also found in Leonard Pond, Potter Cove, Black Island Cove, Absalom, and Gull Island birds. The lowest levels of mercury were in birds on the Androscoggin River. Mercury levels were higher in males than in females. The Magalloway River flows out of Lake Azischoos, which has high mercury levels (ECSMarin 2003).

Common snipe



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Marsh Birds

Marsh birds, including American bittern, Virginia rail, sora, Wilson's snipe, and pied-billed grebe breed in the marshes and other wetlands on the refuge. Two non-active great blue heron nests were reported on the refuge in 2002. Umbagog Lake is one of just a handful of locations in New Hampshire where the black tern is observed repeatedly during the breeding season, although no nests have been confirmed.

Volunteers using taped broadcast callbacks surveyed breeding marsh birds annually on the refuge from 1999 to 2002. Surveys were conducted along three transects: one each along the Dead Cambridge River, in Leonard Marsh/Leonard Pond/Chewonki Marsh, and one in Harper's and Sweat Meadows. The most common targeted marsh birds recorded were Wilson's snipe, Virginia rail, American bittern, and alder flycatcher. Sora, pied-billed grebe, marsh wren, and belted kingfisher also were noted. Other birds that forage or nest in the wetlands were recorded on this or other surveys; they included common yellowthroat, great blue heron, Lincoln's sparrow, northern waterthrush, palm warbler, red-winged blackbird, rusty blackbird, and swamp sparrow.

Common terns have been observed perching on exposed rock outcrops on the lake both historically and in recent years. However, those records involve small groups of migrating or non-breeding individuals. They do not indicate that this species has ever attempted to breed in the Umbagog Lake area (Brewster 1924).

Shorebirds

Shorebirds migrate through the refuge mid- to late April through mid-June (spring) and late August through early to mid-November (fall), congregating in relatively low numbers on the margins of wetlands. Only a few species of shorebirds are known to breed on or near the refuge, including spotted sandpiper, Wilson's snipe, and American woodcock. We have not conducted woodcock surveys; however, we plan to establish singing ground surveys on the refuge to gain additional information on their breeding status.

We conducted a few limited spring and fall shorebird surveys from 2000 to 2002. Bob Quinn compiled a list of shorebird sightings on the refuge from 1990 to 1998. The most common species are Wilson's snipe, spotted sandpiper, greater yellowlegs, solitary sandpiper, and killdeer. During migration, large mixed flocks are sporadically seen feeding on the exposed mud flats that appear when the water levels are low. Other migrant shorebirds that are seen on rare occasions include semi-palmated and black-bellied plover, red-necked phalarope, red knot, semi-palmated and least sandpipers, dunlin, short-billed dowitcher, Wilson's phalarope, and lesser yellowlegs (Quinn 2005).

Bald Eagle

Bald eagles were absent from the refuge between 1949 and 1989, a result of widespread use of DDT that caused major population declines across their range. The bald eagle made a remarkable recovery, along with many other raptors, after DDT was banned and the eagle was protected on the Endangered Species List. Since 1980, ASNH, through a contract with the NHTG, has monitored bald eagles and ospreys in New Hampshire.

Nesting bald eagles returned to Umbagog Lake in 1989, after a more than 30-year absence. In 1989, a pair nested in a live white pine tree on an island in Leonard Pond on the refuge, near the confluence of the Magalloway and Androscoggin rivers. That nest was continuously occupied until 1994. In 1994, the pair moved to a tree on Pine Point on the eastern shore of the lake. That year, the adult male eagle died, apparently from ingesting lead shot, and the Pine Point nest failed. The remaining adult female paired with another male and re-established the nest at the Leonard Pond site. That nest has continued to be occupied each year from 1994 to 2004. From 1990 to 2002, the nest produced an average 1.2 chicks/year. During that 12-year period, nest failures occurred four times (i.e., no chicks fledged): in 1994, 1997, 2000, and 2002. By 1992, the original nest tree had died, although nesting continued in the snag that remained. In 2002, the eagle pair dismantled the Leonard Pond nest, but remained in the vicinity. A mate change apparently occurred in 2001 (new male), and in 2003 the female was replaced. No eggs hatched successfully in either 2003 or 2004 (ASNH unpublished data).

In 2000, a second pair established a nest on the east side of the lake in a white pine tree on Tidswell Point, approximately half a mile inland from the lake. That nest produced two chicks in 2000, one chick in 2001, one in 2002, two in 2003, (only 1 of these survived to fledging), and two in 2004. In 2006, a third pair established a nest in Sweat Meadows and successfully fledged 2 young in 2007.

The refuge eagles likely remain in the general vicinity of the refuge year-round. The adult male was confirmed on or near the lake every month of the year except January (ASNH unpublished data).

The Leonard Pond eagles generally forage around the north end of the lake, from Errol Dam to the Rapid River and southeast to Tyler Cove. The Tidswell Point eagles were observed foraging primarily around the southern end of the lake. In 2005, ASNH documented three territorial pairs of eagles, although only one nest was successful: two young fledged. A varying number of immature eagles are also observed from time to time on the lake and rivers during the breeding season (Martin et al. 2006).

Umbagog Lake breeding eagles start nest building in March, and start incubating in early April. One to two eggs hatch around May 6 through May 22, and the young fledge between July 30 and August 17. Eagle fledglings typically disperse from mid-September to early October.

Public access to the Leonard Pond nest is restricted by buoys and signs placed about 500 feet away from the nest. Buoys are left out from shortly after ice-out through the end of October (ice-out on Umbagog Lake averages around May 2). Predator guards were installed on both the Leonard Pond and Tidswell nest trees. In 1990, ASNH surveyed boat activity around the Leonard Pond eagle nest during May through August. Visitation reached a high of 133 boat approaches to the nest site in one day (349 people). The highest visitation rates occurred on Saturdays (mean of 6.6 boats/hour) and on August weekends (mean of 9.4 boats/ hour). Lowest levels of visitation were in June (mean of 3.3 boats/hr). The majority of the visitors obeyed the closure signs, although a few canoeists violated them. ASNH also observed some visitors attempting to feed fish to eagles (ASNH unpublished data).

Osprey



USFWS

Osprey

Ospreys were considered common summer residents around Umbagog Lake as far back as the late 1800s. Populations across the eastern United States declined precipitously beginning in the 1950s, and by the late 1970s, just three or four breeding pairs remained in the entire State of New Hampshire, all of which were located near the refuge.

Since 1980, ospreys have monitored by ASNH, NHFG, or the refuge. Within the refuge acquisition boundary, approximately 23 nest site locations are recorded for osprey over the past 20 years. However, in the past 10 years, a gradual decline was noted in the number of osprey pairs nesting within the four townships surrounding the refuge: Cambridge, Errol, Second College Grant, and Wentworth Location (Martin 2002). The factors contributing to that apparent local decline have not been completely identified. At the same time, osprey populations elsewhere in New Hampshire are increasing. An apparent decrease in active nests in the Umbagog Lake area occurred from about 1996 to 2001, and was followed by an apparent increase in 2002 (Martin et al. 2006).

In 2006, there were 11 territorial pairs of osprey engaged in active nesting attempts, and 15 fledglings were produced. The majority of nest trees have had predator guards placed around the bottom of the tree.

Other Raptors

Peregrine falcons, although never common in the area, were eliminated from their historical breeding sites in both Maine and New Hampshire, including several areas near Umbagog Lake, by the late 1950s. Four historical nesting cliffs are within view of the lake, likely chosen by peregrines for their proximity to a good food supply of ducks, shorebirds, and songbirds. Today, the lake, marshes, and other open areas on the refuge provide stopover habitat for migrating peregrines passing through the area in both the spring and the fall.

Confirmed intermittent sightings of individual golden eagles continue in areas near the refuge, mostly during migration and in winter, typically associated with a temporary local abundance of carrion. For several decades, the Umbagog Lake area annually has supported from one to five breeding pairs of northern harriers. Cooper’s hawks are longtime occupants of the Umbagog Lake area (Brewster 1924), and merlins are regular nesters on the refuge.

Other Birds

The upland forests and diverse wetland communities on the refuge support more than 100 breeding species of songbirds, and offer stopover habitat for dozens more during migration. The peatland communities in particular support a suite of birds with boreal forest affinities, such as gray jay, spruce grouse, black-backed woodpecker, and palm warbler, which approach their southern range limits in this area. Other northern coniferous forest birds known to breed on the refuge include pine grosbeak, white-winged crossbill, and red crossbill.

Bird surveys conducted on the New Hampshire side of the refuge from 1999 to 2004, mostly within the mixed woods and hardwood floodplain, recorded more than 40 bird species, including several species of conservation concern: ovenbird, black-throated-blue warbler, American redstart, veery, yellow-bellied sapsucker, black-throated-green warbler, Nashville warbler, and northern parula. In 2005, we established five additional transect surveys focused in softwood habitat types such as cedar swamps, black spruce, and spruce-fir. More than 67 landbird species were recorded, including the following species of concern: yellow-bellied flycatcher, Canada warbler, blackburnian warbler, ovenbird, black-throated blue warbler, American redstart, black-throated green warbler, bay-breasted warbler, chestnut-sided warbler, northern parula, veery, purple finch, boreal chickadee, yellow-bellied sapsucker, eastern wood peewee, Cape May warbler, and ruffed grouse.

Mammals

Based upon known regional distributions and habitat requirements, the refuge supports approximately 50 different mammal species. At least 36 of those are confirmed on the refuge, including 7 types of shrews or moles, 4 bats, 10 rodents, and 12 carnivores, as well as moose, white-tailed deer, and snowshoe hare. Common carnivores include black bear, eastern coyote, red fox, fisher, and river otter.

For 3 years, we conducted limited field surveys of small mammal populations to establish baseline data for the refuge. The masked shrew was most frequently detected. We also initiated surveys of mid-sized carnivores, including fisher, marten, bobcat, and lynx (see lynx discussion below), using techniques such as snow tracking and photography at remote bait stations. From 2002 to 2004, we assembled seven camera bait stations around the refuge. Most were kept up for approximately 1 month in January or February, except for two sites on Sunday Cove, which were up from March to early June. Fisher were detected at five sites;

An American marten at a bait station on the refuge



USEFWS

marten at three sites; and, bobcat at one site. Coyote and short- and long-tailed weasel also have been observed on the refuge.

Moose, white-tailed deer, and beaver are common in the area of the refuge, and are known elsewhere to exert particularly strong influences on the local plant community, affecting both the composition and age structure of the forest. However, we do not have local information to that effect. No surveys for these species have been conducted on the refuge.

From 1992 to 1995, refuge staff mapped active beaver colonies along the Magalloway and Androscoggin rivers, the Mountain Pond drainage, and the north end of Umbagog Lake. The colonies mapped range from 6 to 11. That mapping predates any of the current staff. Records on the methodology the survey used are lacking. It appears to have been an effort to characterize wildlife activity in the area of the refuge and begin collecting baseline data.

Lynx

Lynx are Federal-listed as Threatened. As mentioned above, we used camera bait and tracking surveys from 2002 to 2004 to detect small mammals and midsized carnivores such as lynx. We detected no lynx on the refuge, although their presence has been confirmed approximately 10 miles away in Magalloway Plantation, Maine. State lynx experts have told us that those occurrences are considered to be individuals dispersing from their breeding areas, since the closest confirmed breeding location in Maine is approximately 90 miles from the refuge (J. Vashon, MDIFW, personal communication, 2006). In New Hampshire, researchers discovered a lynx track in January 2006 along Route 2 in the town of Jefferson, approximately 45 miles southeast of the refuge (NHFG 2006).

Lynx are medium-sized cats that are adapted to life in deep, deep snow and are specialist predators on the snowshoe hare. Their adaptations to life in a typically boreal forest give them a competitive edge over such other species as bobcat and coyote. Northern New Hampshire is the southern edge of lynx habitat. Given their dependency on snowshoe hare, lynx must occupy large home ranges to ensure access to sufficient prey. Snowshoe hare are most abundant in forests with dense understory that provide forage, escape cover, and protection during extreme weather, and therefore, hare densities are generally higher in regenerating, earlier successional forest. Lynx also require lots of coarse woody debris, such as downed logs and windfalls, as safe den sites (Federal Register 2005).

In Maine, lynx use spruce-fir dominated regenerating stands that develop 15 to 30 years after forest disturbance. The Service has proposed more than 10,000 acres in Maine as “critical habitat.” The refuge does not provide large areas of either the late- or the early seral conifer forest preferred by lynx, although refuge habitats may serve as dispersal habitat for lynx (Federal Register 2005). The Service has not proposed any areas as critical habitat solely because they provide habitat for dispersing animals.

White-tailed deer wintering areas

The NHFG and MDIFW identified many areas of lowland conifer forests on and near the refuge that provide critically important winter cover for white-tailed deer (map 4-7). Up to 100 deer are known to congregate in some of these areas on the refuge (Will Staats, NHFG, personal communication, 2003). Triggered to some extent by increasing snow depths, deer usually migrate to those areas in the late fall. Those areas are also important during periods of intense cold, even during snow free winters. The deer create a vast network of trails throughout the wintering area, traveling along those trails to search for food or escape predators.

Quality deer wintering habitat consists of two components and their proximity to each other: cover to protect the deer from the elements, and access to browse. Softwood stands (primarily spruce-fir) at least 35 feet tall with a crown closure that averages about 70 percent or more is ideal winter cover (Reay et al. 1990). Older, taller stands that are generally stronger provide the best cover-branch structure for intercepting snow. Those older stands often begin to develop gaps, which stimulate regeneration and provide browse for deer. Younger, denser stands are also desirable if they have small openings, about a quarter of an acre in size or less, so that the deer have access to browse and sunlight for warmth.

In the 1990s, MDIFW staff conducted aerial and ground surveys of Region D in Maine. Those surveys determined that Upton and Rangeley had the most extensive wintering habitat for deer in the entire region, which includes 115 organized towns and townships (Chuck Hulsey, MDIFW, personal communication, 2006). Unregulated timber harvesting continues to threaten valuable winter shelter in Upton, which is strategically important to regional deer populations. The conservation of that habitat is of the highest importance for achieving deer population objectives set by public working groups (Chuck Hulsey, MDIFW, personal communications, 2006).

Fish

Based upon available local documentation and a list compiled by MDIFW, at least 24 fish species are present in water bodies on the refuge. Major changes in both the abundance and species composition of the Umbagog Lake fishery during the past 150 years have created a fishery today that bears very little resemblance to that present before the establishment of the first Errol Dam in the 1850s. During the 1800s, the lake supported a thriving brook trout population (Bonney, personal communication, 2002). Today, only portions of Umbagog Lake and the Rapid River support a native brook trout population.

Before 1900, however, Atlantic salmon, chain pickerel, rainbow smelt, brown bullhead, and several other species were introduced into the Androscoggin River or the Rangeley Lakes. Changes that are more recent include the introduction and subsequent population expansion of smallmouth bass, introduced into the lake in 1995. Northern pike have also been observed in the lake in recent years, but their present population status remains unclear (Bonney, personal communication).

Green frog



John Mosesso, Jr./NBII

Amphibians

Spring surveys of singing frogs (1999–2002) and stream surveys (2001–2002) have recorded 16 amphibian species on the refuge: seven salamanders, eight frogs, and one toad. Those include northern two-lined, northern red-backed, dusky, and spring salamander in or along streams. The fen and flooded meadows, peat lands, cedar swamps, and floodplains support diverse frogs and toads; the most common include bullfrog, green frog, spring peeper, American toad, and mink frog. Other species include northern leopard, pickerel, and wood frog. Blue-spotted and spotted salamanders and eastern newts were found in vernal pools in floodplains and cedar swamps.

Invertebrates

As part of a water quality study in 2003, 20 sites on Umbagog Lake, the lower Magalloway River, and the upper Androscoggin River were surveyed for aquatic macro-invertebrates (Van de Poll 2004). Van de Poll collected 120 taxa representing 14 classes, 28 orders, and 79 families of macro-invertebrates. No obvious indications of a reduction in community diversity or severe pollution were found. Some of the higher diversity sites for macro-invertebrates were the fringes of wetlands on the lake. The most groups of invertebrates collected were little pond snails and the shrimp-like scuds, followed by midges, mayflies,

caddisflies, and beetles (Van de Poll 2004). We have not conducted any other invertebrate surveys.

Cultural and Historic Resources

Invasive Animals

We have not systematically surveyed for invasive terrestrial or aquatic animals. We are not aware of any invasive terrestrial animals on the refuge, and our primary concern about aquatic invasive species focuses on the many introduced fish species, such as smallmouth bass.

We have not conducted a detailed archeological and historic survey of all refuge lands. However, we have conducted some specific project surveys to determine further the eligibility of certain sites. In New Hampshire, we know of one historic and three prehistoric archeological sites on refuge land. In Maine, we know of one prehistoric site on refuge land. We expect that a detailed, systematic survey would likely reveal many more sites that are prehistoric.

Several limited historical architectural surveys on the refuge determined that its buildings were not eligible for the National Register of Historic Places. In October 1992, the Maine SHPO concurred with our regional archeologist in finding the Stranger Farm ineligible. In 1993, our regional HPO determined that the Potter Farm, which includes a house and two outbuildings more than 50 years old, is ineligible, because they have been altered since their original construction. We forwarded that assessment to the New Hampshire SHPO but received no response, indicating tacit concurrence with the Service assessment. An associated cemetery, the Stone cemetery, lies on the private Kronck property, on which the Service owns an easement. In 1995, we also assessed and determined ineligible the now demolished Priest cabin. In 2004, our regional archeologist evaluated the cabins in the area of Chapel Hill Road, and determined none eligible. We have forwarded that assessment to the New Hampshire SHPO, and are awaiting their response.

We have not surveyed other cabins, several more than 50 years old, on refuge lands. The Service may acquire more cabins with future acquisitions.

The refuge has only a few archaeological artifacts for museum property. They are stored in the Regional Office. There are no important museum property issues at the refuge (D.H. Hurd and Company 1982; Dobbs and Ober 1995).

Priority Public Uses

We describe below current opportunities on the refuge for engaging in the six priority public uses of the Refuge System Improvement Act: hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

The refuge area is a very popular destination, especially for water recreation. Many visitors return year after year. Refuge lands provide year-round activities; the most popular include motor boating, canoeing, kayaking, remote lake camping, observing and photographing wildlife, hunting, and snowmobiling. All activities are allowed from half an hour before sunrise to half an hour after sunset, with the exception of camping in designated sites on designated days, which provides for overnight use. The waters in and around the refuge undergo the most recreational pressure during the summer (USFWS 2000b).

We have not conducted formal surveys of annual refuge visitation, despite their desirability. Limited funding and staffing, numerous access points, and the confusion of many visitors about whether they are on refuge or state lands have proved challenging. However, for the purposes of this plan, we have estimated annual visitation based on a variety of sources, including visitor contacts at refuge headquarters, boat activity surveys between 2000 and 2004, reservations for

the duck hunting blinds, and general observations by refuge and state agency personnel. We estimate our total annual visitation at approximately 49,500 visitors over the last 5 years. Most visitors are non-local residents. Appendix G of the Final CCP/EIS, table G.6, summarizes our 15-year projection of visitation by activity.

Hunting

After completing a refuge Hunt Plan, we opened the refuge officially in fall 2000 for hunting for waterfowl, migratory game birds, upland game and big game. We amended that Hunt Plan, and its accompanying EA, most recently in April 2007. Alternative 2 in that EA represents our current program. The objectives of the hunt program include providing the public with a safe, high-quality recreational experience, providing an opportunity to utilize a renewable natural resource, and providing a tool to help maintain wildlife populations at levels within the carrying capacity of their habitat (USFWS, 2007). We estimate 5,650 hunter visits on refuge lands annually. The refuge lies in New Hampshire Wildlife Management Units (WMU) A and WMU C2, and Maine WMU 7.

All federal and the respective state hunting regulations apply, including seasons, bag limits and license requirements, along with additional, special refuge regulations (listed in 50 C.F.R. 32 sub-part B). The only exceptions to state regulations are that we do not currently allow turkey hunting on refuge lands and we do not allow bobcat hunting in Maine. Since the New Hampshire-Maine state line crosses the refuge, hunters are responsible for knowing which state they are in and hunting according to the regulations for that state. Hunting seasons generally are between early September and the end of March. No refuge permits are required, and no fees are charged. Enforcement is primarily by the respective state game wardens. The most commonly hunted species in and around the refuge are waterfowl, ruffed grouse, woodcock, moose, white-tailed deer, and snowshoe hare.

In 1999, we instituted a waterfowl blind reservations system allowing hunters to sign up on a first-come, first-served basis for one of six permanent waterfowl blinds on refuge waters. We do not have quantitative data on harvest levels, but hunters using blinds have recorded harvest of: black duck, mallard, common merganser, Canada goose, wood and ring-necked duck, blue-winged and green-winged teal, scaup, bufflehead, and Wilson's snipe.

Harvest levels have not been determined for any mammal or upland game bird species taken from the refuge. However, NHFG and MDIFW data from both of the respective WMUs or associated townships provides some information on harvest rates. The refuge represents only a very small proportion of each WMU, 2.12% of WMU's in New Hampshire, and 0.57% of WMU 7 in Maine, and therefore, only a very small proportion of the reported harvest would be considered as coming directly from refuge lands. In 2004, New Hampshire deer harvest rates for the townships of Cambridge, Errol, and Wentworth Location were 0.41 deer/sq mile; 0.39 deer/sq mile, and 0.36 deer/sq mile, respectively. In Maine, deer harvest rates for WMU 7 were reported to be 0.37 deer/sq mile.

Also in 2004, 4 bear and 34 moose were taken in the township of Errol. In Maine's WMU 7, 198 bear and 112 moose were taken. Of the 198 bear taken, only 31 were taken using methods allowed on the refuge. In addition, 26 turkeys were harvested in New Hampshire's WMU C2, but only four were taken in towns next to the refuge.

Fishing

We plan to officially open refuge lands to fishing with completion of this CCP. Most anglers who visit our area want to fish on the lake and in other state waters;

fishing from the lake's shoreline is less popular. We estimate approximately 11,000 visitors per year are fishing on the refuge or accessing lake fishing through the refuge. We currently provide access to these state waters via several boat landings (map 4-3). Our primary concern about current fishing activities arises when anglers access sensitive resource areas administratively closed, such as the eagle, osprey, and loon nesting sites.

Fishing from boats on Umbagog Lake and its tributary rivers falls under state jurisdiction, and state regulations apply for seasons, creel limits, and license requirements. Licensed New Hampshire or Maine anglers may fish any part of the lake with their license, and certain sections of the rivers, including the Androscoggin River upstream of the Errol Dam and the Magalloway River within New Hampshire, and on the Rapid River in Maine upstream to the marker at Cedar Stump.

Anglers fish Umbagog Lake for a variety of both cold and warm water species. The most popular are smallmouth and largemouth bass, landlocked salmon, brook trout, and lake trout. Local streams and rivers, (e.g., the Magalloway, Androscoggin, and Rapid rivers), are also noted for their excellent fly-fishing opportunities.

The abundant, well-established population of smallmouth bass illegally introduced into the lake in the mid-1980s recently colonized the Rapid River as far as Pond-in-the-River, and are now a concern among state agencies managing the native brook trout. Since that introduction, the number of bass boats on the lake has increased, and bass tournaments there have become increasingly popular. The State of Maine sets restrictions on those tournaments to allow only one permit on a water body for a specific date, no tournaments until June 15, five tournaments annually on water bodies greater than 3,500 acres, and a maximum of 100 boats per tournament.

Ice fishing is also becoming increasingly popular, and ice-fishing camps appear on the lake throughout the winter, primarily on state jurisdiction. Although fishing remains popular, mercury contamination throughout the region has led to recommendations on limiting fish consumption (NH DES 2004). Mercury deposition affects all of the freshwater lakes in New Hampshire and Maine, not just Umbagog Lake (NH DES 2004; MDEP 2004).

*Observing wildlife
on the refuge*



USFWS

Wildlife Observation and Nature Photography

Wildlife observation and nature photography are major attractions in the Umbagog Lake area, and we have noticed public participation increasing over the past 5 years. Loon, bald eagle, and moose are the major viewing attractions, as are bird watching and leaf peeping in general. We allow access by foot, snowshoe, cross-country ski, and motorized or non-motorized boat. We estimate that 18,500 visitors annually engage in viewing and photographing wildlife on the refuge.

We maintain one trail, the Magalloway River Trail; accessed off Route 16 approximately 2 miles north of refuge headquarters (map 4-3). The trail follows a gravel road built for a proposed subdivision cul-de-sac, and is now part of the refuge in an area known as the "Day Flats." That area supports a major moose wallow, and has the potential for restoration to a wooded wetland habitat. It is approximately one-third of a mile long, and has a viewing platform at its end that overlooks a backwater oxbow in the river. We plan to complete a quarter-mile loop extension of that trail.

Interpretation and Environmental Education

Our staff conduct interpretive programs as funding and staff time allow, typically about three each year. The demand for programs from local schools, scouting,

and other groups far exceeds our ability to provide them. A limited amount of interpretive literature (e.g., handouts or brochures) is available from displays at the refuge headquarters.

We participate in two very popular outreach events each year: the Wildlife Festival and the “Take Me Fishing” Day. Since 1997, our staff and the Umbagog Chamber of Commerce have sponsored the annual Wildlife Festival in Errol in early August. More than 300 people have attended this event in some years. The “Take Me Fishing” event, also held in August, recently was combined with the Wildlife Festival on the same day. The fishing event is also offered in cooperation with the Umbagog Chamber of Commerce, as well as Orvis, Shakespeare, and other local companies, and is held at the Potter Farm. Up to 50 people have participated in that fishing event in a given year.

We have not developed a curriculum for environmental education programs. We have been involved in fulfilling requests from teachers at local schools to provide programs that supplement their curriculum. Generally, one or two school programs are given in a given year.

We have regularly supported college interns: namely, graduate students from Vermont and New Hampshire universities who seek on-the-job experience while achieving college credit. They have completed a variety of projects, including research on habitat and species of concern to us.

Remote Camping on Umbagog Lake

The State of New Hampshire operates the Umbagog Lake state campground at the southern end of the lake: 37 developed shoreline sites and 30 remote lake camping sites in various locations on the lake (map 4-3). Twelve of the remote lake sites are located on refuge land. A cooperative agreement between the NHDRED and the Service will formalize the administration of those sites. They are a very popular destination, and typically are full to capacity in July and August, and often into September. A 3-year average from 2001 to 2003 showed 4,700 campers in July and 5,347 for August. Overall, use has declined in recent years, but only because several sites were closed to retain the remote backcountry quality of the camping facilities (New Hampshire Division of Parks and Recreation 2004). Two other river camp sites (North 1 and North 2) occur on refuge lands but their removal and restoration is planned. In addition to the state park, other private campgrounds with facilities are available in the surrounding area.

Boating

One improved and two unimproved public boat launch sites along the Magalloway River are on refuge land (upper Magalloway River car-top launch, a launch at refuge headquarters, and one at Parson’s landing (map 4-3). One other launch site exists on refuge land on the Androscoggin River, above the Errol Dam (Steamer Diamond landing). The launch at Parson’s landing has been heavily impacted, and is therefore, planned for closure. Improved launch sites are also located off refuge land near the Errol Dam on the Androscoggin River and at the south end of Umbagog Lake, at Umbagog State Park. The park rents boats and motors, and offers pontoon boat tours of the lake. The State of Maine requires that all motorized watercraft on inland waters, including Umbagog Lake, display a “Lake and River Protection” sticker.

We estimate that 14,000 visitors are boating on refuge waters, mostly in conjunction with viewing and photographing wildlife and fishing. Rough estimates by our interns in June and July indicate that the use of motorized boats and canoes or kayaks were roughly equal from 2000 through 2004. However, we have observed a rapid increase in motorized boating over the past few years,

much of it attributed to bass fishing. A much smaller percentage of jet skis, sailboats, and pontoon boats are used on the lake.

The Androscoggin River, Umbagog Lake, and the Rapid River are highlighted as part of the Northern Forest Canoe Trail. That trail extends 740 miles from Old Forge, New York, to Fort Kent, Maine. At least six local outfitters and campgrounds offer canoe and kayak rentals and guided canoe or kayak tours of the lake, and some offer paddling instruction on the lake and in surrounding rivers and streams. College, school, and summer camp groups also use the lake for paddling trips. Canoe and kayak use has increased dramatically.

Snowmobiling

Snowmobiling is another activity we have observed increasing markedly on refuge and surrounding lands in recent years. With hundreds of miles of groomed snowmobile trails, the Umbagog Lake area is very popular and local businesses target this audience through advertisements (Umbagog Chamber of Commerce 2005). It is a significant economic activity for the area during winter.

We estimate 20,000 snowmobile visits occur each year on refuge lands as part

*Snowmobiling on
the refuge*



Marvin Moriarty/USFWS

of a regional trail system (Gray, New Hampshire Bureau of Trails, personal communication, 2005). Snowmobile use on the refuge is permitted on designated trails only. Map 4-4 depicts trail locations authorized by the refuge manager on the refuge in both New Hampshire and Maine. Unfortunately, several unauthorized spur trails on the refuge are an enforcement issue.

Certain activities evaluated by the refuge manager were determined not to be appropriate on refuge lands including: ATV, ORV and dirtbike use, competitions or organized competitive group events (e.g. fishing derbies, dog trials, or bike and ski races), and geocaching. Appendix C includes negative findings of appropriateness, which document the refuge manager's rationale.

Furbearer Trapping

The refuge is not open for trapping. However, we suspect that beaver trapping is occurring in some areas of the refuge. The NHFG and MDIFW have asked us to open refuge lands to furbearer trapping consistent with their respective state seasons. Those agencies maintain that trapping is a traditional, historic use in the area, was established well before the refuge was created, and was allowed by previous owners. They also promote trapping as a wildlife-dependent activity that is an effective tool for managing furbearer populations.

Off-road Vehicle Use

ORV and ATV use is not allowed on the refuge except by special use permit on a case-by-case basis to allow hunters with disabilities reasonable access to hunt and retrieve their game.

Partnerships

We have been involved in many partnerships since refuge establishment, which would not have been possible without the cooperation of the states of New Hampshire and Maine, timber companies, conservation organizations, private landowners, local elected officials, and town and county community leaders. Those partners continue to be active in land conservation for the common goal of maintaining the aesthetic, cultural, economic, and ecological values of the region for future generations.

Our partnerships continue to expand to include not only groups and individuals interested in land conservation, but also those interested in habitat and species management, recreation and visitor services, and education and public outreach. A list of our current partners follows.

Conservation organizations: Trust for Public Lands, TNC, ASNH, Loon Preservation Committee, New England Forestry Foundation, Mahoosic Land Trust, Society for the Protection of New Hampshire Forests, Androscoggin Watershed Council, Rangeley Lakes Heritage Trust, The Conservation Fund, Trout Unlimited;

Town and County Governments: Towns of Errol, Upton, Magalloway Plantation, and Coos County;

State agencies: NHFG, MDIFW, NHDRED, New Hampshire Office of Energy and Planning;

Private companies: FPLE, Wagner Forest Management; and,

Universities and other educational institutions and organizations: Dartmouth College, University of Vermont, University of Massachusetts, Hurricane Island Outward Bound, The Chewonki Foundation, and the Northwoods Stewardship Center.

Friends Group

The Friends of Umbagog National Wildlife Refuge assist in the development and implementation of interpretive programs and tours on the refuge. Members also participate in the annual Wildlife Festival and Take-Me-Fishing events. They are invaluable in supporting those priority programs and helping us respond to the requests for programs that far exceed our ability to meet them.

Volunteer Programs

Our active volunteer program involves student interns from all over the country, as well as local residents, clubs, and organizations.

Every summer and fall, we host three to four volunteer student interns, who are generally college-aged students or recent graduates. Interns spend 10 to 12

weeks assisting with various refuge projects in return for housing and a small stipend. Their duties include working on maintenance, collecting biological data, monitoring public use, leading nature walks and interpretive programs, helping with the Wildlife Festival and Fishing event, monitoring public use, designing educational displays, greeting the public, and maintaining the refuge GIS system.

Four or five volunteers, generally local or from elsewhere in New Hampshire, assist us each spring in surveying land birds, marsh birds, and shorebirds. Ten to 25 volunteers assist the refuge each year at the Wildlife Festival. Volunteers run information booths and lead birding tours (by canoes, pontoon boats, or walks). They also spend a day helping with various refuge projects. Past projects have included cleaning up the refuge and surveying for waterfowl broods, ospreys, eagles, and other raptors. Five volunteer local anglers also assisted with the first Take Me Fishing event in 2002. They set up displays, demonstrated fly-tying and fly-casting, and guided fishing trips on the lake.

Several organizations bring volunteer youth groups to perform service work on the refuge each summer. Those include Hurricane Outward Bound, The Chewonki Foundation, and the Vermont Leadership Center. Past projects have included clearing trails, building fences, and painting, assisting in biological surveys, and restoring campsites. Group sizes average from 5 to 10 volunteers.

Every year, anywhere from two to five individuals contact us to volunteer their help for one or more days. In the past, those volunteers have assisted with maintenance, biological surveys, public outreach and visitor services, the design of an interpretive trail, clerical work, and research. The duration of the work has varied from just a few hours up to 2 months. We provide housing for volunteers who contribute more than one day and come from locations that are more distant.

Youth Conservation Corps Program

We also host a YCC summer program, typically for 4 to 5 youth between the ages of 14 and 18. An adult coordinator is also hired to supervise them. The YCC program includes an environmental educational component in addition to their paid work assisting with refuge studies, facilities maintenance, and other activities. This is a popular program in the area, as summer outdoor employment for youth is limited.

*Youth Conservation
Corps crew
on the refuge*



Ian Drew/USFWS

Chapter 4



Ed Henry/USFWS

Sunset on Umbagog Lake

Management Direction and Implementation

Introduction and Management Program Highlights

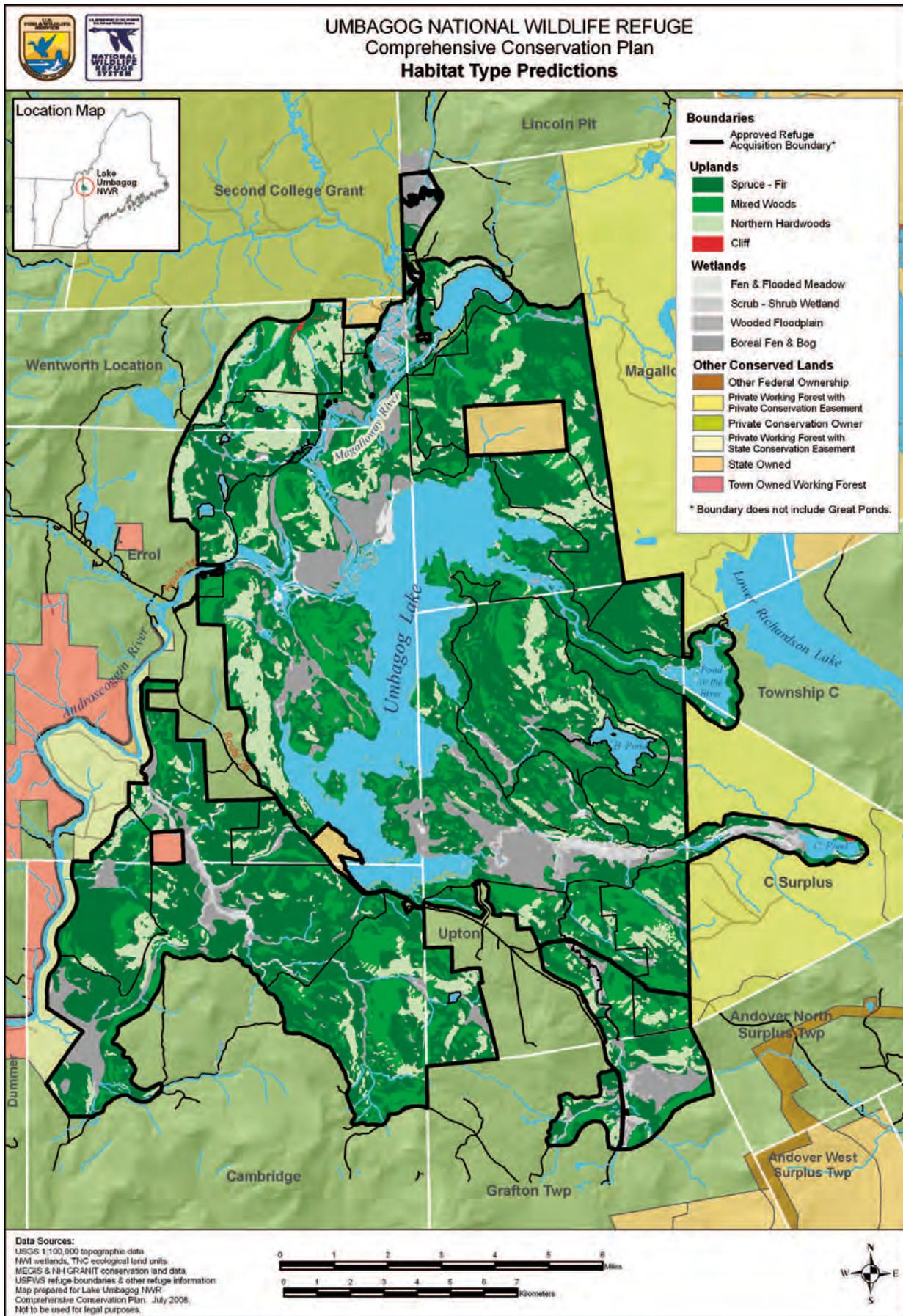
This CCP includes an array of management actions that, in our professional judgment, will be effective in achieving the refuge purposes, supporting the vision and goals for the refuge, making a major contribution to state and regional conservations plans, and addressing the issues identified in chapter 2. We believe it is reasonable, feasible, and practicable.

This plan is designed to emphasize the conservation of a mixed forest matrix landscape and its component habitat types for which we believe the refuge can make the most important ecological contribution within the Upper Androscoggin River watershed, the larger Northern Forest landscape, and the Refuge System. The habitat types we describe support a wide variety for Federal trust resources, in particular, birds of conservation concern identified in the BCR 14 ecoregional plan, including wetlands-dependent species. We identify “focal species” for each habitat type objective, whose life requirements will guide management activities in that respective habitat type. Focal species were selected because they are Federal trust resources whose habitat needs, in our opinion, broadly represent the habitat requirements for a majority of other Federal trust species and native wildlife dependent on that respective habitat type.

Appendix H describes in greater detail our process for selecting habitat types and focal species. Our objective statements for goals 1-3 below identify the habitat type, acres to be conserved, and the focal species that will be a target of our management. An accompanying rationale statement identifies each focal species’ particular habitat needs. The strategies represent potential management actions for accomplishing the objectives and meeting those habitat needs. Map 4-1 depicts the broad habitat types we predict would result after approximately 100 years of implementing our management objectives for upland habitats. Table 4.1 summarizes the acres by habitat type we expect to have on the refuge with full implementation of our management and refuge expansion plans.

Table 4.1. Habitat types predicted under full implementation of the CCP

Habitat Type	Current Refuge Acres*	Additional Acres Planned for Acquisition Within Approved Refuge Boundary	
		Fee Acquisition	Easement Acquisition
Fen and Flooded Meadow	487	182	20
Boreal Fen and Bog	1,235	2,444	407
Northern White Cedar	829	202 ⁺	0 ⁺
Scrub-Shrub Wetlands	682	1,048	77
Open Water** and Submerged Aquatic Vegetation ⁺⁺	5,033	847	23
Wooded Floodplain	1,140	276	13
Lakeshore Pine-Hemlock	232	288 ⁺	0 ⁺



Habitat Type	Current Refuge Acres*	Additional Acres Planned for Acquisition Within Approved Refuge Boundary	
		Fee Acquisition	Easement Acquisition
Spruce-Fir Forest	2,346	15,432	11,085
Mixed Woods	3,859	7,675	5,731
Northern Hardwood Forest	4,640	5,232	3,611
Recently Harvested	1,058	551	0+
Fields, Residences and other Developments	109	145	0+
Totals	21,650 acres	34,322 acres	20,967 acres
Grand Total		76,939 acres	

*As of January 1, 2008; all but 6 acres is Service-owned in fee title

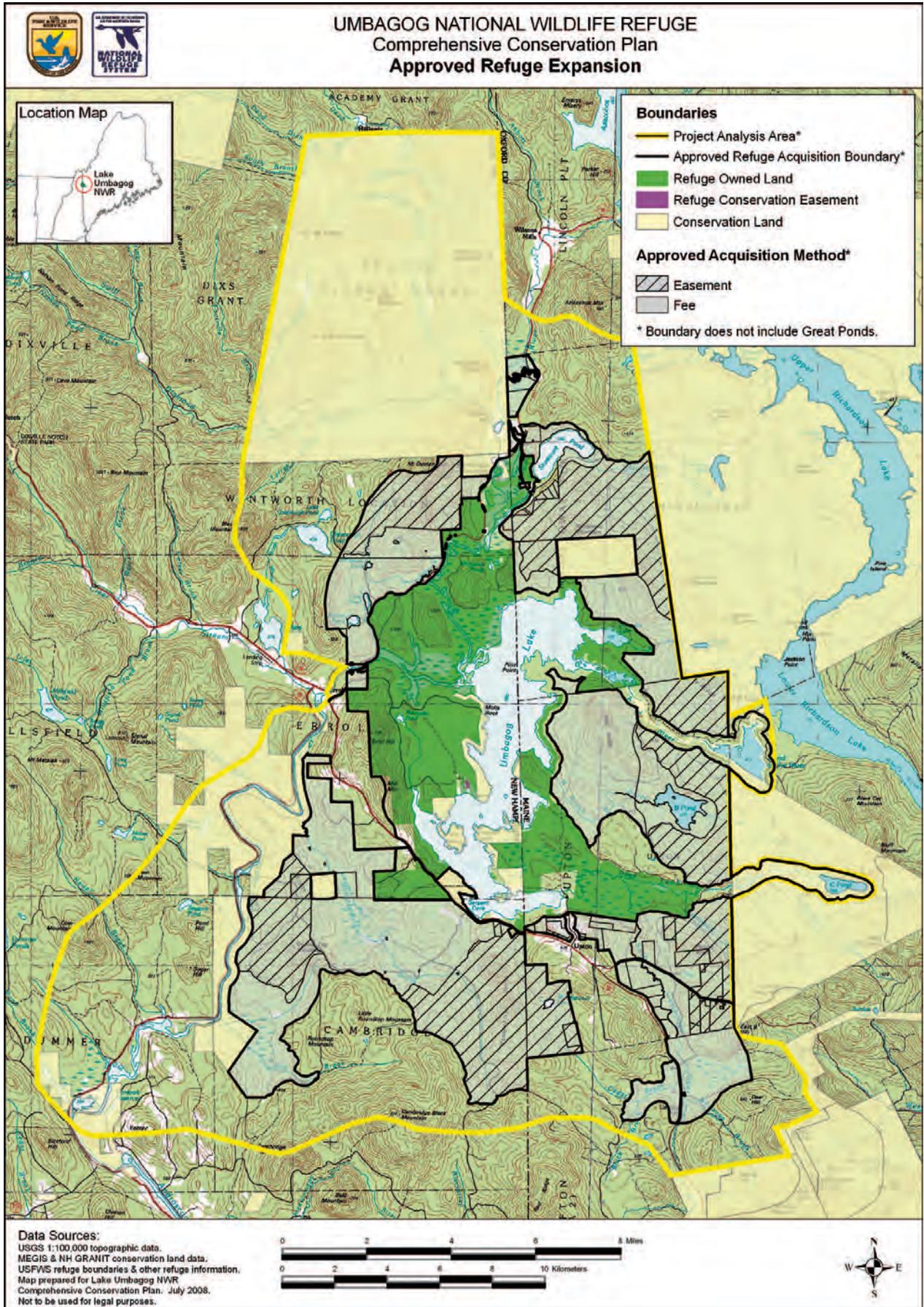
+There may be additional small patches not discernable on aerial photos

** Open water does not include Great Ponds in either state, but does include acres under rivers and other small water bodies. Refuge ownership on Umbagog Lake includes all acquired shoreline extending to the original Great Ponds, which existed before the lake's impoundment.

+ Floating leaved and submerged aquatic vegetation communities have not been mapped, but likely include associations in the following NVCS alliances: White water-lily-Yellow pond-lily species Permanently Flooded Temperate Herbaceous Alliance, and the Pondweed species-Coontail species-Waterweed species Permanently Flooded Herbaceous Alliance.

Keeping with the original purposes for which the refuge was established, the wetlands objectives under goal 1 are our highest priority biological objectives to implement. Protecting the biological integrity, diversity, and environmental health of Umbagog Lake and its associated rivers is paramount. As our second highest habitat management priority, we will implement the objective under goal 3, which will promote and sustain a mixed forest matrix; that is, a mosaic of spruce-fir, mixed woods, and northern hardwood habitat types, with emphasis on promoting the conifer component. Our analysis indicates that the refuge is in a unique position, based on site capability and natural potential, to make an important contribution to the mixed forest matrix in the watershed, as well as in the larger Northern Forest landscape, and within the Refuge System. As our third habitat management priority, we plan to implement those actions that would improve American woodcock habitat. These actions are identified under objectives 1.4, 2.1 and 3.1.

In support of these priorities, and our other habitat goals and objectives, this plan has expanded the existing, approved refuge boundary by 47,807 acres through a combination of Service fee-simple (56%) and conservation easement (44%) acquisitions (map 4-2). All lands proposed for acquisition are: predominantly undeveloped; either are or have the potential to be high quality wildlife habitat; occur in an amount and distribution to provide us management flexibility to achieve our habitat goals and objectives; and, would collectively result in a land base that affords a vital linkage to other conserved lands in the Upper Androscoggin watershed and Northern Forest region. As we acquire lands in fee, we would manage them by the goals, objectives, and strategies outlined in this chapter.





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Fishing on Umbagog Lake

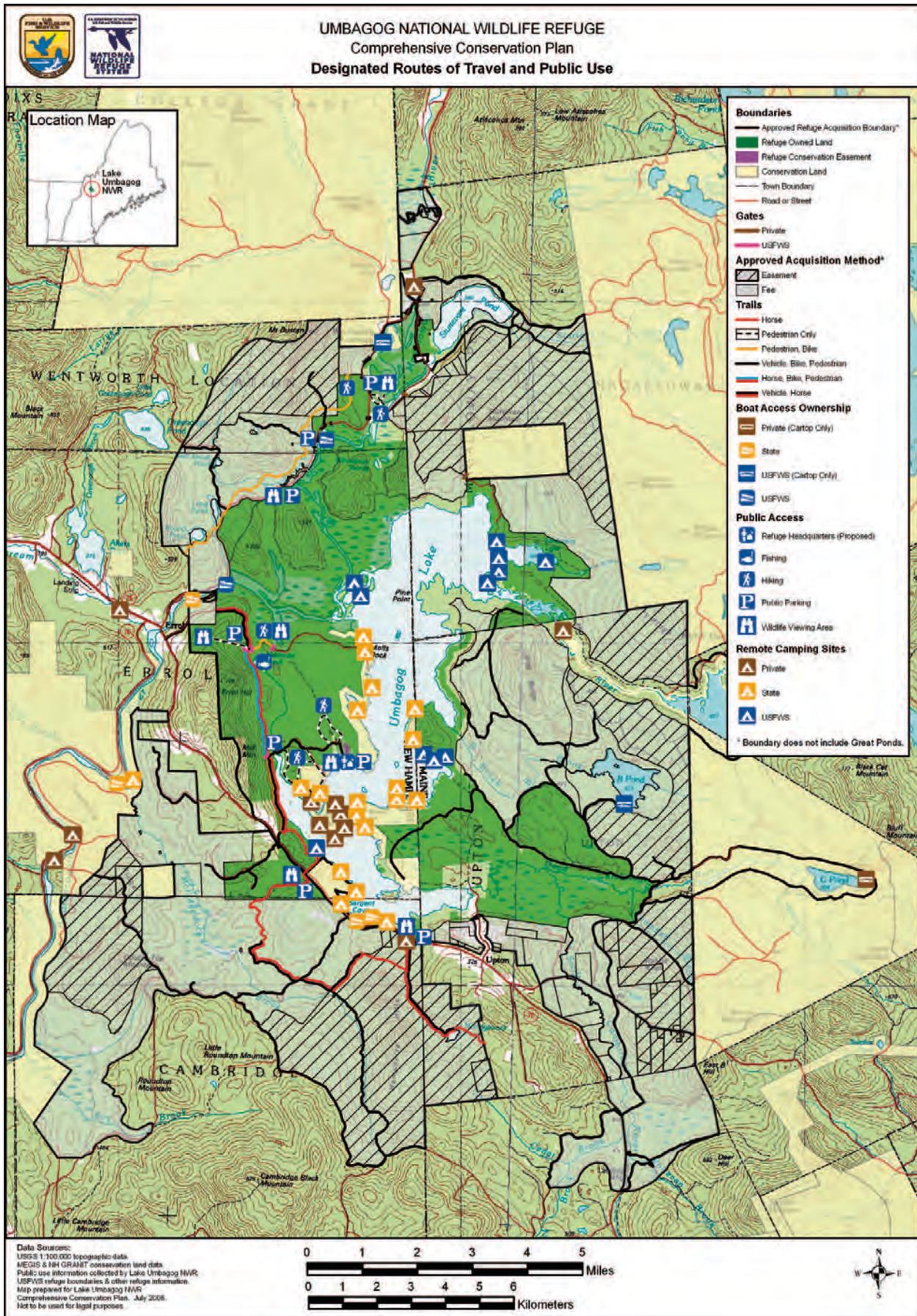
Our land conservation objectives are the result of a very active regional partnership and fully complement the management on adjacent conserved lands, both public and private. The plan also complements the original purpose and intent for which the refuge was established. Appendix A, “Land Protection Plan” (LPP), identifies the significance of the refuge expansion in contributing to the current and planned network of conservation lands and wildlife resources in the regional landscape. Working in partnership with these surrounding landowners is critical to its successful implementation. The detailed strategies in the LPP were developed cooperatively with our state fish and wildlife agency partners, and supported by our other land conservation partners working in the Northern Forest region.

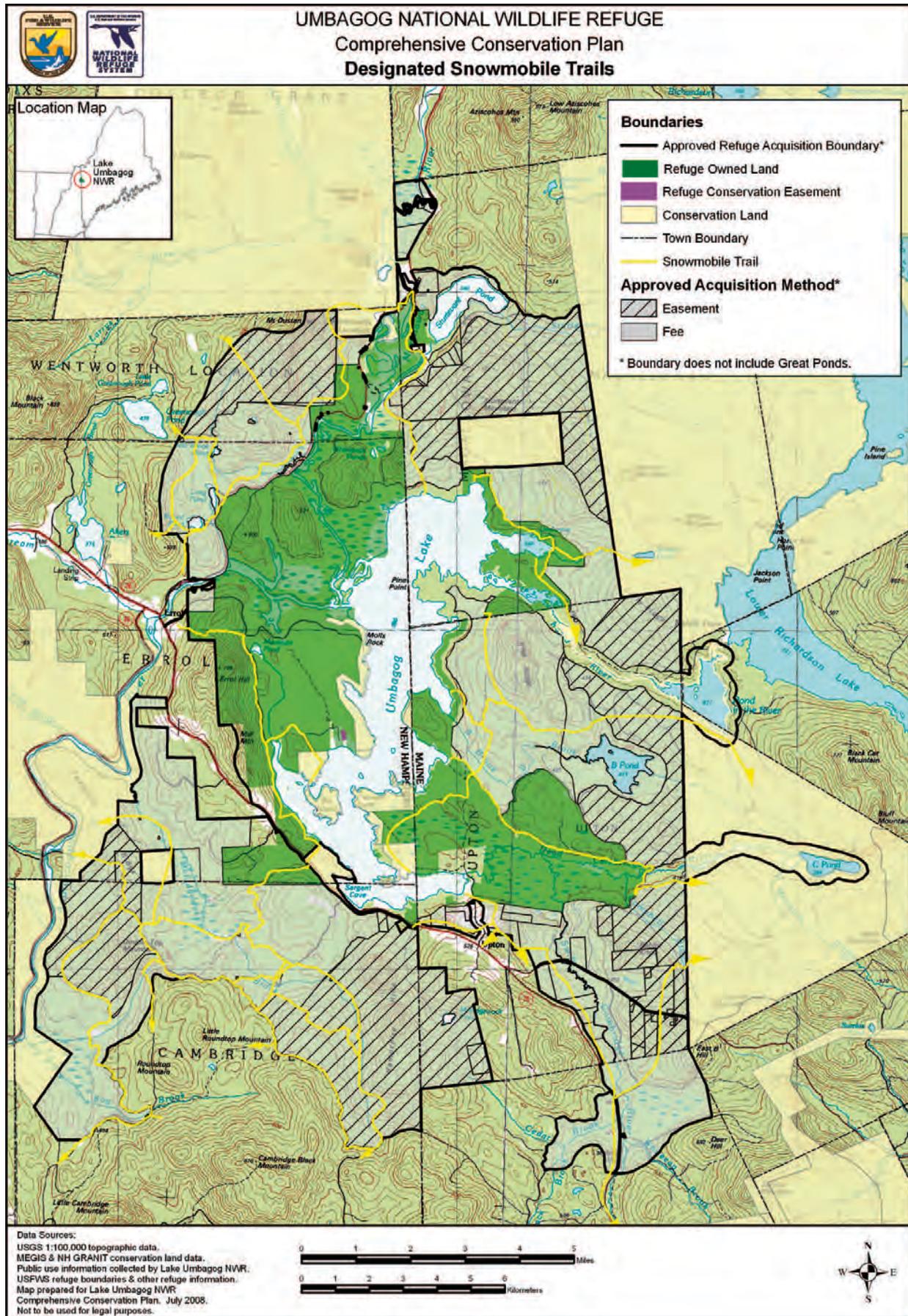
Regarding our visitor services programs, this CCP will enhance the existing priority public use opportunities for hunting and fishing by providing better outreach and information materials, and improving access and parking (maps 4-3

and 4-4). Opportunities for wildlife viewing, photography, and interpretation will be expanded primarily by providing new infrastructure such as trails and viewing areas. In addition, new roadside pullouts, informational kiosks, and viewing platforms are planned along the major travel corridors. Further, new visitor infrastructure, including a series of interpretive trails, will be developed in conjunction with the planned new location for a refuge administrative headquarters and visitor contact facility at the former Potter Farm site. We will also pursue a partner-managed, regional visitor contact facility in the Town of Errol.

Concerning other refuge uses, we will continue to allow snowmobiling on the existing designated trails. Remote camping on the existing, 12 designated lake sites will also continue to be allowed and managed cooperatively with NH DRED, although we will increase monitoring of individual sites, and rehabilitate or relocate those lake sites in need of restoration. We will eliminate the two river sites, and not replace them. In summary, we do not plan to increase opportunities for either snowmobiling or camping.

Lands we acquire in the future in the new approved refuge boundary area will be open to long-term public access for compatible, priority public uses such as: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. We will maintain open the major road corridors as designated routes of public travel in the approved refuge expansion lands to facilitate access to these and other allowed, compatible refuge activities (maps 4-3 and 4-4).





General Refuge Management

We primarily developed our management direction hierarchically, from goals to objectives to strategies. However, we also found that some important actions either relate to multiple goals or represent general administrative or compliance activities. We present those below.

Coordinating Umbagog Lake Water Level Management

We will continue to work cooperatively with the FERC licensee of the Errol Project, which is currently FPLE. Specifically, under Article 27 of the current license, we will continue to develop a yearly water level management plan with the licensee and other regulatory agencies “to benefit nesting wildlife.” While we and others have expressed concerns about the impacts from fluctuating water levels, these concerns have not been evaluated and researched in sufficient detail for us to seek to modify the current water level plan. As such, we will continue to promote stable water levels during the nesting season to the extent possible. We will also work to complete a Memorandum of Understanding (MOU) with FPLE to coordinate activities within the FERC boundary. In addition, although not binding under the current license, we will continue to recommend to FPLE that they voluntarily manage water levels at other critical times of the year (e.g. during fall migration) to benefit wildlife.

Under objective 1.5, we have identified several future studies and inventory and monitoring projects that will assist in evaluating the impacts from water level fluctuations. Implementing this activity supports refuge goals 1 and 7 relating to the conservation of open water, submerged aquatic vegetation, and wetlands habitats and developing our research program.

Creating an Umbagog Lake “Working Group”

Within 3 years of CCP approval, we will facilitate the development of an Umbagog Lake Working Group. Members will include representatives from those state and federal agencies with management authority of the lake and its natural resources and recreational opportunities, as well as the holder of the FERC license, FPLE. The mission of the group will be to voluntarily coordinate, facilitate, and/or streamline management as a partnership to reduce resource threats and resolve user conflicts on the lake and associated rivers. This partnership will not function as a regulatory or enforcement entity, although members may propose changes in existing regulations to their respective regulatory authorities to facilitate a management goal. Some of the priority projects for the working group to consider are listed below; additional strategies are included under goal 6, objective 6.2.

- Work with states to eliminate the use of lead fishing tackle; in conjunction, evaluate the potential for wildlife to ingest lead (bio-availability) from this and other sources in the surrounding lake and rivers;
- Work with State of New Hampshire to evaluate no-wake exemption on Magalloway and Androscoggin rivers which allows high speed boat operation within 150 feet of shoreline;
- Cooperatively evaluate area closures to determine if changes to current protection measures are warranted;
- In coordination with states of Maine and New Hampshire agencies, conduct outreach at known user conflict sites such as the Rapid River, and boat launch sites;
- Develop boater ethics programs for the lake and rivers and develop outreach materials for distribution at boat launch sites; and,
- Identify sources of point and non-point sediment and nutrient loading (e.g. septic systems, erosion, forest and other land use practices, etc) impacting refuge wetlands, Umbagog Lake, and associated lakes and rivers, and address these impacts where possible.

Maintaining Partnerships

We support partnerships to the fullest extent possible, and therefore will maintain existing partnerships identified under goal 6, while also seeking new ones. These relationships are vital to our success in managing all aspects of the refuge, from conserving land, to managing habitats and protecting species, to outreach and education, and providing wildlife-dependent recreation. The NHFG and the MDIFW have been particularly important and valued partners. We will pursue new partnerships in areas of mutual interest that benefit refuge goals and objectives. We highlight two partnership efforts below. Implementing this program supports all refuge goals, with particular emphasis on goal 6 relating to conserving and managing wildlife resources through partnerships.

Land Conservation

One of our biggest partnership programs is focused on land conservation in the region. The decision document establishing the refuge (USFWS 1991) emphasized that the refuge was part of a larger conservation partnership to protect and manage timber, wetland, and wildlife resources of the Umbagog area. We carry that emphasis forward in the present plan. We will continue our participation in those partnerships with the goal to permanently protect and sustain Federal trust resources and other unique natural resource values in the Umbagog area and the Northern Forest ecosystem. An important component of this goal is an objective to improve connectivity between existing conservation tracts and preserve working forest and public access. Conservation partnerships in the region have evolved into a dynamic, landscape-level, multi-partner effort.

The list of partners is extensive and includes the Service, other Federal agencies, state agencies, private conservation organizations, local communities, private landowners, and private businesses. Appendix A, the LPP, includes a detailed description of some of the important accomplishments, as well as some current land conservation projects.

Community Relations

We will continue to work within community forums such as the Umbagog Area Chamber of Commerce and town meetings, and other venues. In addition, we will host one informal meeting each quarter in the local area to share information or discuss topics of interest with residents, visitors and local officials.

Expanding and Protecting the Floating Island National Natural Landmark

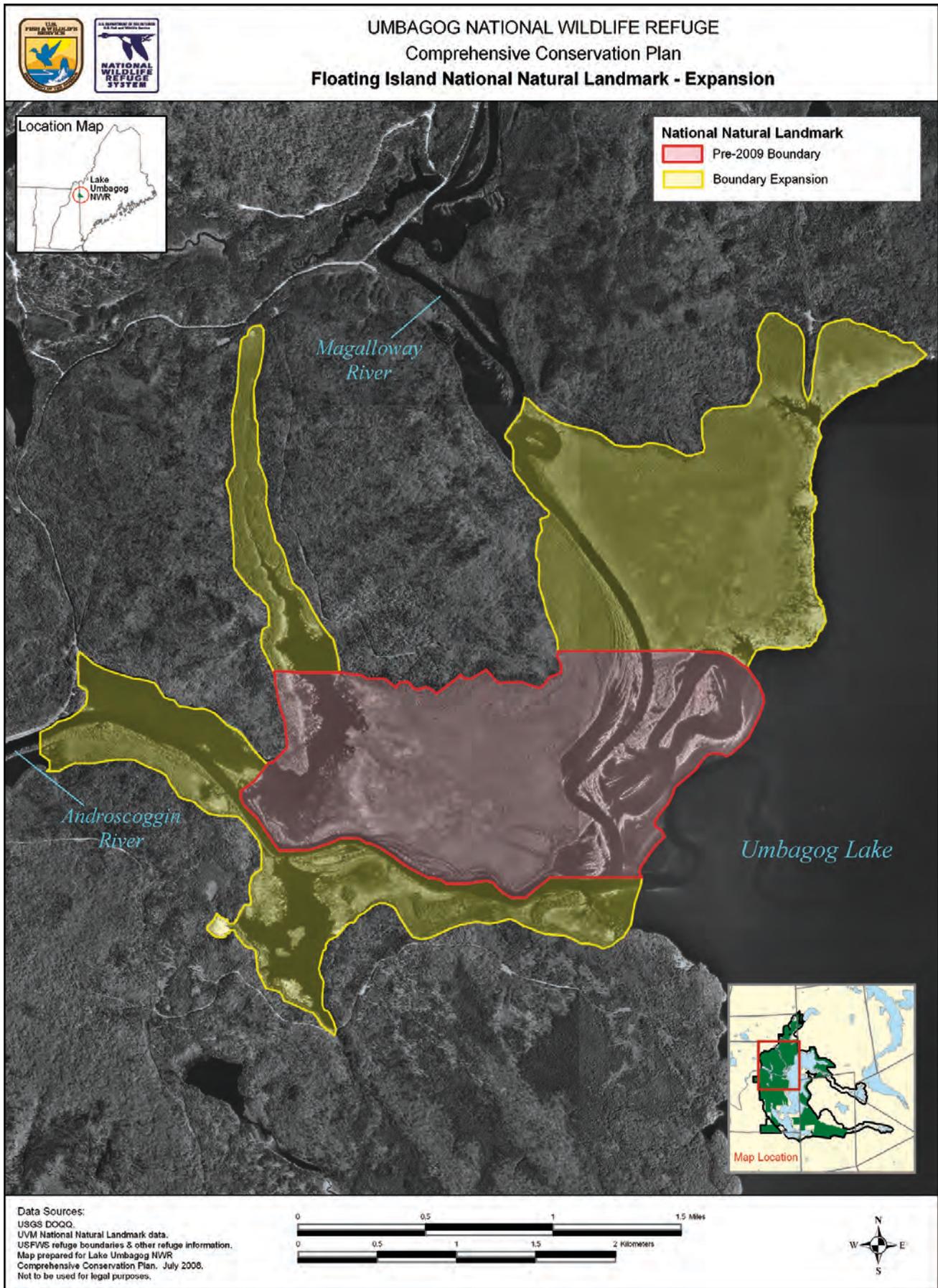
In chapter 3 we describe the establishment of the Floating Island National Natural Landmark (FINNL) in 1972. It was chosen by the National Park Service (NPS) as an example of an exemplary native bog community. It is currently 860 acres and lies entirely within the refuge boundary.

In cooperation with the NPS, we will expand the boundary of the FINNL to one that is more ecologically-based using the 2002-2003 vegetation survey results (see map 4-5). This new boundary encompasses 2,181 acres. Within 5-10 years of CCP approval, we will conduct all administrative procedures with NPS to expand the boundary and convene a workshop with wetlands ecologists to determine what information should be collected and what monitoring should occur to document any potential loss or degradation of the area. We will also establish a baseline from which to compare subsequent information.

Implementing this program supports refuge goals 1 and 7 relating to the conservation of open water, submerged aquatic vegetation and wetland habitats, and research.

Controlling Invasive Species

The Refuge System has identified management to control the establishment and spread of invasive species as a national priority. Fortunately, on this refuge, the threat is currently low. However, our objective is to ensure no new invasive species become established, and we will manage to control the spread of what does exist. To the extent possible, we will physically remove invasive species



where they are encountered. Although we have not previously had the need, we propose to use approved herbicides when determined by the refuge manager to be necessary to control invasive plants, after regional office review and approval. Of particular concern on the refuge are purple loosestrife, *Phragmites*, Eurasian milfoil, and Japanese knotweed.

In conjunction with the HMP and IMP, we will develop a list of invasive species of greatest concern on the refuge, identify priority areas with which to be vigilant, and establish monitoring and treatment strategies. We will refer to the National Wildlife Refuge System Invasive Species Management Strategy released in May 2004 (USFWS 2004b) for additional tools, processes, and strategies. The 2004 report is complemented by a technical report issued in May 2005 by USGS, titled: The Invasive Species Survey: A Report on the Invasion of the National Wildlife Refuge System (USGS 2005). These reports together give both a status review and a management strategy for combating invasive species. In addition, we will stay abreast of Service policy revisions currently being reworked to facilitate implementation. Other strategies include:

- Survey the Floating Island National Natural Landmark (FINNL) and other unique or rare plant communities as a priority to ensure invasive plants do not threaten the integrity of these sites and implement treatments as warranted (see additional discussion on FINNL below);
- Institute proper care of all refuge equipment to avoid introduction or transport of invasive plants;
- Require researchers on the refuge to take steps to prevent transport of aquatic invasive plants and pathogens;
- Continue to work with state agencies to prevent introduction of invasive species to all water bodies on the refuge;
- Increase enforcement to check boats and equipment to protect against invasive plant transport;
- Implement outreach and education programs, including signage, where appropriate, and actively support state initiatives on this topic; and,
- Develop special regulations on the refuge as warranted to control spread of invasive species.

Implementing this program supports refuge goals 1-3 relating to the conservation of open water and submerged aquatic vegetation, wetlands, floodplain and lakeshore, and upland forest habitats.

Implementing and Prioritizing a Biological Monitoring and Inventory Program

Establishing a foundation of information, or a baseline, from which to make management decisions is critical to achieving our goals. There is much we would like to know about the refuge's resources, including how they function or move across the landscape, and what threatens them, including climate change. Unfortunately, there is not enough time or funding to accomplish all we would like to know. There are several studies we initiated recently, or plan to initiate, as soon as funding is available, including:

- Visitor use (initiated in 2007);
- Wildlife disturbance study (initiated in 2007);
- Other top priority activities we have identified as funding allows include:

- ◆ Conducting an ecological systems analysis to identify the ecological processes that historically and currently influence the lake, determine lake bathymetry, identify wetlands functions and measures of integrity, and evaluate water quality; and,
- ◆ Initiating a baseline contaminants assessment.
- ◆ Identifying what inventory methods should be implemented to confirm the status and critical components necessary to sustain focal species and habitats identified in objective statements. Prioritize list and begin implementing by re-directing refuge biologist's time to priority inventory and monitoring activities;
- ◆ Continuing to coordinate with state agencies and FPLE in the monitoring of bald eagle, osprey, and loon nests, and to evaluate the effectiveness of our protection measures. Objectives 1.6 and 2.3 identify the protection measures we currently implement, or plan to implement, to protect these birds from human disturbance during the nesting season; pursue expanding this cooperative monitoring effort to forest dependent raptors suspected to be in decline;
- ◆ Determining whether a monitoring or inventory program on the refuge is warranted for lynx. Within 3 years of CCP approval, we will work in cooperation with the Lynx Recovery Team to evaluate refuge habitats. We will implement an inventory and/or monitoring program if there is consensus on habitat values. If survey results are favorable, and recovery experts agree the refuge can make an important contribution to lynx recovery, we will amend the HMP to include measures to sustain and enhance habitat for lynx; and,
- ◆ Developing a program to inventory and monitor unique areas. See discussion below on "deer wintering areas," "vernal pools" and the "Floating Island National Natural Landmark."

Implementing this program supports refuge goals 1-3 and goal 7, relating to the conservation of open water and submerged aquatic vegetation, wetlands, floodplain, lakeshore, and upland forest habitats, and developing a research program.

Protecting Vernal Pool Communities and other Unique or Rare Communities

Vernal pools and other unique or rare natural communities are important to the health, integrity, and biodiversity of the Upper Androscoggin watershed. Despite the small size, patchiness, and ephemeral nature of some of these habitats, their value is disproportionately significant.

Our objective is to conserve and maintain all natural vernal pools, including those pools embedded in wetland or riparian habitats, on existing refuge lands and within the refuge expansion area. Also, we will conserve and protect cliffs, talus slopes, and other unique, significant, or rare upland habitat types identified by Maine Natural Areas Program (MNAP) and New Hampshire Natural Heritage Inventory (NH NHI) on these same lands.

Strategies:

Within 5 years of CCP approval:

- Complete inventory for vernal pools and map in GIS. At a minimum, prior to any forest management activities, survey stands for vernal pools and ensure best management practices are followed;

- Establish criteria for ranking vernal pools as to their conservation concern and need for management based on size, location, threats, productivity, seasonality, species diversity, and other parameters;

Within 7 years of CCP approval:

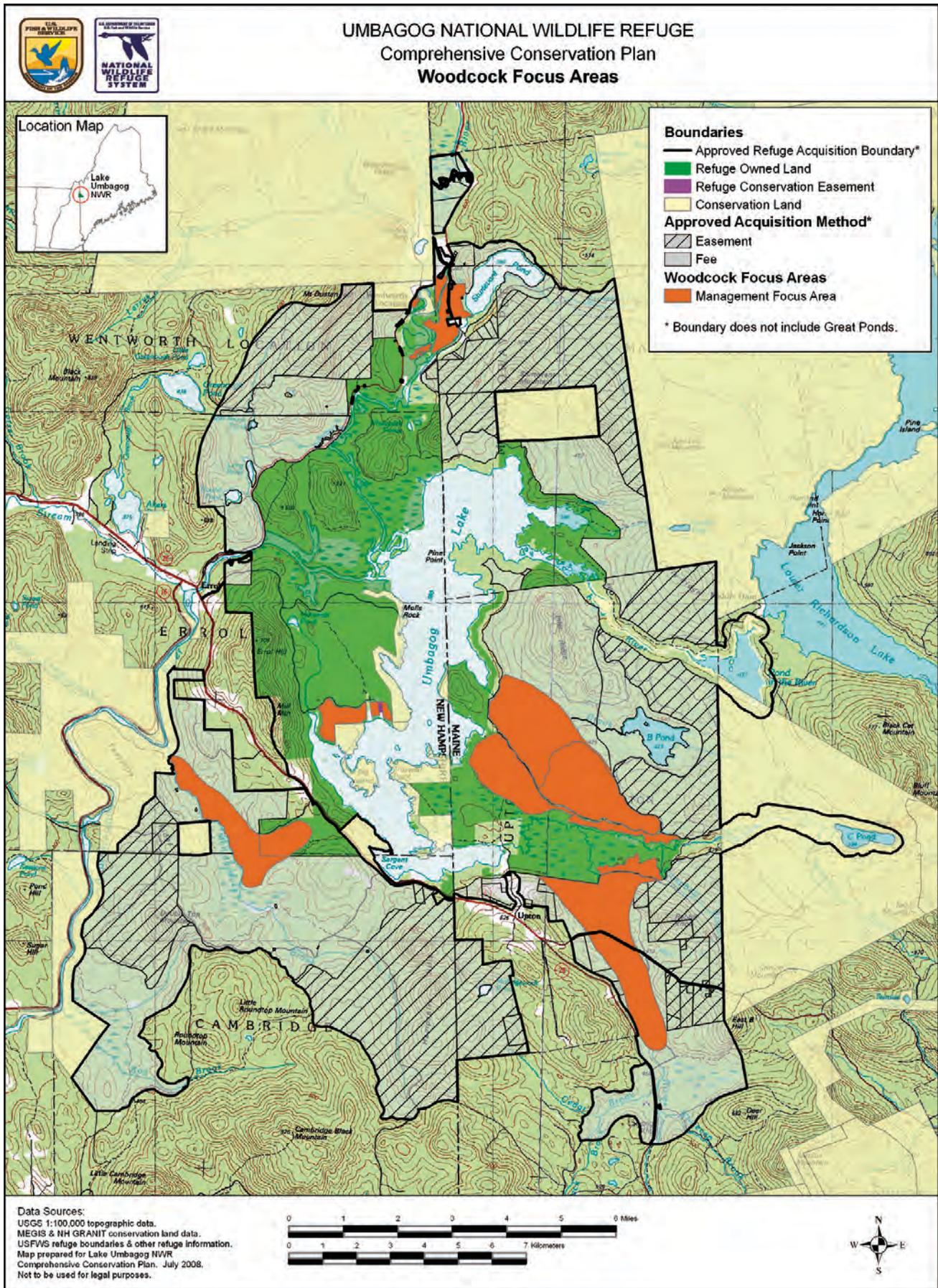
- Develop and implement management standards and guidelines to conserve vernal pool habitat; determine which pools should be protected by a no-disturbance buffer vs. those that should be managed and restored;
- Evaluate effectiveness of management and protection zones;
- Promote vernal pool conservation in refuge outreach programs;
- Cooperate with NH NHI and MNAP to inventory and map the other rare and unique types in a GIS database; develop standards and guidelines for the protection and management of these types

Implementing this program supports refuge goals 1-3 relating to the conservation of open water and submerged aquatic vegetation, wetlands, floodplain and lakeshore, and upland forest habitats.

Implementing Forest Management to Achieve Habitat Objectives

We will use forest management, including tree cutting, as one of several tools to achieve respective habitat objectives for the Federal trust resources, specifically the refuge focal species, identified in goal 3. All commercial and non-commercial tree cutting will adhere to accepted silvicultural prescriptions, and the best management practices in each respective state at a minimum. Management activities will be planned to ensure that habitat for species requiring large, unfragmented habitat blocks is not compromised. Appendix E, “Forest Management Guidelines” describes desired future conditions, silvicultural methods and treatments and other operational guidelines we will use, and identifies locations for management. However, these details may be refined as we acquire site-specific stand exam data.

We expect that forest management to support habitat and focal species objectives in the next 15 years will primarily occur on Service-owned fee lands within the current, approved refuge boundary and in the management units identified in appendix E. In particular, at this time we do not predict that we would conduct any commercial tree cutting in the expansion areas during the 15 year life of this CCP for several reasons. We cannot accurately predict, but assume it is years away, when we would acquire forest tracts large enough to make a meaningful forest management unit and to create an economically-viable, commercial harvest operation. In addition, once acquired, and assuming funds are available for project work, we would need to conduct a stand exam; map habitat management units and management operational zones; develop management prescriptions; conduct field site-prep and layout work; and, write and implement a contract. However, more importantly, it is our expectation that any forested lands acquired in the expansion areas within the next 15 years, would be harvested to a low stocking density by the current owner before property transfer, and thus, would preclude a commercial harvest in support of our management objectives. This has been our experience with past refuge acquisitions of forested lands. As a result, we predict at this time that our management activities in the expansion areas, within the 15 year life of this CCP, would be more pre-commercial operations in nature, such as thinning, habitat restoration (e.g. restoring log landings, slash piles, etc), and/or vegetation manipulations to create openings and enhance woodcock habitat in woodcock focus areas (map 4-6).



Prior to implementing any forest management, we will collect detailed stand-level information in forest management areas to ensure that management prescriptions and decisions are based on the best available information. We would also evaluate the effects of our management on a refuge-wide scale, to ensure that management activities do not adversely impact species requiring unfragmented habitat. Additional strategies are noted below in the detailed descriptions of objectives under goal 3. Implementing this program supports refuge goal 3 relating to the conservation of upland forest habitats.

Strategies:

- Hire a forester and begin a detailed forest inventory and stand map on currently owned refuge lands; within 4 years of CCP approval, complete a forest management plan, amending the HMP as warranted. Consider using a contractor to conduct field work if a forester position is not filled, so that timeframes can be met.
- On lands we acquire in the future with management potential, and if they are acquired in at least 200 acre contiguous, viable management units, we would plan to complete a stand-level evaluation, and map habitat management units and management operational zones within 2 years of acquisition; amend the HMP as warranted.

Implementing a Furbearer Management Program

Our objectives under goals 1 through 3 discuss specific habitat conditions and bird breeding densities (e.g. nesting pairs) and productivity goals. There are times when individual furbearing animals, or local concentrations of those animals, impact our ability to achieve priority resource objectives. Protecting human health and safety, maintaining roads, trails, houses and other infrastructure, as well as concerns with impacts on other native wildlife and habitats are a few of the other reasons furbearers might need to be managed. Both non-lethal and/or lethal techniques could be employed in any given situation.

We will analyze each situation where these techniques are needed and choose the most appropriate method to achieve our goals. Trapping is one tool that could be used at the refuge manager’s discretion to achieve an administrative or resource management objective. We intend to consider public trapping as an option in the future to achieve our goals if active management is identified; however, the actual details of developing and implementing a program would require further analysis of possible alternative methods, and would be laid out in a Furbearer Management Plan in a separate NEPA process. Implementing a comprehensive furbearer management program supports refuge goals 1-3 relating the conservation of open water and submerged aquatic vegetation, wetland, floodplain, lakeshore and upland forest habitats.

Strategies:

- Within 3 years of CCP approval, begin NEPA analysis, including public involvement, associated with developing a Furbearer Management Plan; establish furbearer management units as warranted; identify where habitat management or reintroductions, increases, or reductions of native furbearer species, such as beaver, is desirable.
- Work with States of New Hampshire and Maine to determine population estimates and how refuge fits into the state’s management strategies.

Removing Unnecessary Structures and Site Restoration

Our management goals and objectives include restoring to natural conditions, as soon as practicable, developed sites that are no longer needed for refuge administration or programs.

Strategies:

- Within 3 years of acquiring a new land parcel, remove dwellings, such as cabins or other developed sites or structures, if determined they are surplus to refuge needs and assuming funding is available. Re-grade sites to natural topography and hydrology and re-vegetate to establish desirable conditions.

Within 3 years of CCP approval, complete demolition of the 12 camps with structures already acquired by the refuge.

- Within 5 years of CCP approval, inventory and assess all access roads within the refuge, and on any newly acquired lands, and implement procedures to retire and restore unnecessary forest interior and secondary roads to promote watershed and resource protection. All off-road (ORV) and all-terrain vehicles (ATV) trails, and all unauthorized snowmobile trails, will be eliminated.

Implementing this program supports refuge goals 2-3 relating to the conservation of floodplain, lakeshore and upland forest habitats.

Assessing Refuge Staffing and Administration Needs

Annual staffing and operations and maintenance funds between 2002-2007 are presented in chapter 3. Below we describe activities related to staffing and administration; some are new, others are on-going. Implementing these activities supports all seven refuge goals.

Permanent Staffing and Operational Budgets

Our objective is to sustain annual funding and staffing levels that allow us to achieve our refuge purposes, as interpreted by the goals, objectives, and strategies. Many of our most visible projects since refuge establishment, including land acquisition, were achieved through special project or “earmarked” funds that typically have a 1- to 2-year duration. While these funds are very important to us, they are limited in their flexibility since they typically can not be used for any other priority project that may arise.

In response to Refuge System operational funding declines nationwide, our region initiated a new base budget approach in 2007. The goal is to have a maximum of 75% of a refuge station’s budget cover salaries and fixed costs, while the remaining 25% or more will be operations dollars. The intent of this strategy is to improve the refuge manager’s capability to do the highest priority project work and not have the vast majority of a refuge’s budget tied up in inflexible, fixed costs. Unfortunately, in a stable or declining budget environment, this may also have implications to the level of permanent staffing.

Appendix F of the Final CCP/EIS lists our RONS and SAMMS construction and maintenance projects currently in those databases, and indicates the regional and refuge ranking. We also included new projects not yet in the databases, which we plan to implement as part of this CCP. If funding for these projects is not available, we will seek alternate means of accomplishing our projects; for example, through our volunteer program, challenge cost share grants, or other partnership grants, and internships. The SAMMS projects include a list of backlogged maintenance needs. Both databases will be updated in 2009. Contact refuge headquarters for the most up-to-date information.

Within the guidelines of the new base budget approach, we will seek to fill our currently approved, but vacant positions which we believe are needed to accomplish our highest priority projects. We plan to add additional staff to provide depth in our biological and visitor services programs. We identify our recommended priority order for new staffing in the RONS tables in appendix F of the Final CCP/EIS. We also seek an increase in our maintenance staff since they provide invaluable support to all program areas. Appendix D, “Staffing Chart,” identifies our plan for current and future staffing growth.

Facility and Fleet Maintenance

Included in the following objectives and strategies are the plans for periodic maintenance and renovation of existing facilities to ensure the safety and accessibility for staff and visitors. Our current facilities are described in chapter 3. They include administrative facilities such as refuge quarters, refuge office and the maintenance shop off Mountain Pond road. Visitor facilities to be maintained include: the 1/3 mile Magalloway River trail and new ¼ mile extension, sign, and viewing platform; and, 2 roofed, wooden information kiosks. A Magalloway River canoe trail and launch site project will be completed in 2009 and will also require periodic maintenance. Any new facilities planned in this CCP, once constructed, will be placed on the maintenance schedule. All facilities and fleet maintenance and upgrades will incorporate ecologically beneficial technologies, tools, materials, and practices.

Refuge Operating Hours

The refuge will be open for public use from ½-hour before sunrise to ½-hour after sunset, seven days a week, to ensure visitor safety and protect refuge resources. The only regular exception is for overnight use by visitors with camping permits in designated camping sites. However, the refuge manager does have the authority to issue a special use permit to allow others access outside these timeframes. For example, research personnel or hunters may be permitted access at different times, or organized groups may be permitted to conduct nocturnal activities, such as wildlife observation, and educational and interpretive programs.

Permitting Special Uses, Including Research, Economic Uses and Camp Leases

The refuge manager must evaluate activities that require a special use permit for their appropriateness and compatibility on a case-by-case basis as applications for permits are received. All research, commercial or economic uses, and camp leases require special use permits. Implementing this program supports refuge goals 1-3 relating to the conservation of open water and submerged aquatic vegetation, wetland, floodplain, lakeshore and upland forest habitats, and goal 6, relating to conserving and managing wildlife resources through partnerships. Our intent with some of these activities is described below.

Research

Research on species of concern and their habitats will continue as a priority, assuming the detailed proposals meet appropriateness and compatibility thresholds. Generally, we will approve permits that provide a direct benefit to the refuge, or for research that will strengthen our decisions on managing natural resources on the refuge. The refuge manager also may consider requests that do not relate directly to refuge objectives, but to the protection or enhancement of native species and biological diversity in the region and support the goals of the Umbagog Lake Working Group, or recognized ecoregional conservation team, such as the Atlantic Coast or Eastern Brook Trout joint ventures.

All researchers will be required to submit detailed research proposals following the guidelines established by Service policy and Refuge staff. Special use permits will also identify the schedules for progress reports, the criteria for determining when a project should cease, and the requirements for publication or other interim and final reports. All publications will acknowledge the Service and the role of Service staff as key partners in funding and/or operations. Researchers will be required to take steps to ensure that invasives and pathogens (particularly aquatic invasive plants and pathogens) are not inadvertently introduced or transferred to the Umbagog system. We will ask our refuge biologists, other divisions of the Service, USGS, select universities or recognized experts, and states of New Hampshire and Maine agencies to peer review and comment on research proposals and draft publications, and will share research results internally, with these reviewers, and other conservation agencies and organizations. To the extent practicable, and given the publication type, all research deliverables will conform to Service graphic standards.

Some projects, such as depredation and banding studies, require additional Service permits. The refuge manager will not approve those projects until all required permits are received and the consultation requirements under the Endangered Species Act (ESA) have been met.

Commercial and Economic Uses

All commercial and economic uses will adhere to 50 CFR, Subpart A, §29.1 and Service policy which allow these activities if they are necessary to achieve the Refuge System mission, or refuge purposes and goals. Allowing these activities also requires the Service to determine appropriateness and prepare a compatibility determination and an annual special use permit outlining terms, conditions, fees, and any other stipulations to ensure compatibility.

Cabin (Camp) Leases

No modifications are planned for the 29 cabin lease agreements that currently exist under special use permit. These permits are renewed every year, assuming the terms of the permit are met, and until the 50 year lease is up. In addition, there are 4 properties under life-use agreements within the refuge boundary which are observed as private landholdings until the end of their life use.

- The cabin leases include certain conditions, such as (1) the camps must be maintained in a manner compatible with the purposes of the refuge and produce the least amount of environmental disturbance; and, (2) no new permits will be issued for construction of new camps on the properties. Most of these structures were built as summer fishing camps or seasonal cottages, but some have become year-round cottages. All the camp leases expire in 50 years from date of Service acquisition.

Changing the Refuge's Name

With approval of this CCP, the name of the refuge will officially change to "Umbagog National Wildlife Refuge" for several reasons. The refuge consists of lake, riverine, and significant uplands habitats. The current name focuses entirely on the lake. In addition, the approved expansion includes more riverine and upland habitats, some of which lies as far as 6 miles from the lake. Also, this is a name recommended to us by local residents. We believe the new name is a better representation of the broader geographic context and management emphasis we pursued in developing this CCP.

Constructing a New Refuge Headquarters and Visitor Contact Facility

In developing the Final CCP/EIS we evaluated a new location for the refuge headquarters office and visitor contact facility. In conjunction with our state partners, Service Visitor Service's Specialists, and the core planning team, we identified a list of site selection criteria including:

- a location on existing refuge lands, with ready access to the lake for both staff and visitors,
- a site already developed or disturbed,
- a site immersed in a natural setting with a diversity of habitats to facilitate an interpretive trail, visitor programs, and outreach on refuge purposes, management, and the refuge's role in wildlife resource conservation in the Northern Forest.

Four prospective sites on current refuge lands met most, if not all, of these criteria. The four sites were all located at the southern end of the lake and referred to as: the Potter Farm site, two Thurston Cove sites (option A and B), and the State Border site. We hired Oak Point Associates to evaluate the feasibility and economics of constructing a facility at those four prospective sites, as well as compare them to upgrading our current headquarters office on Route 16 in Errol. Their January 21, 2005 final report can be reviewed at refuge headquarters.

With approval of this CCP, the Potter Farm site was chosen for implementation. We are planning a small office facility, as defined by the new Service facility standards. The existing headquarters building will be maintained as a research or auxiliary field office. In addition, we will remove the adjacent small cabin at the current headquarters site.

Our Director, via Director's Order 144, and our regional leadership team have identified facility energy and resource conservation as a priority. As such, any new buildings or building upgrades will incorporate ecologically sound and environmentally beneficial technologies, tools, materials, and practices, including building design and construction, water and energy consumption, wastewater management, and solid and hazardous waste management.

Providing other Visitor Services Facilities

In conjunction with the development of a new refuge headquarters and visitor contact facility, we plan to construct a series of interpretive trails at the Potter Farm site. A conceptual design and tentative location for a Potter Farm trail were identified by Oak Point Associates in their report. The trail is approximately 2 miles long, and will be designed to allow travel by people with disabilities.

Additional visitor facilities are also planned along major travel routes, including roadside pullouts on Routes 16 and a roadside pullout with overlook platform on Route 26. Each of these sites would have an information kiosk, and provide parking for several vehicles. This also includes a ¼-mile loop extension to the Magalloway River trail accessible to people with disabilities (see map 4-3). Each of these projects will facilitate wildlife observation, nature photography and interpretation of the refuge's resources. Implementation of these activities will support goals 4 and 5 relating to opportunities for high quality hunting, fishing, wildlife observation and photography, and environmental education and interpretation.

The CCP deals with public road access similarly. Maps 4-3 and 4-4 depict which roads we will designate as public routes of travel on both current and approved refuge expansion lands. The public will be allowed access over these designated roads at their own risk and under the current conditions. It is our intention to maintain the designated roads in a way similar to how they were maintained under previous landowners. Major maintenance of designated roads will occur periodically, especially prior to, during, and post, logging operations. Otherwise, only minor maintenance will occur until the roads are needed again for management purposes. Road maintenance will be done both by refuge staff and private contractors.

Assessing the Appropriateness and Compatibility of Activities

Chapter 1 describes the requirements for determining whether an activity or action is appropriate and compatibility with the refuge purposes. This CCP includes final findings of appropriateness and compatibility determinations in appendix C for activities we evaluated. We will only allow on refuge lands those activities determined appropriate and compatible which meet or facilitate refuge purposes, goals, and objectives.

The following are stipulations to incorporate into existing or future compatibility determinations:

- Access for non wildlife-dependent activities on the refuge will occur only on certain designated trails.
- Visitor motorized vehicle access on refuge roads is limited to street-registered passenger vehicles up to one-ton hauling capacity in designated areas; no ORV or ATV use will be allowed.

- When the Service acquires land in the approved expansion area in full, fee-simple ownership, we will allow public access and compatible public recreation, and other refuge uses, consistent with what we currently allow, or plan to allow, on existing refuge lands under this CCP.
- When a conservation easement, or a partial interest, is purchased, the Service's objective is to obtain all rights determined necessary to ensure protection of Federal trust resources on that parcel. Typically, at a minimum, the purchase would include development rights. However, we may also seek to obtain the rights to manage habitats, and/or to manage public use and access, if the seller is willing and we have funding available.

The refuge manager has determined that all six priority public uses are compatible, although some have stipulations as detailed in appendix C. Non-priority uses that the refuge manager proposes are compatible on this refuge with stipulations are also detailed in appendix C. These include forest management, research, camping, recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds, snowmobiling, horseback riding, bicycling, and dog sledding.

Activities Not Allowed

The 1997 Refuge Improvement Act states that "compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System." Compatible hunting, fishing, wildlife observation and wildlife photography, and environmental education and interpretation are the priority general wildlife-dependent uses of the Refuge System. According to Service Manual 605 FW 1, these uses should receive preferential consideration in refuge planning and management before the refuge manager analyzes other recreational opportunities for appropriateness and compatibility.

We have received requests for non-priority, non-wildlife dependent activities that have never been allowed on this refuge. Activities evaluated by the refuge manager and determined not to be appropriate on refuge lands include: ATV, ORV or motorbike use, field trials for dogs and geocaching. Appendix C documents the refuge manager's decision on their appropriateness. Most of these activities are sufficiently provided elsewhere nearby on other ownerships, so the lack of access on the refuge does not eliminate the opportunity in the Umbagog Lake area. According to Service policy 603 FW 1, if the refuge manager determines a use is not appropriate, it can be denied without determining compatibility.

Providing Hunting and Fishing Programs

For the next two years, we will continue to implement our current hunting program, which we describe in chapter 3, except for one minor change. Now, we will work with the local waterfowl club to evaluate placement of the existing six blinds.

Within two years of CCP approval, we will begin the administrative process to propose an expansion to our hunting program, in particular, for a turkey hunt in both states, and a bobcat hunt in New Hampshire. We will conduct a separate NEPA analysis and include public involvement during that evaluation. If an expanded hunt program is approved, we will update our Hunt Plan and complete all other administrative requirements to create an opening package.

We will formally open the refuge to fishing, which has not been done to date. Within 2 years of CCP approval, we will complete a Fishing Plan and all other Service administrative process requirements to officially open the refuge to fishing.

Providing Boating Access	We will maintain the following boat access sites: the Upper Magalloway River car-top launch; the current office headquarters (Brown Owl) boat launch; and the Steamer Diamond boat launch. The Upper Magalloway launch site and restroom improvements will be completed in 2009. The current office headquarters site will have some minor improvements done to increase visibility for those using trailers and to provide additional signage to warn oncoming traffic.
Implementing a Fire Management Program	We do not plan to utilize management-prescribed fire as a habitat management tool within the 15-year life of this CCP. While the chance of natural ignition is low, should a wildland fire occur, we plan to rapidly and aggressively suppress it in areas where property is likely to be threatened according to the guidance in appendix I of the Final CCP/EIS, "Fire Management Program Guidance." This management direction will be refined after completion of a refuge Fire Management Plan to be developed within two years of CCP approval. Our suppression objective is to avoid property damage, minimize human health or safety concerns, and reduce the likelihood of resource damage. Fire is not a prevalent natural ecosystem process in the Northern Forest. It has been suggested by researchers that stand-replacement fire intervals are at 800+ year intervals in most regional forest types (Lorimer 1977). However, given Northeast Regional climate change predictions, the average temperatures may increase, especially in the summer, will be coupled with little change in summer rainfall and result in more frequent, short-term droughts (NECIA 2007). This, in turn, could alter the natural fire regime and result in more frequent fires, or a catastrophic one. We will use an adaptive management approach and monitor changing conditions. If necessary, we may conduct prescribed burns to minimize the threat of a catastrophic fire event.
Maintaining a Youth Conservation Corps	We plan to maintain the annual youth conservation corps (YCC) program which has generally consisted of a crew of four to five persons (15-18 years old), and a crew leader. This has been a very popular program in the local community because youth employment opportunities are limited in this rural area. The crew accomplishes many important tasks in support of our biological and visitor services programs. If enough funding can be secured, we will expand this program to support two crews.
Conducting a Wilderness Review	As we describe in chapter 1, Refuge System planning policy (602 FW 3) requires that we conduct a wilderness review during the CCP process. The first step in that review is to inventory all refuge lands and waters in Service fee simple ownership. Our inventory of this refuge determined that no areas currently meet the eligibility criteria for a wilderness study area as defined by the Wilderness Act. Therefore, we did not further analyze the refuge's suitability for wilderness designation. The results of the wilderness inventory are included in appendix D of the Final CCP/EIS. The entire refuge will undergo another wilderness review in 15 years as part of the CCP revision. Specifically, any lands acquired in fee by the Service in the interim, along with existing refuge lands, will become part of that wilderness review in 15 years.
Conducting a Wild and Scenic Rivers Review	Service planning policy also requires that we conduct a wild and scenic rivers review during the CCP process. We inventoried the river and river segments which occur within the refuge acquisition boundary area and determined that five river segments met the criteria for wild and scenic river eligibility. These river segments and their immediate environments were determined to be free-flowing and possess at least one Outstandingly Remarkable Value. However, we are not pursuing further study to determine their suitability, or making a recommendation on these river segments at this time because we believe the entire river lengths should be studied (not just those on refuge lands) with full participation and involvement of our federal, state, local, and nongovernmental

partners. The results of our Wild and Scenic River inventory are included in appendix E of the Final CCP/EIS. We will provide protection for free-flowing river values, and other river values, pending the completion of future comprehensive inter-jurisdictional eligibility studies.

Protecting Cultural Resources

As a Federal land management agency, we are entrusted with the responsibility to locate and protect all historic resources, specifically archeological sites and historic structures eligible for, or listed in, the National Register of Historic Places. This applies not only to refuge lands, but also on lands affected by refuge activities, and includes any museum properties. Consultation with the Maine and New Hampshire SHPOs indicates there are five recorded archeological sites within the refuge area. Considering the topography of the area and proximity to water courses, it is likely that additional prehistoric or historic sites may be located in the future. Archeological remains in the form of prehistoric camps sites or villages would most likely be located along streams and lakes where early inhabitants would have ample water, shelter, and good fishing and hunting opportunities.

We will conduct an evaluation on the potential to impact archeological and historical resources as required, and will consult with respective SHPOs. We will be especially thorough in areas along the lake and streams where there is a higher probability of locating a site. These activities will ensure we comply with section 106 of the National Historic Preservation Act. That compliance may require any or all of the following: a State Historic Preservation Records survey, literature survey, or field survey.

Distributing Refuge Revenue Sharing Payments

The Service will continue to pay the following localities annual refuge revenue sharing payments based on the acreage and the appraised value of refuge lands in their jurisdiction: Errol, Cambridge and Wentworth Location in New Hampshire; and, Upton and Magalloway Plantation in Maine. These annual payments are calculated by formula determined by, and with funds appropriated by, Congress. We will continue those payments in accordance with the law, commensurate with changes in the appraised market value of refuge lands, or new appropriation levels dictated by Congress. Additional towns may be added with future acquisitions.

Developing Refuge Operational Plans (“Step-down” Plans)

The U.S. Fish and Wildlife Service Manual, Part 602, Chapter 4 (Refuge Planning Policy) lists more than 25 step-down management plans that may be developed for a refuge. Those plans “step down” goals and objectives to specific strategies and implementation schedules. Some require annual revisions; others are on a 5- to 10-year schedule. Some require additional NEPA analysis, public involvement, and compatibility determinations before we can implement them.

The following step-down management plans are scheduled for completion. That schedule depends on obtaining the staffing identified in appendix D and commensurate budgets.

- A Habitat Management Plan (HMP), immediately following CCP approval (see discussion immediately below)
- An Annual Habitat Work Plan(AHWP), within 1 year of CCP approval and annually thereafter (see discussion below)
- A Inventory and Monitoring Plan (IMP), within 2 years of CCP approval (see discussion below)

- A Hunt Plan (last revised April 2007), within 2 years of CCP approval we will conduct separate NEPA analysis to update our Hunt Plan
- A Fishing Plan, within 2 years of CCP approval
- A Fire Management Plan, within 2 years of CCP approval
- A Visitor Services Plan, within 3 years of CCP approval, and assuming a Visitor Services Professional (VSP) is hired; would incorporate hunt and fishing plans noted above
- A Law Enforcement Plan, within 3 years of CCP approval
- Facilities and Sign Plan, within 3 years of CCP approval

Habitat Management Plan

An HMP for the refuge is the requisite first step to achieving the objectives of goals 1–3. For example, the HMP will incorporate the habitat objectives developed herein, and will also identify “what, which, how, and when” actions and strategies will be implemented over the 15 year time frame to achieve those objectives. Specifically, the HMP will define management areas, treatment units, identify type or method of treatment, establish the timing for management actions, and define how we will measure success over the next 15 years. In this CCP, the goals, objectives, and list of strategies identify how we intend to manage habitats on the refuge. Both the CCP and HMP are based on current resource information, published research, and our own field experiences. Our methods, timing, and techniques will be updated as new, credible information becomes available. To facilitate our management, we will regularly maintain our GIS database, documenting any major vegetation changes on at least a 5 year basis. As appropriate, actions listed under “General Refuge Management” will be incorporated into the HMP.

Annual Habitat Work Plan and Inventory and Monitoring Plan

The AHWP and the IMP for the refuge are also priorities for completion upon CCP approval. These plans are vital for implementing habitat management actions and measuring our success in meeting the objectives. The AHWP is generated each year from the HMP, and will outline specific management activities to occur in that year. The IMP will outline the methodology to assess whether our original assumptions and management actions are, in fact, supporting our habitat and species objectives. Inventory and monitoring needs will be prioritized in the IMP. The results of inventories and monitoring will provide us with more information on the status of our natural resources and allow us to make more informed management decisions.

Implementing Adaptive Management

This plan will employ an adaptive management approach for improving resource management by learning from management outcomes. In 2007, Secretary of Interior Kempthorne issued Secretarial Order No. 3270 to provide guidance on policy and procedures for implementing adaptive management in departmental agencies. In response to that order, an intradepartmental working group developed a technical guidebook to assist managers and practitioners: “Adaptive Management: The U.S. Department of Interior, Technical Guide.” It defines adaptive management, the conditions under which we should consider it, the process for implementing it in a structured framework, and evaluating its effectiveness (Williams et al. 2007). You may view the technical guidebook at <http://www.doi.gov/initiatives/AdaptiveManagement/documents.html>.

The guidebook provides the following operational definition for adaptive management:

“Adaptive management is a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a ‘trial and error’ process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social and economic goals, increase scientific knowledge, and reduces tensions among stakeholders.”

This definition gives special emphasis to the uncertainty about management impacts, iterative learning to reduce uncertainty, and improved management as a result of learning. At the refuge level, monitoring management actions and outcomes, and key resources, will be very important to implementing an adaptive management process. Our invasive species and forest management activities are examples of refuge programs or activities where an adaptive management approach may be implemented.

The refuge manager will be responsible for changing management actions and strategies if they do not produce the desired conditions. Significant changes from what we present in this CCP may warrant additional NEPA analysis and public comment. Minor changes will not, but we will document them in our project evaluation or annual reports. Implementing an adaptive management approach supports all seven goals of the refuge.

Conducting Additional NEPA Analysis

NEPA generally requires site-specific analysis and disclosure of impacts in either an EA or an EIS for all major federal actions. Other routine activities or general administration are categorically excluded from the NEPA requirements to prepare detailed environmental documents.

Many of the actions in this document are described and analyzed in enough detail to comply with NEPA, and would not require additional environmental analysis. Although this is not an all-inclusive list, the following project examples fall into this category: the HMP, including its forest and wetlands habitat management programs; the IMP; expanding or reducing priority public use programs, including the fishing program, but excepting the hunting program; new visitor services infrastructure planned; development of a new headquarters and visitor contact facility; and controlling invasive plants.

We acknowledge that the additions to the hunt programs and the implementation of a furbearer management program (assuming it includes a general public trapping season), are not analyzed in sufficient detail in this document to comply with NEPA and would require further environmental analysis before implementation.

Refuge Goals, Objectives and Strategies

Chapter 2 in the Final CCP/EIS should be reviewed for a discussion on actions that were considered outside the scope of preparing this CCP and to review the other management alternatives evaluated in detail. The analysis in the Final CCP/EIS fulfills NEPA requirements for adopting the actions approved in this CCP.

As we describe in chapter 1, our goals are intentionally broad, descriptive statements of desired future condition for refuge lands. By design, they are not quantitative, but are more prescriptive in defining the targets of our management. They also articulate the principle elements of refuge purposes and our vision statement, and provide the foundation for developing specific management objectives.

Objectives are incremental steps we take to achieve a goal and they further define the management targets 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. They should be 1) specific; 2) measurable; 3) achievable; 4) results-oriented; and 5) time-fixed. Together these properties constitute the acronym referred to as “SMART” objectives.

The objectives we considered ranged from those that require only a minimum level of funding and staffing to those that would require a considerable increase in funding, staffing, infrastructure and partnership development. Some of our objectives directly relate to habitat management, while others strive to meet population targets tied to recovery plans, regional, or Umbagog Lake species and habitat goals. With each objective statement, we provide a background narrative so you can understand its context and why we think it is important. The objectives of this CCP will be used to develop refuge step-down plans, including the HMP and Visitor Services plan. Our successes will be based on how well we achieve our objectives.

GOAL 1:

Manage open water and submerged aquatic vegetation and wetlands to benefit Federal trust species and other species of conservation concern.

Objective 1.1 (Fen and Flooded Meadow)

Manage up to 689 acres of fen and flooded meadow on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary. Provide nesting and brood rearing habitat for American black and ring-necked ducks, pied-billed grebe and other marsh birds, and brood rearing habitat for wood duck and common goldeneye. Also, manage undisturbed staging areas for migrating waterfowl and stopover areas for migrating shorebirds from late August through mid-October.

Rationale

The fen and flooded meadow habitat type encompasses medium fen, cattail marsh, seasonally flooded mixed graminoid meadow, eastern tussock sedge meadow, spikerush shallow emergent marsh, and few-seeded sedge-leatherleaf fen (appendix G). The wetter edges of these natural communities are functioning as “emergent marsh” habitat for waterfowl and other marsh and water birds.

The refuge currently owns, or has approval to acquire an interest in, 689 acres of this habitat type. Included are those lands in the LPP (appendix A), which is the latest, approved plan for a refuge expansion. It is primarily on the fee title lands that we plan to conduct active management. Our management emphasis over the next 15 years will be to identify the habitat attributes most important for sustaining the focal species identified in the objective statement, and enhancing,

and/or restoring, those attributes. We describe some of those attributes in the species' discussions below.

Umbagog Lake is identified as one of three waterfowl focus areas in New Hampshire under the NAWMP (Atlantic Coast Joint Venture 2005). The Refuge supports the highest concentrations of nesting black ducks and ring-necked ducks in New Hampshire (USFWS 1991). The black duck is a species of concern in the NAWMP because of the historic decline in their population, with habitat loss an important contributing factor. The regional importance of Umbagog Lake to black duck was one of the reasons the refuge was established. Though black duck populations are stable or increasing, they are listed as highest priority for conservation in BCR14 (Dettmers 2005).

Black duck pairs arrive in Maine by April with the peak hatch generally from June 1-10. They are quite intolerant of human disturbance even during brood stage; therefore, minimizing human disturbance from late May through June may be important. They are generalists in their nest site selection and locate well-concealed nests on the ground in uplands near beaver flowages, floodplains, alder-lined brooks, and other wetlands. On the refuge, black duck and other waterfowl brood rearing habitat is in the "emergent marsh" around the edges of Leonard Marsh, and Harper's and Sweat Meadows, and the backwaters of the Magalloway and Dead Cambridge rivers. These shallow, permanent fens with abundant emergent vegetation, sedges, floating-leaved plants, pondweeds, and scrub-shrub vegetation rich in invertebrates, are favored brood rearing areas for waterfowl. Ducklings feed mostly on larvae of flies, caddisflies, mayflies, and other insects. Adult ducks eat the seeds of bur reed, sedges, pondweeds, and other aquatic plants as well as insects and other invertebrates (Longcore et al. 2000). In the expansion area, critical waterfowl areas planned for acquisitions include: the extension of the Magalloway River; Swift-Cambridge River; and Mollidgewock Brook.

Ring-necked ducks nest much closer to water than black ducks and are susceptible to water level changes. Therefore, the ring-necked duck may be an important indicator for the effects of water level fluctuations in Umbagog Lake. They build a nest usually on floating hummocks and islands in dense emergent vegetation, especially *Carex* sedges mixed with other herbaceous or woody plants. These ducks nest May through June, later than black ducks, with peak hatching occurring later in June. This diving duck forages in shallow water usually less than six feet deep. Their primary food sources are seeds and tubers of submerged and emergent plants and some aquatic invertebrates; the young depend entirely on aquatic invertebrates during their first two weeks (Bellrose 1976; Jerry Longcore, USGS, pers comm, 2004).

The bathymetric study of the lake will help determine the effects of water level changes on waterfowl habitat. Water level changes that occur after mid-July would likely not have a significant effect on duck broods. Ducks with broods are not territorial and will keep moving around in the large inter-connected waterways of Umbagog Lake (Jerry Longcore, USGS, pers comm, 2004).

Umbagog Lake is also an important migratory staging area for the waterfowl mentioned above as well as such species as scaup, scoters, and Canada geese. Many migrating waterfowl feed among the fen and flooded meadows on seeds and tubers of aquatic plants, while other species such as scoters, forage along the rocky shallow water areas of the lake.

Marsh birds using Leonard Marsh, Harper's Meadow, and Chewonki Marsh include Wilson's snipe, Virginia rail, American bittern, pied-billed grebe, and sora. The pied-billed grebe is listed as endangered in New Hampshire. The grebe typically builds a floating platform nest over shallow water attached to the stems

of emergent vegetation. There is some indication that water depth (>10 inches to enable predator escape and nest construction) and density of emergent vegetation ($\geq 4 \text{ in}^2$ of stem basal area/yard²) are important criteria and the pied-billed grebe may shift its nesting activity within and between nesting seasons in response to changes in water levels and availability of emergent vegetation cover (Muller and Storer 1999).

Our ability to benefit migratory shorebirds will depend on our ability to work with the holder of the FERC license for the Errol Project, FPLE, to affect water level management outside of June and July. Peak shorebird migration times for the Umbagog Lake area are mid-May to early June during spring, and late-August through mid-October for fall migration (Bob Quinn, private consultant, unpublished data, 2004). Shorebirds forage in exposed mudflats. Exposed mudflats occur irregularly in the fall depending on the lake levels, and occur most commonly where the Androscoggin River leaves Umbagog Lake in the Leonard Pond area. Inland freshwater wetlands and mudflats are thought to be particularly important for migrating spotted and solitary sandpipers. The most common shorebirds using the refuge are Wilson's snipe, spotted sandpiper, greater yellowlegs, and solitary sandpiper. The North Atlantic Regional Shorebird Plan lists greater yellowlegs as a high conservation priority (Clark and Niles 2000).

Strategies

In addition to those strategies listed under "General Refuge Management" affecting this habitat type:

Continue to:

- Repeat the aquatic invertebrate survey at wetland edges every 5 years to monitor system health and waterfowl food resources
- Support research to determine the impacts of water level management on fen and flooded meadow habitat
- Establish baseline inventory and permanent markers in this habitat type. Revisit these plots every 5 years.
- Conduct spring and fall migratory shorebird and waterfowl surveys.
- Conduct breeding marsh bird surveys according to Regional protocol
- Acquire up to 202 acres of this habitat type still in private ownership within the approved refuge boundary, from willing sellers, and manage the fee land similar to current refuge lands under objective 1.1.

Within 5 years of CCP approval:

- Design and implement an expanded waterfowl, shorebird, marsh, and wading bird breeding survey program to include migration and brood surveys.
- Evaluate, and implement where appropriate, opportunities to expand wild rice and other vegetative food sources for migratory waterfowl.
- Survey aquatic invertebrate availability during spring and fall migration periods for shorebirds and waterfowl.
- Evaluate isolated backwater areas with high potential for waterfowl brood rearing (e.g. quiet backwaters w/ combination of forest cover, submerged aquatic vegetation, and intermixed emergent wetlands in Dead Cambridge and Upper Magalloway rivers) to determine if seasonal boat access closures would reduce habitat disturbance; implement if beneficial.

Within 5-10 years of CCP approval:

- Initiate study to determine the water level regime most beneficial to waterfowl at each important stage: breeding, brood rearing, and spring and fall migration.

Within 10-15 years of CCP approval:

- Evaluate the impacts of various water levels on shorebirds, waterbirds, and marsh birds.
- If necessary, discuss with the hydropower facility owner/operator the possibility of altering water level management during waterfowl and shorebird migration periods to improve foraging and staging habitat conditions. This would occur voluntarily and within the bounds of, and during the remaining duration of, the current FERC license.

Objective 1.2 (Boreal Fen and Bog)

Manage up to 4,086 acres of boreal fen and bog on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to sustain the health and integrity, and uniqueness of the rare species and natural communities, such as the Floating Island National Natural Landmark, the circumneutral pattern fen, and other peatlands.

Rationale

The boreal fen and bog habitat types encompasses leatherleaf poor fen, medium shrub fen, sub-boreal dwarf-shrub fen, circumneutral pattern fen, black spruce wooded bog, black spruce-larch swamp, and spruce-fir swamp (appendix G). “Peatlands” is another commonly used term to describe some of these plant communities. We recognize these plant communities as important components of the region’s native biological diversity and seek to maintain the health of these areas in keeping with the Service’s Biological Integrity, Diversity, and Environmental Health policy (601 FW 3).

The refuge currently owns, or has approval to acquire an interest in, 4,086 acres of this habitat type. Included are those lands in the LPP (appendix A) which is the latest, approved plan for refuge expansion. It is primarily on the fee title lands that we plan to conduct active management. Our management emphasis over the next 15 years will be to complete an inventory of the unique and rare community types, and establish what measures of ecological health and integrity should be monitored over time.

On the western side of Umbagog Lake is a large peatland complex encompassing four areas: Leonard Marsh, Sweat Meadow, Harper’s Meadow, and Chewonki Marsh. An 860-acre portion of the complex, known as “Floating Island,” was designated as a NNL in 1982 (Nazaire 2003). We plan to work with the NPS to expand this boundary up to 2,181 acres (re: General Refuge Management earlier in the chapter) (map 4-5). These areas and associated wetlands form one of the largest peatland complexes in New Hampshire and harbor a high diversity of vascular plants, mosses, and liverworts (Dan Sperduto, NHNHB, pers comm.). The peatland complex is impacted by water level fluctuations in Umbagog Lake, although the impacts on community structure and species diversity and abundance are unknown (Nazaire 2003). In a study of a similar ecosystem in Sweden, Nilsson and Keddy (1988) found a direct correlation between the duration of flooding and species diversity and abundance, with long flood periods reducing plant diversity and abundance.

A rare fen of high regional significance, the circumneutral patterned fen, is found near the center of Tidswell Point. Most of this fen is on land owned by the State of New Hampshire as part of the Umbagog State Park, with a portion on the refuge. Only a few locations of this natural community type are known to occur



USFWS

Pitcher plant

in New England. A large, high quality northern white cedar swamp surrounds the fen (Dan Sperduto, NHNHB, pers comm).

Protecting and sustaining the floating bog, patterned fen, and other unique peatlands on the refuge requires increased efforts to identify and understand the factors that determine the occurrence and persistence of these peatland communities. We will monitor and manage the factors that affect the peatlands.

Many birds use peatland habitats for breeding, foraging, during migration, or in winter. These include palm warbler, rusty blackbird, black-backed woodpecker, yellow-rumped warbler, northern water thrush, and swamp sparrow, among others. Mink frog, a host of other amphibians, and a diverse suite of small mammals, including many shrew species and bog lemmings utilize this habitat as well. All of these species would benefit from the refuge's objective of conserving the boreal fen and bog habitat.

Strategies

In addition to those strategies listed under "General Refuge Management" affecting this habitat type:

Continue to:

- Establish baseline inventory and permanent markers in this habitat type. Re-survey and photograph plots every 5 years.
- Survey for birds, especially birds of conservation concern known in this cover type, such as palm warblers and rusty blackbirds, to evaluate implications from management on their habitat requirements.
- Acquire up to 2,851 acres of this cover type still in private ownership within the approved refuge boundary, from willing sellers, and manage the fee land similar to current refuge lands under objective 1.2.

Within 5 years of CCP approval:

- Conduct a comprehensive inventory of the FINNL to better define criteria for monitoring and managing its diversity and integrity over the long-term.
- Work with the NHNHB and MNAP, and NPS to identify and refine monitoring and management criteria for the FINNL and the other unique wetlands.
- Work closely with State Non-game and Natural Heritage programs to identify and monitor rare species occurrences in this habitat type.
- Establish buffer zones around these sensitive natural communities based on best management practices published by both states; evaluate their effectiveness and appropriateness in protecting these habitats over the long-term.

Within 5-10 years of CCP approval:

- Develop a proposal to NPS to modify the current natural landmark boundary to more accurately encompass the natural system.
- Initiate a detailed study to assess rare plants and animals, especially invertebrates, associated with this habitat type.

Within 10-15 years of CCP approval:

- Conduct a hydro-geologic study of groundwater and nutrient flow that are maintaining these peatlands. Address issues or threats as necessary.

Objective 1.3 (Northern White Cedar)

Manage up to 1,031 acres of northern white cedar on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to sustain the health and diversity of natural and rare ecological communities in the Upper Androscoggin watershed.

Rationale

Northern white cedar habitat encompasses a suite of natural communities, all dominated by northern white cedar (appendix G). Northern white cedar is a boreal species that occurs as far south as Carroll and Grafton counties in New Hampshire. NHNHB considers northern white cedar swamps a “signature community” of the north woods and hence an important component of the region’s biodiversity (Sperduto and Engstrom 1998). We recognize these plant communities as important components of the region’s native biological diversity and seek to maintain the health of these areas in keeping with the Service’s Biological Integrity, Diversity, and Environmental Health policy (601 FW 3).

The refuge currently owns, or has approval to acquire an interest in, 1,031 acres of this habitat type. Included are those lands in the LPP (appendix A) which is the latest, approved plan for refuge expansion. Additional small, scattered stands likely occur within the expansion area, but they are not discernable within the data sets that we used for our vegetation mapping. It is primarily on the fee title lands that we plan to conduct active management. Our management emphasis over the next 15 years will primarily be to complete an inventory of this habitat type, and establish what measures of ecological health and integrity should be monitored over time.

The largest (80-100 acres) northern white cedar swamp in New Hampshire surrounds the Whaleback Ponds and extends toward the Magalloway River. This wetland basin is within the refuge acquisition boundary but only a portion is currently under Service ownership (Dan Sperduto, NHNHB, pers comm).

Several northern bird species use this habitat type year-round including boreal chickadee, gray jay, black-backed woodpecker, spruce grouse, and more rarely, American three-toed woodpecker, (a New Hampshire threatened species). White-tailed deer find cover and forage in northern white cedar stands. Ten species of amphibians and 7 species of small mammals are known to occur in this habitat type on the refuge, and will directly benefit from our objective to maintain it.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this habitat type:

Continue to:

- Inventory small mammal and amphibians using this cover type
- Acquire up to 202 acres of this cover type still in private ownership within the approved refuge boundary, from willing sellers, and manage the fee lands similar to current refuge lands under objective 1.3.

Within 5 years of CCP approval:

- Establish buffer zones to protect these sensitive natural communities using best management practices developed by states; evaluate their effectiveness and appropriateness in protecting this habitat type over the long-term.

- Work closely with State Non-game and Natural Heritage programs to conduct more detailed surveys of rare plant and animal occurrences in, and the overall condition, of these natural communities.
- Ensure that the HMP addresses competition from balsam fir and hardwoods resulting from disturbance or management actions.

Within 5-10 years of CCP approval:

- Evaluate and monitor regeneration of northern white cedar including potential impacts from deer, snowshoe hare, and moose browsing; ensure that the HMP addresses the effects of browsing by these species if relevant.
- Evaluate the habitat requirements of boreal species utilizing this habitat type, such as black backed woodpecker, and if appropriate, manage to enhance habitat components for these species.

Within 10-15 years of CCP approval:

- Evaluate land use changes and management actions (e.g., timber harvest) and how they might affect the hydrology of northern white cedar swamps.
- Restore up to 150 acres over 15 years of northern white cedar in areas where past land use practices have converted it to another habitat type; consider winter cutting and other accepted silvicultural practices that would promote cedar stands.

Objective 1.4 (Scrub-Shrub Wetland)

Manage up to 1,807 acres of scrub-shrub wetland on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, as foraging and brood habitat for American woodcock, and to provide nesting and migratory habitat for birds of conservation concern, such as Canada warbler.

Rationale

Scrub-shrub wetland encompasses speckled alder peatland lagg, speckled and/or green alder shrubland, speckled alder swamp, and sweetgale mixed shrub thicket (appendix G). The refuge currently owns, or has approval to acquire an interest in, 1,807 acres of this habitat type. Included are those lands in the LPP (appendix A) which is the latest, approved plan for refuge expansion. It is primarily on the fee title lands that we plan to conduct active habitat management. Our management emphasis over the next 15 years will be to identify the habitat attributes most important for sustaining the focal species identified in the objective statement, and creating and/or enhancing those attributes, especially in woodcock focus areas (map 4-6). We describe some of those attributes in the species' discussion below.

The Service developed the American Woodcock Management Plan in 1990 to help stem the decline in American woodcock (USFWS 1990). Long-term trends show a decline of -1.3% per year from 1993-2003 and -2.3% per year from 1968-2003 in the eastern United States. Between 2002 and 2003, Maine reported an increase in the breeding population, yet the overall trend in Maine since 1968 is still negative. New Hampshire showed no significant increase from 2002 to 2003, but it is the only eastern region state showing an increase from 1968 to 2003. Recruitment rates (number of immature birds per adult female) in recent years are 18% below the long-term regional average. The major causes for these declines are thought to be loss and degradation of habitat on the breeding and wintering grounds, resulting from forest succession and land use changes (Kelley 2003). The 2005 Maine CWCS identifies habitat conservation, and additional

Scrub-shrub wetland on Dead Cambridge River



Bill Zimni/USFWS

surveys and monitoring, as the two highest priorities in the state for conserving woodcock populations (MDIFW 2005).

Functional foraging habitat for woodcock occurs on moist, rich soil dominated by dense shrub cover (75-90%); alder is ideal, although young aspen and birch are also suitable as feeding areas and daytime (diurnal) cover. Woodcock require several different habitat conditions that must be in close proximity to one another. These include clearings for courtship (singing grounds), large openings for night roosting, young second growth hardwoods (15-30 years) for nesting and brood-rearing, and functional foraging areas (Sepik et al. 1981; Keppie and Whiting 1994).

The Canada warbler is declining across much of its range and is listed as highest priority in BCR 14 (Dettmers 2005). PIF has a goal of increasing the Canada warbler continental population by 50% (Rich et al. 2004). It breeds in a range of habitat types including deciduous forested swamps, cool, moist, mature forest or streams and swamps with dense undergrowth, streamside thickets, and cedar bogs (Conway 1999). Although shrub-scrub is an important habitat component over some of its range, it may be of lesser importance in the northeast. It nests on or near the ground, generally near water. Suitable habitat often has a layer of moss and an uneven forest floor; however, they may be less common in shrub wetlands (Conway 1999). On the White Mountain National Forest in New Hampshire and Maine they occur in northern hardwoods with a softwood understory (DeGraaf and Yamasaki 2001). In central Maine, Collins (1983) found the Canada warbler in forests with a high percent shrub cover (70%), moderate canopy cover (64%), and minor component of conifers in the canopy. Hagan and Grove (1999) suggest the species is likely adapted to natural tree fall gaps, hence their positive response to forest management that creates dense deciduous understory with some overstory remaining. Canada warbler will also benefit from the management in mixed woods and northern hardwoods (see objective 3.1). The 2005 Maine CWCS identifies habitat conservation and research as the two highest priorities in the state for conserving Canada warbler populations (MDIFW 2005).

Other birds that nest in scrub-shrub habitat include swamp and song sparrows, common yellowthroat, yellow warbler, and alder flycatcher.

Beaver can be ecologically important to creating and maintaining scrub-shrub and other wetlands environments that also provide important habitat for woodcock and Canada warbler, other focal species such as black duck and wood duck, and culturally important species such as moose. Our plan to analyze opportunities for furbearer management will consider the impacts of managing local beaver populations to improve habitat and meet refuge goals. Beaver occupy small to large slowly flowing, wooded streams, rivers, or lakes and rarely occur in fast-moving waters. Howard and Larson (1985) described the best beaver habitat as occurring on relatively wide streams with low gradient on soil with poor drainage. Nearby food sources are also important including the roots and tubers of aquatic vegetation for summer diet and the bark of deciduous trees for fall and winter caching (DeGraaf and Yamasaki 2001). Stream gradients less than 3 percent are optimal, while narrow, steep valleys are less suitable.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this habitat type:

Continue to:

- Support research to determine the impacts of water level management on this cover type

- Acquire up to 1,125 acres of this cover type still in private ownership within the approved refuge boundary, from willing sellers, and manage the fee lands similar to current refuge lands under objective 1.4.

Within 5 years of CCP approval:

Develop and implement a plan to improve habitat for nesting and migratory birds of conservation concern, such as Canada warbler.

If furbearer management plan is appropriate (see “implementing a furbearer management program” earlier in this chapter under “General Refuge Management”) implement strategies to manage beaver populations to achieve refuge habitat goals and objective.

Within 5-10 years of CCP approval:

- In woodcock focus areas (map 4-6), develop and implement a plan to manage this habitat in proximity to upland nesting areas. Create and maintain alder in suitable age/size class to maintain quality foraging and brood areas. Alder would be maintained on approximately 20-year rotations.

- Manage concurrently for Canada warbler in woodcock focus areas.

Objective 1.5 (Open Water and Submerged Aquatic Vegetation)

In partnership with the States of Maine and New Hampshire, and the holder of the FERC license for the Errol Project (currently FPLE), as appropriate, manage up to 5,903 acres of open water on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to maintain floating-leaved and submerged aquatic vegetation (SAV) and native fish such as brook trout. Also, manage waters to provide loafing and foraging areas for water birds, and to maintain high water quality to benefit other native vertebrate and invertebrate aquatic life.

Rationale

The refuge currently owns, or has approval to acquire an interest in, 5,903 acres of this habitat type. Included are those lands in the LPP (appendix A) which is the latest, approved plan for refuge expansion. The refuge’s open waters encompass the rivers and backwaters, small ponds, and the portion of Umbagog Lake that extends from the current shoreline to the original, pre-1851 shoreline, including the zone of floating-leaved and submerged aquatic vegetation. These open waters provide loafing areas for many birds and harbor important plant and other food resources below the surface. It is primarily on the fee title lands that we plan to conduct active management. Our management emphasis over the next 15 years will be to inventory and map the extent of SAV and mussel beds, and establish parameters, and implement a program, for monitoring water quality and the effects of water-level fluctuations on resources of concern.

Umbagog Lake has some unique features, perhaps related to its extensive shallow areas. The average depth of the lake is 15 feet. Aside from the Magalloway and Androscoggin rivers, most of Umbagog functions as a lake ecosystem. However, little is known about how the riverine and lake aquatic system functions. The lake has vast mussel beds that extend through much of the lake, at least on the New Hampshire side. The enormous collective filtering capacity of this community may contribute much to the high water clarity of the system. More study is needed to understand how the mussels affect the rest of the Umbagog Lake food web and how water level fluctuations affect the mussels (Jim Haney, University of New Hampshire, personal communication, 2005).

SAV, with their flexible stems and leaves, are rooted in the sediment and completely covered by water. These plants produce oxygen, filter and trap

sediments, absorb nutrients, and provide food and shelter for fish and wildlife. Plants such as pondweeds, bulrushes, and wild celery produce seeds and tubers critical to foraging waterfowl. SAVs host many aquatic invertebrates that are, in turn, food for waterfowl and their broods. The distribution of these plants in the lake is affected by water depth, water clarity, and sediment type. SAVs typically occur on muddy or soft sediments rather than on sand or gravel sediments (Stevenson et al. 1979, Krischik et al. 2005). Different water levels on Umbagog Lake affect the extent of ice scouring and freezing of the lake bottom and consequently the distribution of SAVs.

The Magalloway River and Umbagog Lake are important wintering habitat for native brook trout from the Diamond River watershed (Diane Timmins, NHFG, personal communication, 2004) and Rapid River (Boucher 2005). MDIFW is concerned about potential recruitment of smallmouth bass into the Rapid River and the Cambridge River systems and the bass dominating critical habitat and food resources to the detriment of “an extraordinary brook trout resource” (Boucher 2005). Smallmouth bass were illegally introduced into Umbagog Lake around 1985. Prior to this release, the major fishery in the lake was a cold water fishery around the mouth of the Rapid River and warm water fishery for pickerel and yellow perch.

In addition to potential impacts to brook trout, there are indications that the number and behavior of anglers has changed on Umbagog Lake with the arrival of bass. Bass anglers fish more intensively than other anglers and tend to fish in shallower water, close to shore, and spend more time in one spot. The impacts to this increased fishing pressure on loons and other wildlife is unknown (Forrest Bonney, personal communication, 2002). The 2005 Maine CWCS identifies surveys/monitoring and research as the two highest priorities in the state for conserving brook trout populations (MDIFW 2005). In addition, we will work with our state partners to implement the goals and objectives of the Eastern Brook Trout Joint Venture, an interagency partnership which is currently developing a strategic plan.

Strategies

In addition to strategies under “General Refuge Management” affecting this habitat type:

Within 5 years of CCP approval:

- Initiate mapping project to determine distribution of submerged aquatic vegetation – species, density, and size of beds.
- Initiate mapping and monitoring program to evaluate native mussel beds; survey lake and associated rivers for rare and invasive species.
- Determine, in cooperation with state partners, the holder of the FERC license for Errol Project, FPLE, and the Umbagog Working Group, how best to implement the Eastern Brook Trout Joint Venture goals and objectives in this area

Within 5-10 years of CCP approval:

- Evaluate littoral zone sediments where submerged aquatic vegetation is sparse or non-existent, and re-establish vegetation where appropriate to enhance or improve food resources for waterfowl.
- Monitor water quality, chemistry, and water levels for potential effects on aquatic vegetation, fish, and waterfowl.
- Inventory macro-invertebrates and fisheries resources.

- Evaluate the potential use of fish barriers to prevent non-native fish species from becoming established in water bodies surrounding Umbagog Lake;
- Acquire up to an estimated 870 acres of this habitat within the approved refuge boundary and manage the fee lands similar to current refuge lands, as described in objective 1.5.

Within 10-15 years of CCP approval:

- Evaluate point and non-point sources of pollution affecting refuge lands and work with State, private and local entities to improve water quality.

Objective 1.6 (Common Loon)

Within 15 years of CCP completion, and cooperating with state partners, and the holder of the FERC license for the Errol Project (currently FPPE), as appropriate, conserve and manage common loon territories to support a 5-year annual average of 14 nesting pairs on Umbagog Lake and its tributaries, and 4 additional pairs within the expansion area, and achieve a 5-year average annual productivity of 0.5 chicks per nesting pair. Management activities will be focused in fen and flooded meadow, floodplain and lakeshore, and open water and submerged aquatic vegetation habitats.

Rationale

Umbagog Lake and its associated rivers and backwaters are important breeding areas for the common loon in the Northeastern United States. This refuge is one of only 3 in the Refuge System in the lower 48 states that support breeding common loons. The common loon was also one of the key species specifically identified for conservation at the time of refuge establishment. The BCR 14 plan lists the common loon as a species of moderate conservation concern.

Regional threats to common loon include habitat loss due to shoreline development, water level fluctuations, human disturbance (recreational pressures), environmental contaminants, oil spills, lake acidification, mercury poisoning, and lead poisoning among other threats. The proposed Lowest Observed Adverse Effect Level (LOAEL) for mercury in adult loon blood is 3.0 ug/g (Evers et al. 2004). Because blood mercury levels from adult loons sampled from Umbagog Lake during 1994-2004 have never reached this proposed effect level, mercury does not appear to be a risk factor to adult loons in this system. Lead fishing tackle does pose a significant threat to loons. From 2000-2004, six loon carcasses found on Umbagog Lake were submitted to Tufts University School of Veterinary Medicine to determine the cause of death. All six (100%) were attributed to lead poisoning (Mark Pokras, Tufts University, unpublished data).

The Service and cooperating partners monitor and manage activities on Umbagog Lake to benefit loons. They work annually with the holder of the FERC license for the Errol Project, currently FPPE, who manages water levels, and by closing nesting areas, and installing educational signs. In spite of these management activities, the Loon Preservation Committee (LPC) reported that the Umbagog Lake loon population declined from 31 territorial pairs in 2000 to 15 territorial pairs in 2002 (Taylor and Rubin 2002).

The majority of loon nests on Umbagog Lake are established from mid-May to mid-June with hatching dates from mid-June to late July. Nest site selection is often opportunistic with loons using island and mainland marshes, muskrat feeding mounds, floating bogs, and logs. Loons also readily accept floating platforms (McIntyre and Barr 1997). Common loons are strongly territorial and the territory size they will defend is highly variable depending on lake size, suitable nesting sites and land features that provide privacy from other pairs

(Lang and Lynch 1996). Umbagog Lake's large size and prevalence of coves and islands offers many potentially suitable territories for common loons.

Common loons and chick on the Magalloway River



Ian Drew/USFWS

Using summary data from LPC reports from 1991 to 2005, the number of nesting pairs were analyzed in 5 year intervals to develop a target number of nesting pairs of common loons. From 1991-1995, the average number of nesting pairs was 17.4 ± 3.44 , from 1996-2000, the number was 18.4 ± 2.30 and from 2001-2005, the number was 14.0 ± 2.92 . The historical average from 1976 to present (14 pairs) is reflected in the most current 5 year average. This number of nesting attempts by common loons also reflects current conditions with confounding variables including the presence of 4 nesting pairs of eagles. The refuge and cooperating partners will work to keep the number of nesting pairs at the approximate historical average of 14 pairs. The refuge and cooperating partners will also work toward increasing production of those 14 pairs to an average of 0.5 chicks per pair based on the rate of 0.48 chicks fledged per pair for a self-sustaining population (Evers 2004). This objective is not intended to maximize the number of common loons in the area, but to achieve a level which reduces negative interactions between common loons and between common loons and other waterfowl.

The four additional pairs within the expansion area include territories on: 1) Sturtevant Pond, 2) B Pond, 3) C Pond and 4) Pond in the River.

Strategies

In addition to those strategies listed under "General Refuge Management" affecting this species:

Continue to:

- Monitor loon populations in partnership with the states, conservation organizations, and the holder of the FERC license for the Errol Project
- Support research to determine causes and implications for decline in number of loon territories on Umbagog Lake
- Participate in annual meetings with FERC licensee or representative to advise on lake water levels to benefit nesting loon, within the conditions of the FERC license and Article 27
- Protect active loon nests in spring and summer from predators and human disturbance using outreach and visitor contact, buoy lines, restricted access, and other tools as warranted
- Develop and maintain an Umbagog Lake loon dataset in partnership with NHFG, MDIFW, and private conservation organizations

Within 5 years of CCP approval:

- As studies are completed on Umbagog Lake, validate the loon nesting and territorial carrying capacities, and further determine whether 14 nesting pairs on the lake, and 4 nesting pairs in the expansion area, remain appropriate targets for these areas.

Within 5-10 years of CCP approval:

- Monitor angler use, and map locations of fishing pressure and other recreational users, in relation to common loon territories and other breeding wildlife

- Develop and implement a study to evaluate interactions of loon with waterfowl during the breeding season; specifically, evaluate how waterfowl interact at high loon densities.
- Develop and implement a study to examine interactions between loons and other piscivores (eagles, osprey, etc.), including competition for food and nest sites.
- Evaluate the need for predator control around common loon sites; consider predator control measures targeted at individual animals
- Evaluate the availability and quality of natural nesting habitat for common loon.

GOAL 2:**Manage floodplain and lakeshore habitats to benefit Federal trust species and other species of conservation concern.****Objective 2.1 (Wooded Floodplain)**

Manage up to 1,429 acres of wooded floodplain on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to provide habitat for nesting cavity-dependent waterfowl and other priority bird species of regional conservation concern, including northern parula and rusty blackbird. In addition, manage perching areas for bald eagle, and brood foraging areas for American black duck and other waterfowl. Also, where this habitat type overlays woodcock focus areas, manage for feeding and nesting American woodcock.

Rationale

Wooded floodplain habitat on the refuge includes the following National Vegetation Classification System (NVCS) associations: red maple floodplain forest, red maple-balsam fir floodplain forest, white spruce-balsam fir berm woodland, red maple-tussock sedge floodplain woodland, black ash-mixed hardwoods swamp, and red maple-black ash swamp (appendix G). This habitat type, which constitutes 5% of refuge acres, contributes significantly to the wildlife diversity known on the refuge. For example, we have detected over 75 bird species from point locations in this habitat type during our breeding bird surveys.

The Magalloway River floodplain, ranked as an S2 (imperiled) community by NHHB, and approximately 245 acres in size, offers quality habitat for waterfowl, providing the combination of large cavity nesting trees and river bottomland areas with submerged and floating leaf aquatic plants and abundant substrate for invertebrates. Common goldeneye, wood duck, and hooded and common mergansers nest in cavities in live trees with a diameter at breast height (d.b.h.) of 18 inches or more (Tubbs et al. 1986).

The rusty blackbird, a watchlist species for BCR 14 and PIF 28 bird conservation planning areas, nests in riparian areas, boreal wooded wetlands, and beaver flowages (DeGraaf and Yamasaki 2001; Rich et al. 2004). According to the species profile in the 2005 NH WAP, this species has declined dramatically; BBS results from 1996-2001 indicate a 10.7% decline (NHFG 2005).

We have documented rusty blackbird breeding in the Magalloway River floodplain. It builds a nest near streams, ponds, bogs, and fens with a conifer component, usually less than 10 feet above the ground in thick foliage near the trunk of a young spruce or fir or in a shrub thicket. It will also utilize the spruce-fir and mixed woods habitat types between 1000 ft to 4,000 ft in elevation in refuge uplands. During migration rusty blackbirds congregate in flocks in wooded swamps (DeGraaf and Yamasaki 2001) and migrating flocks are documented for Umbagog Lake (Brewster 1937), although they may be

less common now (Richards 1994). The rusty blackbird shows some aversion to clearcutting that creates suitable habitat for competitors including red-winged blackbird and common grackle (Dettmers 2005). Some disturbance (e.g., windthrow, beaver activity) creates forest openings allowing regeneration of softwoods and resulting in potential rusty blackbird nesting habitat (Avery 1995). The New Hampshire WAP identifies the use of pesticides on the breeding and wintering grounds, destruction of wintering habitat, acidification of water bodies on the breeding grounds and efforts to control blackbirds on winter roosts may be the contributing to the decline of this bird.

The northern parula is associated with mature moist forests and forested riparian habitats dominated by spruce, hemlock, and fir with an abundance of lichens (especially *Usnea*) in which they build their nests. There are indications that the northern parula population decline is related to the decline of *Usnea*, a lichen sensitive to air pollution (DeGraaf and Yamasaki 2001). PIF considers the northern parula a moderate priority for BCR 14, although the region supports 23% of the population (Dettmers 2005). The northern parula is rarely in deep woods, but also avoids clear cuts and may be sensitive to forest fragmentation (DeGraaf and Yamasaki 2001). It may require at least 250 acres to sustain a breeding population (Robbins et. al. 1989). The 2005 Maine CWCS identifies habitat conservation and research as the two highest priorities in the state for conserving rusty blackbird and northern parula populations (MDIFW 2005).

Through managing this habitat type, and the vernal pools embedded within it, other native species will benefit including a rich diversity of amphibians such as mink frog, spotted and blue-spotted salamanders, and wood frog. In addition, sustaining this habitat would benefit several bats including little brown, hoary, and northern long-eared that roost in tree cavities, under loose bark, or under dense foliage.

The refuge currently owns, or has approval to acquire an interest in, 1,416 acres of this habitat type. Included are those lands in the LPP (appendix A), which is the latest, approved plan for a refuge expansion. It is primarily on the fee title lands that we plan to conduct active management. Our management emphasis over the next 15 years will be to identify the habitat attributes most important for sustaining the focal species identified in the objective statement, and enhancing, and/or restoring, those attributes. We describe some of those attributes in the species' discussions below. We will manage this habitat type on current refuge lands within the habitat management units we have identified in appendix E.

Given our habitat management and land acquisition objectives, we estimate the refuge (fee title lands only) could provide high quality breeding habitat to support 115 pair of northern parula (based on an estimated density of 12.35 ac/ pair), and 58 pair of rusty blackbird (based on an estimated density of 24.71 ac/ pair), thus contributing directly to the BCR 14 goals for both of these species of conservation concern (Randy Dettmers, personal communication, 2006). These values may be over-estimates, since not all wooded floodplain habitat is equally suitable for these two species.

Strategies

In addition to those strategies listed under "General Refuge Management" affecting this habitat type:

Continue to:

- Acquire up to 289 acres of this habitat type still in private ownership within the approved refuge boundary, from willing sellers, and manage the fee lands similar to current refuge lands under objective 2.1
- Restore natural vegetation on unauthorized campsites

- Remove surplus cabins that we have acquired as funding allows. Restore site (e.g. loam, seed and/or plant) to native vegetation.
- Implement vernal pool, small mammal and amphibian surveys
- Include this habitat type in breeding bird surveys

Within 5 years of CCP approval:

- Identify suitable habitat, and assess habitat quality and habitat use by migratory birds such as northern parula and rusty blackbird. Document habitat use using regional Service protocol for breeding bird surveys, or other appropriate protocols.
- Develop and implement a plan to improve habitat for nesting and migrating birds of conservation concern, such as northern parula and rusty blackbird.
- Retain the majority of trees with cavities, standing dead trees, downed logs, large trees, and large super-canopy trees in the riparian areas.
- In woodcock focus areas, develop prescriptions to enhance habitat type for this species.

Within 5-10 years of CCP approval:

- Manage lowland hardwood and alder to provide adequate food resources for beaver to promote a natural cyclical succession of this habitat type driven by beaver.
- If furbearer management plan is appropriate (see “implementing a furbearer management program” earlier in this chapter) implement strategies to manage beaver populations to achieve refuge habitat goals and objective.
- Map and monitor the rare floodplain forest type that occurs along the Magalloway River.
- Evaluate isolated backwater areas with high potential for waterfowl brood rearing (e.g. quiet backwaters with the combination of forest cover, submerged aquatic vegetation, and intermixed emergent wetlands in Dead Cambridge and Upper Magalloway Rivers) to determine if seasonal boat access closures to reduce disturbance; implement closures if beneficial.

Within 10-15 years of CCP approval:

- Maintain, enhance and/or create cavity trees within a range of diameter classes in close proximity to water to provide roosting and nesting areas. Maintain suitable habitat between snags (standing dead trees) and feeding areas.
- Restore the hydrology of the Day Flats area by plugging ditches and re-contouring the disturbed areas.
- Evaluate the dynamics and succession of the red maple/black ash type and relate its importance to focal species. If warranted, restore and maintain it to sites where site capability is high for this type and it is part of the predicted potential natural vegetation.

Objective 2.2 (Lakeshore Pine-Hemlock)

Maintain up to 520 acres of lakeshore pine-hemlock on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to provide nesting and migrating habitat for birds of conservation concern; to sustain the vegetation diversity within this type, such as

the jack pine component; to maintain nesting habitat for bald eagle, osprey, and other raptors; to protect water quality; and, to maintain the scenic and aesthetic values of the Umbagog Lake and other lake shorelines.

Rationale

The lakeshore pine-hemlock habitat type is comprised of the following NVCS associations: hemlock mesic forest, hemlock-hardwoods forest, hemlock-white pine-red spruce forest, red pine-white pine forest, and jack pine/blueberry/feathermoss forest (appendix G).

The refuge currently owns, or has approval to acquire an interest in, 520 acres of this habitat type. Small stands likely occur elsewhere in the approved refuge expansion area, but they were not discernable in the data set we used to map vegetation. It is primarily on the fee title lands that we plan to conduct active management. Our management emphasis over the next 15 years will be to protect and sustain existing and potential nest stands and perch trees for bald eagle and osprey, and to inventory and monitor the jack pine stands to serve as a basis for future management.

On the refuge, bald eagle and osprey often nest in large supercanopy trees (large white pines that stick up above the other canopy trees), or in tall snags (standing dead trees) in this habitat type. Additional information on bald eagles and osprey is discussed under objective 2.3. Jack pine communities are rare in New Hampshire and Maine and the stands around Umbagog Lake are the only low-elevation occurrences in New Hampshire (Publicover et al. 1997). The jack pine stands at Umbagog Lake are scattered along the rocky eastern shore and islands of the lake.

Through managing this habitat type, other native species will benefit, including nesting merlin and sharp-shinned hawk, olive-sided flycatcher, veery, and yellow-bellied sapsucker, among many other common species.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this habitat type:

Continue to:

- Monitor habitat impacts from public use
- Mitigate significant recreational impacts as needed
- Record wildlife use of this habitat type
- Acquire up to 288 acres of this habitat type still in private ownership within the approved refuge boundary, from willing sellers, and manage fee title land similar to current refuge lands under objective 2.2
- Also see objective 2.3.

Within 5 years of CCP approval:

- Develop and implement a HMP to perpetuate this habitat type, giving priority to water quality protection and aesthetic values
- Maintain large diameter trees for raptor perch trees and future nest trees (also see objective 2.3 immediately below)
- Ensure the HMP addresses recruitment of super-canopy pines.

Within 5-10 years of CCP approval:

- Work with NGO's and States to increase monitoring and protection of raptors, and if feasible, implement cooperative procedures to protect merlin and other forest dependent raptors of conservation concern.

Within 10-15 years of CCP approval:

- Where jack pine occurs, map and monitor this type, and consult with state heritage program and other regional ecologists to determine if special management is warranted to sustain this rare ecological community in the Upper Androscoggin watershed; amend HMP to include management prescriptions.

Objective 2.3 (Bald Eagle and Osprey)

Maintain forest stands on the refuge within one mile of high quality bald eagle foraging acres to support 3-4 nesting pairs of bald eagle with a minimum annual 1.0 chick/ pair productivity level over a 5 year average. Given this bald eagle density, and recognizing inter-specific competition, maintain habitat to support 15 nesting pair of osprey on existing and future refuge lands, with a minimum annual 1.0 chick/pair productivity level over a 5 year average.

Rationale

The protection of these two species was a primary reason the refuge was established, and they have been a management priority since then. As such, we believe their management warrants special consideration in a separate objective statement.

Bald eagle

The bald eagle is listed as endangered in New Hampshire and threatened in Maine and continues to be protected by both the Bald and Golden Eagle Protection and the Migratory Bird Treaty Acts. In New Hampshire and Maine, bald eagles are found along major rivers and lakes or near the coast in relatively undisturbed forest patches. Bald eagles perch on, nest in, and hunt from tall, coniferous and deciduous trees or snags (standing dead trees) near water. In the Northeast, white pine is the most common nest tree. Nests are usually within 250 feet of open water near quality foraging areas.

Fish are the preferred food source, although eagles also take waterfowl, aquatic mammals, and scavenge for food. Eagles fish mostly in shallow, low-velocity waters. Chain pickerel, brown bullhead, suckers, white perch, and yellow perch are typical prey in interior Maine (Charles Todd, MDIFW, unpublished report).

In winter, some individuals may leave the breeding areas and congregate in areas with large expanses of unfrozen, open water. A forest stand that offers thermal protection from inclement winter weather is needed for communal night roosting. Night roosts are most often found near foraging areas, but may be further away if the roost is more protected. Umbagog Lake does not support a winter roost site, although some eagles remain in the area (along the Androscoggin River) and scavenge on the lake.

Bald eagle



USFWS

The main goal of national and state plans for bald eagles is to protect and maintain self-sustaining populations. Supporting breeding pairs with an average

annual productivity of at least 1.0 young per occupied nest is highly desired. From 1994-2002 the Leonard Pond nest on Umbagog Lake produced an average of 0.89 chicks/year. A second nest, near Tidswell Point, has produced 1.5 chicks/year from 2000-2005. Umbagog Lake is at the headwaters of the Androscoggin River, and as such, the eagles on the lake are an extension of the Maine eagle population.

Charlie Todd (MDIFW, personal communication, 2005) determined that Umbagog Lake has the potential to support two to three successful nesting pairs of bald eagles given the separation distance that eagles typically establish from one another. Todd (2005) evaluated several large live white pines near the dead nest tree in Leonard Pond to determine the potential for alternative nest sites in the area. Alternative nesting trees appear to be available to the eagles should they decide to use an alternative site.

Osprey

The Upper Androscoggin River watershed is an important breeding area for osprey. At the core of this area, Umbagog Lake and its associated rivers and backwaters, was the only part of New Hampshire that maintained a breeding population of osprey through the region-wide decline from the 1950s through the 1970s (NHFG 2005). Osprey are listed by the State of New Hampshire as a threatened species. Regional threats to osprey include predation, shoreline development, human disturbance, electrocution, mercury, lead shot and sinkers, non-point source pollution (contaminants), and wetland loss (NHFG 2005). Osprey populations have experienced strong recoveries on the statewide scale since the early 1980s (Martin et. al. 2006).

Osprey nesting in the U.S. will winter in the Caribbean, Central America, and South America (Henry and VanVelzen 1972; Environment Canada 2001). Osprey breeding on the east coast of the U.S. will winter primarily in northern South America and sometimes in Cuba and Florida (Martel et. al. 2001). Female osprey generally winter farther south than males and individuals of both sexes show strong fidelity to wintering and breeding sites (NHFG 2005).

In northern New England, osprey will typically establish breeding territories near large lakes, major rivers, and coastal estuaries. A habitat model developed for the Gulf of Maine watershed (USFWS 2000) found that 90% of 200 osprey nests were located within 0.6 miles of major rivers or lakes greater than 100 acres in size. Osprey generally require areas with dependable fishing sources within 2 to 3 miles, standing trees or other suitable structures located in wetlands, and an ice-free period of no less than 20 weeks (NHFG 2005). Ospreys nest atop a variety of structures including natural snags (standing dead trees) and artificial poles in or near water with good visibility (DeGraaf and Yamasaki 2001).

Over the past 25 years, the Audubon Society of New Hampshire (ASNH), through a contract with NHFG, has monitored nesting attempts, and also began augmenting nesting sites with artificial nesting structures around the lake in 1977 (NHFG 2005). In 2005, through a contract with the refuge, ASNH and the Biodiversity Research Institute (BRI) conducted aerial surveys for osprey in addition to the ground surveys used from 1996 to 2004. A similar method of aerial surveys had been used by ASNH from the mid-1980's to 1996 when they were discontinued due to a lack of aircraft and qualified pilots. Seven new nests were discovered (5 in New Hampshire, 2 in Maine) and field observations were conducted on 26 osprey nests in the study area. The 2005 survey data estimated 17 territorial pairs of osprey, with 14 of those pairs actively engaged in nesting and 12 of the 14 nesting pairs successfully fledged a total of 18 young (Martin, et. al. 2006). ASNH has found osprey numbers to be variable over time. The 14 nests discovered in 2005 more than doubles the number of active nests found in 2004 (Martin et. al. 2006).

Charlie Todd (MDIFW, personal communication, 2005) suggested a link between an increasing bald eagle population and declining osprey numbers as a result of increased competition and territoriality. He has observed that bald eagles will appear in an area with many ospreys; with time the osprey may decline and eventually there are osprey areas and eagle areas with no overlap. Bald eagle population recovery has been reported to displace osprey pairs to less optimal nesting areas that are further from preferred foraging areas (Ewins 1997).

Strategies

In addition to those strategies listed under “General Refuge Management” affecting these species and objective 2.2 strategies immediately above:

Continue to:

- Protect super-canopy nesting trees on current and future refuge lands.
- Inventory active and historic nesting sites each year
- Conduct bald eagle and osprey surveys in conjunction with the States of Maine and New Hampshire, and conservation partners
- Protect active bald eagle and osprey nests from predators and human disturbance using outreach and visitor contact, buoy lines, restricted access, predator guards and other tools as warranted
- Implement area closures around bald eagle nest trees; place visible floating buoys and signs to alert all boaters to closure area
- Work cooperatively with State agencies and private conservation organizations on bald eagle and osprey management
- Support efforts to eliminate practices that contribute lead and other contaminants to the environment

Within 5 years of CCP approval:

- Identify and protect super-canopy trees within 1 mile of high quality foraging habitat to support nesting and perching by bald eagles and osprey.
- Protect individual nest trees with at least a 600-foot buffer area.
- Protect historic nest sites, nest trees, and partially constructed nest trees.

Within 5-10 years of CCP approval:

- Manipulate pines in high quality habitat areas to promote new nesting sites.
- Develop and implement outreach methods designed to minimize discarded fishing tackle and lines.

Within 10-15 years of CCP approval:

- Ensure recruitment of new nest trees; identify stands with potential.

GOAL 3:

Manage upland forest habitats, consistent with site capability, to benefit Federal trust species and other species of conservation concern

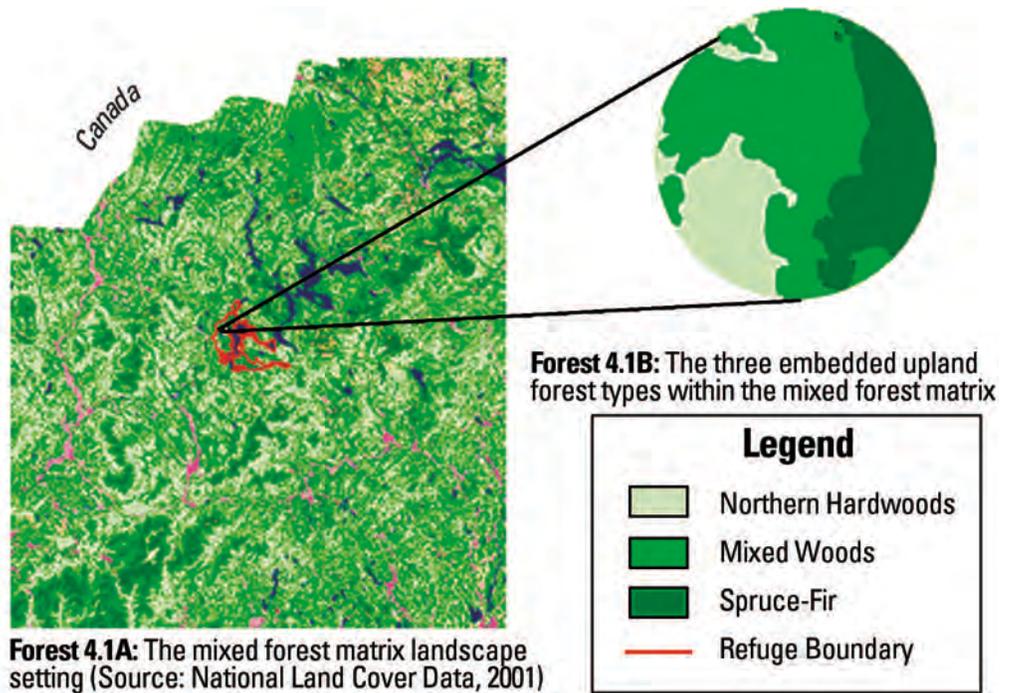
Objective 3.1 (Mixed Spruce-Fir/Northern Hardwood Forest)

Conserve up to 59,611 acres of mixed spruce-fir/northern hardwood forest on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to sustain well-distributed, high quality breeding and foraging habitat for species of conservation concern, including

blackburnian, black-throated green, and Canada warblers, and American woodcock. Also, where consistent with management for those refuge focal species, protect critical deer wintering areas and provide connectivity of habitat types for wide-ranging mammals.

Rationale

We define the “forest matrix” as the most extensive, most connected, and most influential landscape type across the Upper Androscoggin River watershed basin. Throughout the watershed, and including the refuge, the forest matrix is a mosaic of forest types and is described as an overall mixed spruce-fir/northern hardwood forest (see chapter 3 for more details). Identifying the mixed forest matrix is important because it helps us determine what ecological processes most likely affected biodiversity, including the amount and distribution of wildlife species. Other forest ecologists have also defined the mixed spruce-fir/ northern hardwood forest as the past, current, and potential future dominant landscape type in the Upper Androscoggin River Watershed basin (Kuchler 1964; Charlie Cogbill, pers comm, 2004). Embedded in the mixed forest matrix landscape, we also define three dominant habitat types: spruce-fir; conifer-hardwood mixed woods; and, northern hardwood (see figure 4.1A and 4.1B). Each of these individual habitat types is found in varying amounts on the refuge and in the surrounding landscape. We have developed separate sub-objectives for each type as outlined below.



According to Cogbill, during the last 150 years, the mixed forest included more conifer than occurs today, particularly in the lowlands, and contained little aspen or white pine (Cogbill pers comm. 2004). This is also consistent with Kuchler’s potential natural vegetation types, and our analysis of the site capabilities on refuge lands (Kuchler 1964). Site capabilities were interpreted from ecological land units (ELUs), a combination of elevation, bedrock geology, and topography, which are three physical characteristics that strongly influence what types of plant communities may be found there (Anderson 1999).

In the Partners in Flight (PIF) Eastern Spruce-Hardwood Physiographic Area 28 Plan, the mixed forest is identified as a high priority habitat that is critical for “long-term planning to conserve regionally important bird populations”

(Rosenberg and Hodgman 2000). Our breeding bird survey data shows the elevated importance of the refuge's mixed forest matrix for blackburnian, Canada, and black-throated green warblers in the area. We have selected these, and the American woodcock, as our refuge focal species for management. These species habitat requirements are described below.

The selection of our focal species resulted from a landscape analysis described in appendix H. It was after this analysis our planning team determined that sustaining a mature mixed forest, with a high conifer component and high structural diversity, was the most important ecological contribution the refuge could make through management to the Upper Androscoggin River watershed, the Northern Forest, and the Refuge System. As such, after goal 1, this goal is the next highest priority habitat management in this CCP.

To accomplish this, we will manage our forest to achieve a mix of regeneration, mid- and mature age classes, and retain snags (dead or dying trees that are still standing), and other wildlife trees, downed wood and super-canopy trees. Some areas in all forest habitat types may be retained as unmanaged 'control' or comparison areas, as part of forest management research projects. Additionally, forest industry inoperable and high resource sensitivity zones will receive little or no active management. In low and moderate resource sensitivity areas, we will primarily use uneven-aged management techniques to convert the existing, predominantly even-aged forest stands to a multi-aged, multi-structured condition. Even-aged management techniques may also be used in certain stands, such as those with healthy, advanced regeneration of spruce and fir, woodcock focus areas, or in deer wintering areas. Appendix E provides important details on how we plan to manage our forests. It includes additional information, supplementing what is provided below.

The 15 year scope of our CCP falls far short of the decades used to measure tree growth and stand development in the mixed forest. This objective requires consideration of a much longer timeframe within which to measure and achieve results. As such, our expectation is that it would take at least 100 years to accomplish this objective. This timeframe is based on our prediction of how long it would take to achieve the forest and stand composition and structural characteristics targeted for our refuge focal species identified in the objective statement.

Our habitat type classifications are based on grouped National Vegetation Classification System (NVCS) "associations." A cross-walk between refuge forest habitat types, NVCS associations, Society of American Forester types, and other vegetation classification systems is included in appendix G.

General Strategies (also see strategies for the three specific habitat types in sub-objectives below)

Within 5 years of CCP approval:

- Conduct breeding bird surveys according to regional Service protocols to track breeding bird trends on the refuge.
- Conduct a detailed inventory in each of the three habitat types to identify or refine specific silvicultural prescriptions.
- Conduct resource surveys prior to forest management to ensure that resources of concern are identified and impacts minimized or eliminated
- Perpetuate, through accepted silvicultural practices, the three habitat types through time, distributed within the refuge based on site capability and our ability to access and manage them. Ensure that habitat patch size and connectivity are sufficient for species requiring large blocks of unfragmented habitat

- Initiate acquisition from willing sellers on up to 48,766 acres (see sub-objectives below for breakdown of habitat type) of upland forest still in private ownership within the approved refuge boundary, and manage fee lands as described in objective 3.1.

Sub-Objective 3.1a (Spruce-Fir Habitat Type)

Manage up to 28,863 acres of spruce-fir on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to:

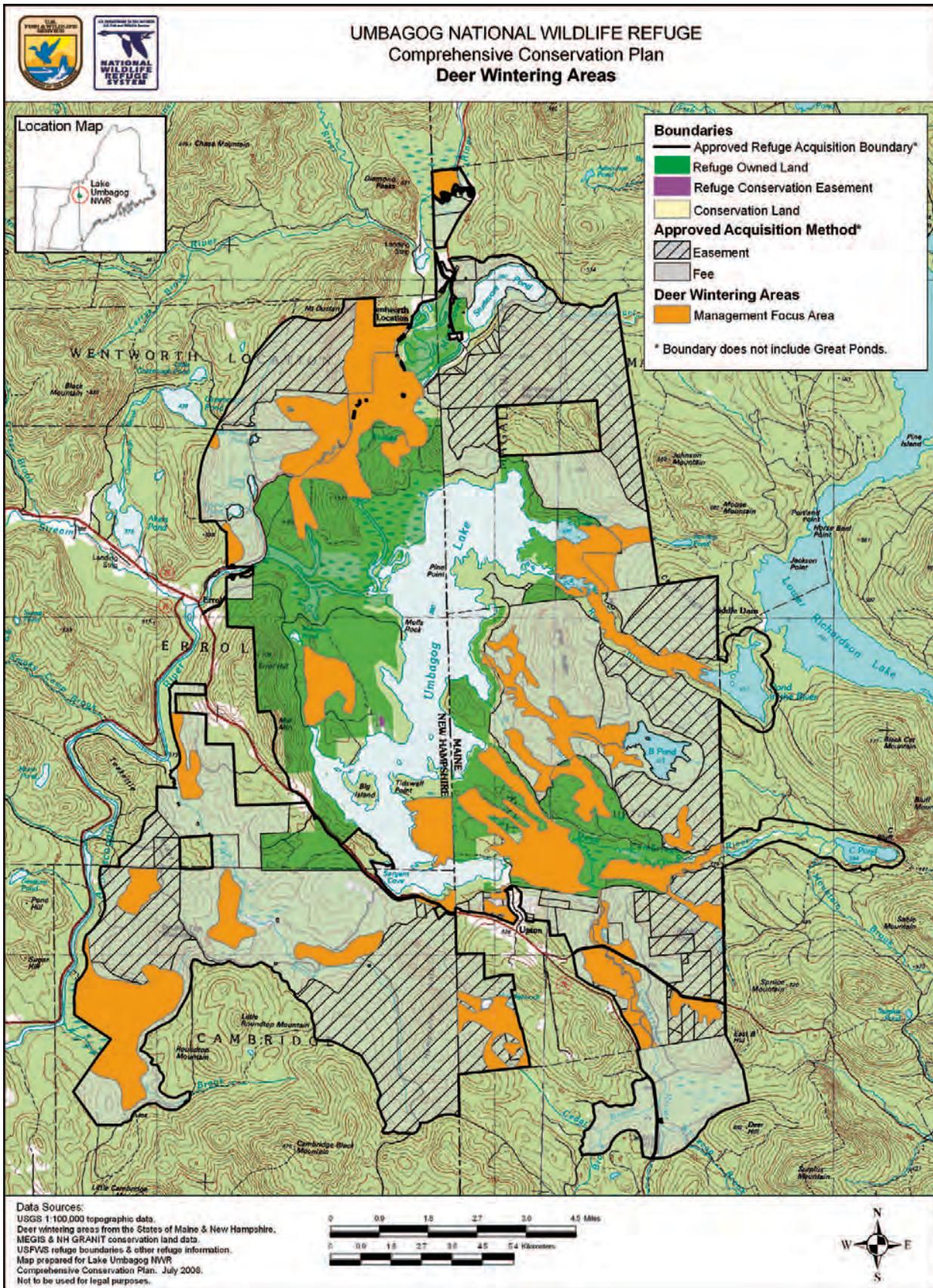
- Sustain singing, nesting and feeding habitat for blackburnian and black-throated green warblers (refuge focal species) by perpetuating a high (>70%) crown closure, favoring spruce during stand improvement, and maintaining super canopy trees
- Maintain at least 50% of deer wintering areas (map 4-7) as quality shelter at any given time, consistent with management of our focal species
- Provide connectivity of forested habitat types for wide-ranging mammals, consistent with management for our focal species
- Provide other structural characteristics to improve stand diversity for other native wildlife species dependent on this habitat type. This will include retention of approximately six live cavity trees or snags (standing dead trees/ acre), with at least 1 of these exceeding 18 inches/dbh, and three others exceeding 12 inches dbh, and retaining coarse woody debris and super dominant or super canopy trees.
- Acquire up to 26,517 acres of this cover type from willing sellers within the approved refuge boundary, and manage fee title lands similar to current refuge lands under objective 3.1a.
- Work with state partners to identify and protect critical deer wintering yards (see map 4-7).

The spruce-fir habitat type includes both high and low elevation spruce-fir. It is comprised of the following NVCS associations: lowland spruce-fir community, red spruce rocky summit, and a black spruce-red spruce community. It is an important ecological component of the diversity of the Upper Androscoggin River Watershed and supports many species of conservation concern.

The 1995 New Hampshire Forest Resources Plan describes the spruce-fir habitat type as supporting more rare animal species than other major habitat types and considers mature spruce-fir a rare habitat type (New Hampshire Division of Forests and Lands 1995).

While we believe this habitat type was much more dominant historically in the mixed forest matrix than we see on the landscape today, its extent and age class distribution in New Hampshire and Maine has been affected by natural disturbances such as spruce budworm and bark beetle outbreaks, and from human disturbances, primarily logging. The 2005 New Hampshire Wildlife Action Plan (WAP) identifies development, timber harvest, non-point pollution, and altered natural disturbance regimes as the most challenging issues currently facing the conservation of this habitat type (NHFG 2005).

Given the apparent decline in spruce-fir habitat, its significance to our mixed forest focal species (blackburnian and black-throated green warblers), and its importance in State conservation plans, the spruce-fir habitat type will be our highest priority for upland forest management. Since our management will tend



to create larger blocks of mature spruce-fir on the landscape, we anticipate that a by-product of our management will be the improvement of habitat quality for species more closely tied to this habitat, such as bay-breasted warbler, boreal chickadee, and gray jay, among others.

Specific Strategies for the Spruce-Fir Habitat Type (see appendix E for additional details)

- Improve habitat structural diversity for refuge focal species through pre-commercial and commercial thinning and/or other stand improvement operations, as appropriate. We will favor spruce during all stand improvements.
- Regenerate this habitat type through accepted silvicultural practices. Methods include, but are not limited to:
 - Utilize primarily single tree or group selection uneven-aged management techniques, and to a lesser extent, clearcutting, or shelterwood even-aged techniques, 2) treatments should be timed to optimize the ability of the site to regenerate spruce and other conifer, 3) target age class goals under management will range from 100-130 years; and, 4) the size of each treatment action and cutting interval will be determined by management unit size, silvicultural prescription, and rotation age.
- In critical deer wintering areas (map 4-7), maintain updated maps of critical areas and manage these stands, to the extent compatible with management of Federal trust resources, to ensure long-term continuation of this habitat. The overall target would be to maintain a minimum of 50% of a deer wintering area as quality shelter at any point in time. Quality shelter includes softwood cover over 35 feet tall and 70% or higher crown closure (Reay et al. 1990). Refuge staff will assist state agencies with ground surveys of wintering deer areas on refuge lands.

Sub-Objective 3.1b (Conifer-Hardwood “Mixed Woods” Habitat Type)

Manage up to 17,265 acres of conifer-hardwood mixed woods with a high conifer component on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, to:

- Sustain singing, nesting and feeding habitat for blackburnian and black-throated green warblers (refuge focal species) by perpetuating a high (>70%) crown closure, favoring spruce during stand improvement, and maintaining super canopy trees. Enhance foraging habitat for the black-throated green warbler and other native species dependent on this habitat type by developing small gaps to promote a diverse, layered understory. We will favor conifers wherever possible based on site capability.
- Provide connectivity of forested habitat types for wide-ranging mammals, consistent with management for our refuge focal species.
- Provide other structural characteristics to improve stand diversity for other native wildlife species dependent on this habitat type. This will include retention of approximately 6 live cavity trees or snags (standing dead trees)/acre, with at least 1 of these exceeding 18 inches/dbh, and 3 others exceeding 12 inches dbh, and retaining coarse woody debris and super dominant trees.
- Acquire up to 13,406 acres of this cover type from willing sellers within the approved refuge boundary, and manage fee title lands similar to current refuge lands under objective 3.1b.

The conifer-hardwood mixed woods habitat type is comprised of the following NVCS associations: aspen-fir woodland, successional spruce-fir forest, and red

spruce-hardwood forest. We believe the conifer component within this habitat type was much greater over the last 150 years than it is today, due to the past 20 years of logging practices. The New Hampshire WAP identifies development and acid-deposition as the most challenging issues facing this habitat type (NHFG 2005). The 2005 Maine CWCS identifies large-scale forestry operations that result in habitat fragmentation, change in over- and under-story species composition (stand conversion), reduction in rotation length, and loss through development as major threats to this habitat type (MDIFW 2005a).

Specific Strategies for the Mixed Woods Habitat Type (see appendix E for additional details)

- Improve habitat structure for refuge focal species through pre-commercial and commercial thinning and/or other stand improvement operations. We will favor spruce during all stand improvements.
- Regenerate this habitat type through accepted silvicultural practices. Favor conifer on appropriate sites. Methods include, but are not limited to:

On conifer- dominated sites

- 1) utilize primarily single tree or group selection uneven-aged management techniques, and to a lesser extent, clearcutting, or shelterwood even-aged techniques;
- 2) treatments should be timed to optimize the ability of the site to regenerate spruce and other conifer;
- 3) target age class goals under management will range from 100-130 years;
- 4) the size of each treatment action and cutting interval will be determined by management unit size, silvicultural prescription, and rotation age;
- 5) in areas of advanced, healthy conifer regeneration, we will implement silvicultural techniques to protect it.

On hardwood- dominated sites

- 1) utilize small group selection with up to 1/5 to 1/2 acre group sizes;
- 2) target age class goals under management are 100-200 years; and,
- 3) cutting cycles will be 15 to 20 years in order to maintain understory development.

Mixed woods on the refuge



Ian Drew/USFWS

Sub-Objective 3.1c (Northern HardwoodHabitat Type)

Manage up to 13,483 acres of northern hardwood habitat type on Service-owned lands, including those planned for acquisition from willing sellers within the approved refuge boundary, and on sites optimally suited for hardwood growth, to:

- Provide foraging habitat for blackburnian and black-throated green warblers (refuge focal species) by developing multi-aged stands and a mid- to high canopy closure
- Sustain breeding, nesting and foraging habitat for Canada warblers, a refuge focal species, by developing openings, a diverse, layered understory, and promoting the aspen and birch community. This management would also benefit American woodcock (see discussion below)

- Provide other structural characteristics to improve stand diversity for other native wildlife species dependent on this habitat type. This will include retention of approximately six live cavity trees or snags (standing dead trees)/ acre, with at least one of these exceeding 18 inches/dbh, and three others exceeding 12 inches dbh, and retaining coarse woody debris, and super dominant trees. Where possible, we will maintain and encourage the development of mast producing trees (e.g. black cherry, mountain ash, beech).
- Acquire up to 8,843 acres of this cover type from willing sellers within the approved refuge boundary, and manage fee title lands similar to current refuge lands under objective 3.1c.

The northern hardwood habitat type is comprised of the following NVCS associations: red maple-yellow birch early successional woodland, northern hardwood forest, semi-rich northern hardwood forest, and paper birch talus woodland. This habitat type is more extensive on the landscape today than probably occurred over the last 150 years (Charlie Cogbill, personal communication, 2004). Similar to the spruce-fir type, its distribution is largely due to site capability and land-use changes over time. It is also an important ecological component of the diversity of the Upper Androskoggin River watershed.

The northern hardwood habitat type is a deciduous forest dominated by sugar maple, yellow birch and American beech on well-drained soils on mid-elevation slopes. American beech becomes more common in older stands. Most of the area covered by this community was logged at some time in the past (Rapp 2003). Aspen-birch is another forest component of this habitat type, although it can also be a temporary, early successional feature of any of the three broad upland habitat types on the refuge. White birch, quaking and bigtooth aspen, and pin cherry can dominate an area following a large disturbance such as fire or clearcut; however, these shade intolerant species are eventually replaced with more shade tolerant species characteristic of the particular site conditions.

Specific Strategies for the Northern Hardwood Habitat Type (see appendix E for additional details)

- Improve habitat structure for refuge focal species through pre-commercial and commercial thinning and/or other stand improvement operations.
- Regenerate these habitat types through accepted silvicultural practices. Methods include, but are not limited to:
 - 1) Utilize single tree or small group selection of up to 1/2 acre group sizes,
 - 2) target age class under management are 100-200 years; and,
 - 3) cutting cycles of 15 to 20 years in order to maintain understory development.

Sub-Objective 3.1d (Woodcock Focus Areas)

Manage 2,664 acres in woodcock focus areas to provide and sustain all life stage habitat requirements for woodcock.

- Use accepted silvicultural practices in woodcock focus areas (map 4-2) to create openings, promote understory development, and sustain early successional habitat for American woodcock and Canada warbler. Generally, use group selection, clearcuts or patch cuts of up to 5 acres in size. Some larger roosting fields may also be maintained. Cutting cycles will be approximately 8-10 years on a 40 year rotation. Some 3-5 acre openings may be permanently maintained primarily by mowing and brush clearing using mechanized equipment.

- Perpetuate aspen-birch communities where they exist, and strive to achieve an appropriate distribution of regenerating, young, mid and mature age classes
- Conduct woodcock singing male surveys to document wildlife response to habitat management.

Focal Species Habitat Requirements

The blackburnian warbler is associated with mature conifer habitats (> 80% canopy cover) of spruce, fir, hemlock, and pines, and in spruce-fir/hardwood mixed habitats including deciduous stands with patches of conifers. It nests and gleans insects in the upper canopy of conifers, especially spruce and hemlock, if present, and rarely pines (DeGraaf and Yamasaki 2001). Males sing from the tops of the tallest conifers, preferably over 60 feet. The blackburnian warbler is a moderate priority with a high regional responsibility within Bird Conservation Region (BCR) 14 (Dettmers 2005). Approximately 25% of the global population occurs in this region. This warbler is of conservation concern because of its relatively small total range, its preference for mature conifers, and its restricted winter range in the subtropical forests of northern South America. Declines are recorded for New England although the overall population appears to be stable. It is considered a forest interior species, susceptible to forest fragmentation and short rotation timber harvesting (50 years or less) (Hagen et al. 1996; Morse 2004). The effects of forest fragmentation, loss of hemlock to woolly adelgid, and deforestation on the wintering grounds are issues of concern to the conservation of this species (Morse 2004). The 2005 Maine CWCS lists the loss of hemlock as the chief threat to this species' conservation in Maine and identifies habitat conservation and research as the two highest priorities in the state for conserving their population state-wide (MDIFW 2005a).

The Canada warbler is declining across much of its range and is listed as highest priority in BCR 14 (Dettmers 2005). This bird is found throughout the watershed, and is not tied specifically to any of the three refuge upland habitat types, but may be tied more directly to a well-developed understory or shrub layer. PIF also has a goal of increasing the Canada warbler continental population by 50% (Rich et al. 2004). The Maine CWCS identifies habitat conservation and research as the two highest priorities in the state for conserving Canada warblers (MDIFW 2005a).

The black-throated green warbler is one of the forest-interior species most closely associated with a mixed forest. Black-throated green warblers are a moderate priority in BCR 14, with a high regional responsibility (18.4% of the global population), and a moderate regional threat level. This species is generally abundant and stable in the region. Although it occupies a wide range of forested habitat types, in the Northeast, it occurs at highest densities in closed canopy mid-to-mature forest with a significant conifer component. This foliage-gleaning warbler generally forages high in the canopy, but at a lower height than blackburnian warblers (Morse 1967). Spruce (particularly red spruce) and paper birch are favored foraging substrates. Although it will nest in deciduous trees, preferred nest sites are in dense conifer foliage on a limb or tree fork, at a height of about 20 ft. (DeGraaf 2001; Foss 1994). Large spruce trees are favored male singing perches (Morse 1993). Black-throated green warblers appear to require fairly large forest patches and a generally forested landscape (Norton 1999). Askins and Philbrick (1987) found that they disappeared from a 250 acre forest tract that became isolated from other forested habitat. Black-throated green warbler densities also decline in heavily thinned forest (Morse 1993). However, structurally heterogeneous forests that include small gaps provide improved foraging opportunities for this warbler (Smith and Dallman 1996).

The American woodcock is a highest priority species in BCR 14 (Dettmers 2005). Woodcock require several different habitat conditions that should be in close proximity to one another, and can consist of both uplands and wetlands habitat types. These include clearings for courtship (singing grounds), large openings for night roosting, young, second-growth hardwoods (15-30 years) for nesting and brood-rearing, and foraging areas (Sepik et al. 1981; Keppie and Whiting 1994). These habitat conditions occur naturally on the refuge and can be expanded through habitat manipulation. Lorimer and White (2003) estimate that natural disturbances in the pre-settlement forests created about 1-3% early successional habitat in mixed woods and northern hardwood forests and up to 7% in spruce flats that are more susceptible to blowdown.

Other Species Benefiting From Our Focal Species Management

As we described in the introduction to this chapter, we selected focal species, in part, because we believe their habitat requirements also represent the habitat needs for many other Federal trust and native wildlife species dependent on that respective habitat type. For example, other birds of high conservation concern in BCR 14 that breed or forage in the mixed forest which we expect will benefit over the long-term from our management include: bay-breasted warbler (BCR highest priority), and boreal chickadee, Cape May and black-throated blue warblers (BCR high priority). Cape May and bay-breasted, in particular, prefer stands dominated by conifer, or pure conifer, which our management will emphasize. While these species do not presently occur at high densities in our area, we predict their presence and breeding pair numbers will increase as our forest management tends toward favoring spruce, and as we allow for some stands to tend toward older age classes. Specifically, we may begin to see direct benefits to Cape May and bay-breasted warblers after 25-50 years of forest management.

Our management for focal species on both current and future refuge lands will serve to ensure long-term conservation of critical deer wintering areas and provide habitat connectivity for wide-ranging mammals including American marten, fisher, bobcat, black bear (Ray 2000), and potentially for the Federal-listed lynx, although it has not been documented in the immediate area (re: chapter 3, mammals discussion). Both state agencies have identified certain deer wintering areas as critical to maintaining the region's deer population and both have regulations and policies in place for their protection. In these areas, deer annually congregate in large numbers for protection and survival against wind, deep snow, and extreme cold. Typically, the deer wintering areas lie in lowland conifer or conifer-dominated mixed stands, 35 feet or taller, where there is a high crown closure, approximately 70% (Reay 1990). In addition, there are patches of hardwoods or softwoods within or near the core of the area at a height accessible to deer as browse. We predict that management strategies for our focal species would provide these stand attributes, and thus, management of deer wintering areas complements our habitat management priorities. Map 4-7 identifies critical deer wintering areas on or adjacent to the refuge provided by NHFG and MDIFW.

The 2005 New Hampshire WAP includes a list of "important wildlife" that may benefit from conserving mixed forest habitat types (NHFG 2005). Besides the species mentioned previously, species known on the refuge include: Cooper's hawk, hoary bat, northern goshawk, American three-toed woodpecker, blue-spotted salamander, northern myotis, ruffed grouse, wild turkey, veery, wood thrush, yellow-bellied sapsucker, American redstart, ovenbird, blue-headed vireo, and rose-breasted grosbeak. Appendix H, table H.1, lists additional species of conservation concern that will benefit from our management by habitat type.

Summary of Upland Forest Management Proposal

Our management emphasis over the next 15 years will be to maintain, enhance, create and/or restore the habitat attributes important for sustaining the focal species identified in the objective statement. Appendix E provides additional

guidance we will follow. During the next 15 years, we will primarily manage the mixed spruce-fir/northern hardwood forest on current refuge lands within the habitat units we identify in appendix E.

The refuge currently owns, or has approval to acquire an interest in, 59,611 acres of upland forest. Included are those lands in the LPP (appendix A) which is the latest, approved plan for a refuge expansion. It is primarily on the fee title lands that we plan to conduct active management since fee acquisition allows for full management capability. On easement lands, our objective will be to purchase the minimum rights and interest necessary to ensure quality wildlife habitat will be permanently sustained. Typically, we will purchase at least development rights; however, we could purchase additional rights as needed, including habitat management rights as warranted. The Service works on a willing seller-only basis, and it will be up to the landowner to determine what additional management rights, if any, are sold.

Given our long-term habitat management and land acquisition objectives, we estimate the refuge lands could provide high quality breeding habitat in the mid- and mature-aged spruce-fir and mixed woods habitat types to support up to approximately 3,975 pairs of Blackburnian warblers (based on an estimated density of 4.94 acres/pair), and 2,892 pairs of black-throated green warblers in (based on an estimated density of 6.79 acres/pair) (Randy Dettmers, personal communication, 2006). In addition, refuge lands could provide high quality breeding habitat in the mixed woods and northern hardwoods habitat types to support up to approximately 1,036 pairs of Canada warblers (based on an estimated density of 13.84 acres/pair). In the refuge’s woodcock focus areas (map 4-6), there will be high quality habitat to support up to approximately 280 American woodcock singing males (based on an estimated density of 23.8 acres/singing male) (Andrew Weik, personal communications, 2006). We recognize, however, that these estimates are based on habitat acres alone, and may not fully take into account intra-specific competition among other breeding bird species in the same area.

In summary, and presented in table 4.2 below, our management would have the potential to directly contribute towards the BCR 14 goals for each of these species of conservation concern (Randy Dettmers, personal communication, 2006).

Table 4.2. Potential number of refuge focal species breeding pairs/singing males supported in refuge’s upland forest habitat types

Refuge Focal Species	Refuge Habitat Type	Number of Potential Breeding Pairs/ Single Males Supported
Blackburnian warbler	Mid- and mature aged spruce-fir and mixed woods	3,975 pair
Black-throated green warbler	Mid- and mature aged spruce-fir and mixed woods	2,892 pair
Canada Warbler	Mixed woods and northern hardwoods	1,036 pair
American Woodcock	Woodcock Focus Area	280 singing males

In addition, results from a Canadian study evaluating mean total density of all birds in various habitats indicate that under full implementation of this objective, over the long term, refuge lands could contribute a potential mean total density, inclusive of all breeding birds, of over 8,538 bird pairs in the spruce-fir and mixed

woods habitat types combined (based on an estimated mean total density of 2.3 acres/pair), and 3,981 bird pairs in the northern hardwoods habitat types (based on an estimated mean total density of 2.48 acres/pair) (Kennedy et al. 1999).

GOAL 4:

Provide high quality wildlife-dependent activities such as hunting, fishing, wildlife observation and photography, as well as camping and boating in support of those activities.

Objective 4.1 (Hunting)

Within 3 years of CCP approval, at least 80% of hunters on the refuge will report that they had a high-quality experience.

Rationale

Hunting is identified in the 1997 Refuge Improvement Act as a priority public use. Priority public uses are to receive enhanced consideration when developing goals and objectives for refuges. Further, hunting is an established traditional use in the local area. We have implemented a hunt program on the refuge during the past 6 years.

In April 2007 we issued an amended Refuge Hunt Plan and environmental assessment after a 30 day public review and comment period. With our stated hunt program objectives, we intend to: 1) maintain a diversity of habitats within the refuge that are capable of supporting a diversity and abundance of wildlife species, and 2) provide wildlife-dependent recreational opportunities. 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. It is also a priority public use on national wildlife refuges.

The refuge hunt program was first implemented during 2000, consistent with state regulations, and additional refuge regulations stipulated in 50CFR. Refuge lands were opened to migratory game bird and waterfowl and small and big game hunting. In April 2007, we amended the 2000 Refuge Hunt Plan and associated environmental assessment, and our Regional Director issued a new Finding of No Significant Impact. The amendment was completed to provide a more detailed analysis of the potential cumulative effects of the current hunt program.

Within two years we will evaluate the potential for new hunting seasons, such as a turkey hunting on refuge lands in both states, and a bobcat hunting on refuge lands in Maine, consistent with both states' regulations. However, additional NEPA analysis and public involvement would need to occur before an expanded program could be implemented.

Providing a high-quality hunt on the refuge promotes visitor appreciation and support for refuge programs. 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 uncrowded 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 operations; and 11) incorporates a message of stewardship and conservation in hunting opportunities. These are all criteria we will use to evaluate our hunt program.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this program:

Continue to:

- Offer a hunt program following state of Maine and New Hampshire regulations. The only exceptions are that we do not allow turkey hunting anywhere on the refuge and we do not allow bobcat hunting on refuge lands in Maine (on New Hampshire lands, bobcat hunting is not allowed by state or refuge regulations). Also, no special refuge permits are required for hunting on refuge lands.
- Maintain six waterfowl hunt blinds; maintain a reservation system for the blinds where the maximum stay is one week

Within 2 years of CCP approval:

- Evaluate the potential for a turkey hunt on refuge lands in both states, and a bobcat hunt on refuge lands in Maine. If appropriate, develop a new Hunt Plan opening package, including new NEPA document, Federal Register notice, and public involvement opportunities. Both new hunt additions will be consistent with respective states’ regulations and refuge regulations.

Within 5 years of CCP approval:

- Establish an inter-state (New Hampshire and Maine) and Service Umbagog Lake Working Group to annually review hunting seasons in an effort to make seasons as consistent as possible
- Develop annual hunt plan after annual state meetings
- Evaluate numbers and distribution of waterfowl blinds each year, including placement of blinds on Maine side of refuge. Work with local waterfowl clubs to improve construction and placement of blinds, and evaluate and manage wood duck boxes.
- Waterfowl hunters would have priority for using blinds during the hunt season
- Establish additional parking areas off of the current road network to facilitate hunting in the expansion area as lands are acquired

Within 5-10 years of CCP approval:

- Provide literature, training, and other outreach tools targeting accurate identification of species of concern on the refuge (e.g. at check stations, kiosks, signage)
- Conduct surveys, or develop reporting system such as check station or permit system, to collect data for evaluating numbers and quality of program

Within 10-15 years of CCP approval:

- Evaluate pull-outs and parking areas for safety, and improve or relocate where necessary; also evaluate opportunities to provide access for people with disabilities
- Try to distribute the hunting pressure through use of maps and outreach

Objective 4.2 (Fishing)

Within 4 years of CCP approval, in cooperation with the states of New Hampshire and Maine fish and wildlife agencies, provide opportunities such that at least 80% of anglers on the refuge, or anglers accessing the lake through the refuge, report they had a high-quality experience.

Rationale

Fishing is identified in the Refuge Improvement Act as a priority public use. Priority public uses are to receive enhanced consideration when developing goals and objectives for refuges. Providing high quality fishing opportunities for the public to engage in this activity on the refuge promotes visitor appreciation and support for refuge programs.



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Preparing to fish on the lake

We will continue to allow access for fishing, in accordance with states of Maine and New Hampshire regulations, except in sensitive areas during nesting season. We will develop a new fishing access site on existing refuge lands at Mountain Pond, in conjunction with new trail and parking area plans. We define a high quality fishing program as one which: 1) maximizes safety for anglers and other visitors; 2) causes no adverse impact on populations of resident or migratory species, native species, threatened and endangered species, or habitat; 3) encourages the highest standards of ethical behavior in regard to catching, attempting to catch, and releasing fish; 4) is available to a broad spectrum of the public that visits, or potentially would visit, the refuge; 5) provides reasonable accommodations for individuals with disabilities to participate in refuge fishing activities; 6) reflects positively on the Refuge System; 7) provides uncrowded conditions; 8) creates minimal conflict with other priority wildlife-dependent recreational uses or refuge operations; 9) provides reasonable challenges and harvest opportunities; and 10) increases visitor understanding and appreciation for the fishery resource.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this program:

Continue to:

- Implement the annual “Take Me Fishing” event
- Restrict fishing access around loon and bald eagle nesting sites

Within 5 years of CCP approval:

- Assist partners in conducting creel and angler surveys
- Work with partners to maintain or restore a quality brook trout fishery wherever appropriate in the Umbagog watershed, including the Rapid, Dead Diamond and Dead Cambridge rivers and tributaries, and C and B Ponds; cooperate with partners in maintaining and improving existing fish barriers to protect trout; work with Umbagog Working Group to implement recommendations from the Eastern Brook Trout Joint Venture once their strategic plan is completed
- Officially open the refuge to fishing through 50CFR regulations and develop a fishing plan
- Establish thresholds of acceptable change to define when access restrictions may be imposed to minimize impacts
- Distribute angling pressure through maps and outreach
- Work with states through interstate commission, or other forum (e.g. Umbagog Lake Working Group), to develop consistent fishing regulations on lead tackle
- Increase educational outreach to public on dangers of lead tackle and other debris to wildlife and the environment.

Within 5-10 years of CCP approval:

- Provide improved shoreline access (e.g. trails, docks, etc)

- Improve opportunities for handicapped access to high quality fishing areas
- Construct safe pullouts
- Establish additional parking areas off of the current road network to facilitate fishing in the expansion area as lands are acquired
- Provide walk-in fishing access to Mountain Pond in conjunction with new trails and parking area plans

Within 10-15 years of CCP approval:

- Work with states to eliminate fishing tournaments on Umbagog Lake to maintain reasonable solitude and a natural experience for anglers and other users.

Objective 4.3 (Wildlife Observation and Photography)

Within 2 years of CCP approval, at least 80% of refuge visitors engaged in wildlife viewing and nature photography will report a high quality experience.

Rationale

Wildlife observation and photography are identified in the Refuge Improvement Act as priority public uses. Priority public uses are to receive enhanced consideration when developing goals and objectives for refuges. Providing high quality opportunities for the public to engage in these activities on the refuge promotes visitor appreciation and support for refuge programs.

We define high quality wildlife observation and photography programs as those in which: 1) observation occurs in a primitive setting or use safe facilities and provide an opportunity to view wildlife and its habitats in a natural setting; 2) observation facilities or programs maximize opportunities to view the spectrum species and habitats of the refuge; 3) observation opportunities, in conjunction with interpretive and educational opportunities, promote public understanding of and increase public appreciation for America's natural resources and the role of the Refuge System in managing and protecting these resources; 4) viewing opportunities are tied to interpretive and educational messages related to stewardship and key resource issues; 5) facilities, when provided, blend with the natural setting, station architectural style, and provide viewing opportunities for all visitors, including persons with disabilities; 6) observers understand and follow procedures that encourage the highest standards of ethical behavior; 7) viewing opportunities exits for a broad spectrum of the public; and 8) observers have minimal conflict with other priority wildlife-dependent recreational uses or refuge operations.

Opportunities to view and photograph wildlife in a natural setting abound on this refuge due to its rural, undeveloped landscape. Moose and loon are two popular attractions that can be viewed roadside or from boats on the refuge's lakes and waters. The Magalloway River trail, with its viewing platform along an oxbow of the Magalloway River, is a popular walking trail maintained by the refuge. It is accessible to people with disabilities. A loop extension is planned.

Additional trails will be created on refuge lands in the Potter Farm and Thurston Cove areas, and Mountain Pond (see map 4-3). These trails will be supplemented with observation platforms and photography blinds. Location of the trail, platforms, and blinds will provide visitors with quality viewing opportunities without disturbing the wildlife. Refuge trails and roads will remain open year-round from a half hour before sunrise to a half hour after sunset, except as otherwise permitted under a special use permit. Access to trails is by foot travel, including snowshoeing and cross country skiing, or by snowmobile on refuge-designated snowmobile trails.

We have also identified one trail in the expansion area we would like to develop for year round use once those lands are acquired. It parallels Route 16, connecting Wentworth Location to Errol, and we preliminarily refer to it as the potential “Long Pond Trail.” It is currently a snowmobile trail, but could also be developed to provide a year round viewing and photography opportunity. Also in the expansion area, generally, we will keep designated major gravel roads open to vehicle travel to afford additional opportunities for wildlife observation and photography.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this program:

Continue to:

- Maintain Magalloway River trail and viewing platform
- Evaluate new opportunities upon request

Within 5 years of CCP approval:

- Provide literature on wildlife viewing opportunities at kiosks and visitor contact facilities
- Designate self-guided canoe trail, with information on wildlife viewing, on Magalloway River
- Close wildlife viewing sites as warranted during nesting season or other sensitive times of the year
- Develop web-based or other wildlife viewing reporting system

Within 5-10 years of CCP approval:

- With partners, promote an Upper Androskoggin watershed regional wildlife viewing trail system (e.g. auto, boat, snowmobile, etc) across ownerships
- Construct wildlife viewing pull-outs at safe, strategic locations (e.g. moose wallows) on Route 16 and 26
- Provide sensitively placed access to view unique fens and bogs
- Create webcam near loon, eagle, and osprey nests
- Work with partners to identify and promote wildlife viewing opportunities on and off the refuge
- Provide ADA compliant photo blinds
- Consider use of temporary blinds for photography in certain sensitive locations where permanent blinds are not appropriate
- Construct new trails: the Potter Farm and Thurston Cove group of loop trails, Mountain Pond area trails, and along Route 16 in the expansion area; make at least one of these ADA compliant to the extent feasible (see map 4-3)

Objective 4.4 (Camping)

Maintain overnight lake experiences on refuge lands, on no more than 12 remote lake sites, to facilitate compatible, safe and unique hunting, fishing, wildlife observation, and photography opportunities.

Rationale

We currently allow camping on refuge lands on 12 remote sites on Umbagog Lake. Two additional river sites are planned for elimination and rehabilitation. Our lake camping program is administered by NH DRED- Division of Parks and Recreation in conjunction with their management of other camping sites, on state and other ownerships, and the management of the Umbagog State campground. Remote camping on Umbagog Lake provides the unique opportunity for visitors to view moose, and hear loons during dusk and dawn when they are most actively calling, while allowing the visitor to be totally immersed in a quiet, private, primitive, and natural setting. Remote lake camping is becoming an increasingly rare experience in the Northeast, except in very remote northern areas. Similar to hunting and fishing, camping is an historic, traditional, and very popular activity on Umbagog Lake and in other rural parts of New Hampshire and Maine.

We will enhance our current camping program and increase site monitoring to ensure: site conditions are not deteriorating; wildlife is protected; and campers adhere to regulations. We will complete a formal cooperative agreement with NH DRED- Division of Parks and Recreation which will include the provision that we will not increase the current capacity for camping on refuge lands. In cooperation with NH DRED- Division of Parks and Recreation and other partners, we will establish thresholds on what is acceptable change to resources and determine when restrictions or mitigation measures should be imposed to reverse impacts before any damage is permanent. We will also require campers to adhere to “Leave No Trace” principles. The Leave No Trace program is a nationally recognized curriculum of outdoor values that promotes visitors’ ethical use of recreational lands. Our outreach program would include distribution of literature and demonstration of Leave No Trace principles.

Strategies

Continue to:

- Close certain campsites which lie adjacent to loon territories during active loon nesting periods
- Work toward prohibiting pets
- Prohibit gathering of firewood on refuge lands
- Limit campsite size
- Maintain and improve campsites on an annual basis

Within 5 years of CCP approval:

- Complete cooperative agreement with NH DRED. It will include: 1) setting fees; 2) limits on number of campers at individual sites; 3) sanitation requirements, 4) resource, and long-term site protection and restoration needs; 5) required orientation to campers; and, 6) boat access only, no personal water craft;
- Manage camping through site locations, and scheduling of day and season lengths, to provide a quality experience while providing maximum protection for wildlife resources
- Establish a program of increased outreach on-site, and increased enforcement of rules and regulations to minimize illegal camping
- Consider designating some sites as “two nights only” for paddlers moving through the area

- Provide campers with an orientation and overview of rules and regulations and Leave No Trace program
- Restore sites or seasonally close sites as needed to protect resources
- Remove and rehabilitate to natural vegetation, the river camping sites at North 1 and North 2, administered through Mollidgewock State Campground along Route 16
- No pets; no loud music (external speakers)

Within 5-10 years of CCP approval:

- Establish inter-governmental and inter-jurisdictional Umbagog Lake Working Group to develop formal cooperative management agreement encompassing cooperative management of the entire lake area.
- Improve campsites to address safety, long term sustainability without degradation, provide a diversity of site locations and opportunities, and resolve social, environmental, and resource issues.

Objective 4.5 (Boating)

Within 4 years of CCP approval, at least 80% of boaters passing through the refuge on the Magalloway and Androscoggin rivers and associated designated waterways, will report they had a high quality experience based on the following criteria: a) suitable access; b) minimal conflict with other users; c) safe experience; and d) a reasonable chance to view wildlife in a natural setting with minimal disturbance.

Rationale

Motorized and non-motorized boating is an appropriate means of facilitating all six priority public uses on Umbagog Refuge. By allowing this use, we are providing opportunities and facilitating refuge programs in a manner and location that offer high quality, wildlife-dependent recreation and maintain the level of current fish and wildlife values.

Boating would be conducted consistent with refuge and New Hampshire and Maine regulations, with some additional restrictions to protect fish, wildlife

and habitat, and reduce potential conflicts among public uses. Boat access is available at a number of locations both on and off refuge ownership near Umbagog Lake. Two State of New Hampshire public boat launches provide boat trailer access to the upper Androscoggin River, Magalloway River, the mouth of the Rapid River, and Umbagog Lake. One launch is located upstream of the Errol Dam, the other is at the southern end of Umbagog Lake.

We provide additional boat-trailer access on refuge-owned land at the Steamer Diamond landing on the Androscoggin River and at refuge headquarters on the Magalloway River. A car-top boat launch is located at Parson's landing on the Magalloway River, just south of refuge headquarters. The public occasionally launches canoes at other sites along Route 16, where it crosses or approaches the Magalloway and Androscoggin rivers. At some of those sites, inadequate parking or poor visibility of oncoming



Ian Drew/USFWS

Boating on the refuge

traffic presents safety hazards. We are constructing an additional car-top boat launch on the Magalloway River, north of refuge headquarters. The new site will provide parking, a dock, and a restroom. After completing that new site, we will close all refuge-owned boat access points along Route 16, except the present access at refuge headquarters and the Steamer Diamond Landing.

All boats launching or landings on refuge lands must follow state boating regulations and, if applicable, show registration with the appropriate state. The public must inspect all boats and boat trailers and clean them of aquatic invasive species before launching from refuge sites. That cleaning should take place on dry ground well away from the water. Exotic, nuisance plants or animals on boats, trailers, diving equipment, or in bait buckets can disrupt aquatic ecosystems and negatively affect native fish and plant species. Umbagog Lake and its associated rivers appear to be relatively free of aquatic invasive plants, and cleaning boats, trailers, and other equipment will help to keep them that way. Signs, education, and periodic enforcement will remind the public of these regulations.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this program:

Continue to:

- Maintain closures around certain bald eagle and loon nesting territories in partnership with the states
- Distribute pamphlet on recommended day-use canoe and kayak trails, which also alerts boaters to closed areas.
- Monitor boat use by counting numbers from a fixed location on peak use days
- Coordinate with states to address increased use

Within 5 years of CCP approval:

- Develop an interpretive self-guided canoe/kayak trail for the Magalloway River; interpret management activities and habitats visible from trail; promote a “Leave No Trace” boater ethic
- Improve maps and interpretive literature for boaters
- Place registration boxes at boat launches to obtain better information on group size, seasons of use, destination, etc.
- Work with recreation specialists to determine the best way to document use and identify conflicts
- Improve outreach program to alert boaters to closed areas and its purpose to protect nesting wildlife

Within 5-10 years of CCP approval:

- Work with partners, including Umbagog Lake Working Group, to manage boater access (types, numbers, and distribution) along lakes and rivers; establish thresholds of acceptable change identifying when restrictions may need to be imposed to maintain visitor experiences and protect natural resources
- Seek opportunities with partners to evaluate visitor opportunities within an Upper Androsoggin River watershed regional context (e.g. regional auto, walking, and boat trails, visitor centers, tours, etc)

- Develop water ethics/etiquette brochure and interpretive literature at strategic locations (e.g. boat launches, kiosks, offices)
- Provide restroom facilities for boaters at Steamer Diamond, Wentworth Location, current refuge office (Brown Owl), and the planned, new refuge office at Potter Farm

GOAL 5:

Develop high quality interpretive opportunities, and facilitate environmental education, to promote an understanding and appreciation for the conservation of fish and wildlife and their habitats, as well as the role of the refuge in the Northern Forest.

Objective 5.1 (Interpretative Programs: on-refuge emphasis)

Every year, at least 80% of visitors contacted after attending refuge interpretive programs will be able to do one of the following: 1) identify the refuge purposes; 2) name at least one refuge focus species and a management action to benefit the species; 3) describe the refuge's role in conserving the Northern Forest, 4) be able to relate the refuge's contribution to the Refuge System and to regional migratory bird conservation.

Rationale

The National Association of Interpreters defines "interpretation" as a communication process that forges emotional and intellectual connections between the interests of the audience and the inherent meanings in the resource. Interpretation is a priority public use identified in the 1997 Refuge Improvement Act and it is one of the most important ways we can raise our visibility, convey our mission, and identify the significant contribution the refuge makes to wildlife conservation. Public understanding of the Service and its activities in the states of New Hampshire and Maine is currently very low. 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.

Providing high quality opportunities for the public to engage in environmental interpretative activities promotes stewardship of natural resources, and an understanding of the refuge's purpose. They also garner support for refuge programs and help raise public awareness of the role of the refuge in Northern Forest and its contribution to migratory bird conservation.

We define high quality interpretive programs as those which: 1) increase public understanding and support for the Refuge System; 2) develop a sense of stewardship leading to actions and attitudes that reflect concern and respect for wildlife resources, cultural resources, and the environment; 3) provide and understanding of the management of our natural and cultural resources; and 4) provide safe, enjoyable, accessible, meaningful, and high quality experiences for visitors increasing their awareness, understanding, and appreciation of fish, wildlife, plants, and their habitats.

We have identified several new trail opportunities on current refuge lands and one in the expansion area. These were described under our wildlife observation and photography discussion above. As additional lands are acquired in the expansion area we would also evaluate their potential to provide high quality interpretive opportunities.

Strategies

In addition to those strategies listed under "General Refuge Management" affecting this program:

Continue to:

- Hire up to two seasonal interns/year, if resources allow, to help accomplish visitor services program priorities

- Offer programs on a request basis only; usually a minimum of 3, and up to a maximum of 12 annually, focused on presenting the Refuge System mission and refuge purposes. Typical audiences have been students or senior citizen groups
- Develop and distribute standard interpretive brochures (e.g. refuge brochure, species lists, etc)
- Seek funding to finish construction of the Magalloway River trail, with interpretive signage, and make it Americans with Disability Act (ADA) compliant
- Develop/construct self-guided Magalloway River Canoe Trail and boat access

Within 5 years of CCP approval:

- Hire a VSP to implement programs and develop a Visitor Service's step-down plan incorporating objectives, finalizing strategies, and coordinate the evaluation of visitor numbers, visitor satisfaction, visitor impacts, carrying capacity, and thresholds of acceptable change.
- Improve on existing brochures and develop new ones interpreting management practices and focus species needs; also, develop self-guided walking trail guides as new trails are constructed
- Establish a self-guided interpretive canoe/kayak trail along the Magalloway River
- Establish self-guided interpretive signs along approved snowmobile trails in partnership with local snowmobile clubs and businesses
- Assess interpretive opportunities in expansion areas as lands become available
- Provide interpretation signs at the Magalloway River trail, including information at trailhead
- Construct information and interpretive kiosks at boat launches, overlooks, roadside pullouts, and any new trailheads

Within 5-10 years of CCP approval:

- Provide a limited number of interpretative programs at two State campgrounds each year, in cooperation with State Parks Staff; utilize volunteers or Friends Group to the extent possible
- Sponsor a limited number of guided interpretive programs on refuge via walks, canoes, kayaks, and/or pontoon boat; utilize volunteers or Friends Group to the extent possible
- Incorporate into Visitor Services plan a procedure for evaluating effectiveness of programs by doing a pre-test, then a post test, or design an evaluation into each program
- Continue to seek funding to finish construction of self-guided Magalloway River trail and new loop extension, and make it ADA compliant
- Construct new interpretative trails: the Potter Farm and Thurston Cove group of loop trails, Mountain Pond area trails, and one along Route 16 in the expansion area trail; make at least one of these ADA compliant to the extent feasible

Within 10-15 years of CCP approval:

- Develop at least 2 pull-outs off Highways 16 and 26 on the refuge where wildlife viewing opportunities exist
- Develop an overlook at Route 26-New Hampshire state line

Objective 5.2 (Community Outreach)

Each year, conduct at least 10 outreach efforts to elected officials, local community leaders, neighbors, and other stakeholders to improve their knowledge and raise their awareness about the refuge and its resources and our management priorities.

Rationale

Greater outreach efforts will increase recognition of the refuge, the Refuge System, and the Service among neighbors, local leaders, conservation organizations, and elected officials. We will strive to annually increase outreach efforts toward the local citizenry. This publicity will also help generate support for similar conservation efforts in the region.

It is particularly important that local residents understand, appreciate, and support the Refuge System mission and this refuge's unique contribution to that mission. In addition, our volunteer program could grow and our Friends group could see enhanced membership and support. The planned Refuge Headquarters and visitor contact facility will serve as an important resource for refuge visitors and local community, providing educational and recreational opportunities, as well as meeting and exhibit space for local conservation organizations.

Gaining support from local community, private landowners, private conservation groups, Congressional, State, and local elected officials, for refuge programs is essential to meeting our goals. This can only happen when these elected officials understand and appreciate the nationally significant contribution of the refuge and its programs to the permanent protection of Federal trust resources. We need to impress upon these individuals the importance of refuge lands to current and future generations of Americans.

Strategies

In addition to those strategies listed under "General Refuge Management" affecting this program:

Continue to:

- Coordinate a minimum of two visitor outreach events annually that showcase refuge resources; for example, the Wildlife Festival and Take Me Fishing event
- Distribute brochure and literature on impacts to loons and other wildlife from lead fishing tackle to discourage their use

Within 5 years of CCP approval:

- Update refuge fact sheets
- Create press kit continue to promote events scheduled on refuge
- Respond to requests for presentations at local service organizational meetings, chamber events, etc
- Participate in those community service, professional associations, and chamber events throughout Upper Androscoggin watershed that would provide the greatest benefit to achieving goals and objectives and furthering the mission of the Refuge System

- Maintain web page
- Establish/maintain a regional media list including newspapers, radio, television
- Foster relationship with selected individuals; personally invite them to refuge activities
- Contact landowners each year to inform them of refuge activities
- Consider having annual meetings with interested adjacent landowners to facilitate communications, raise awareness and understanding of, and seek support for, refuge management programs

Within 5-10 years of CCP approval:

- Consider a webcam at eagle and loon nesting sites

Within 10-15 years of CCP approval:

- Develop web-based outreach and interpretive materials, e.g. virtual tour

Objective 5.3 (Visitor Awareness)

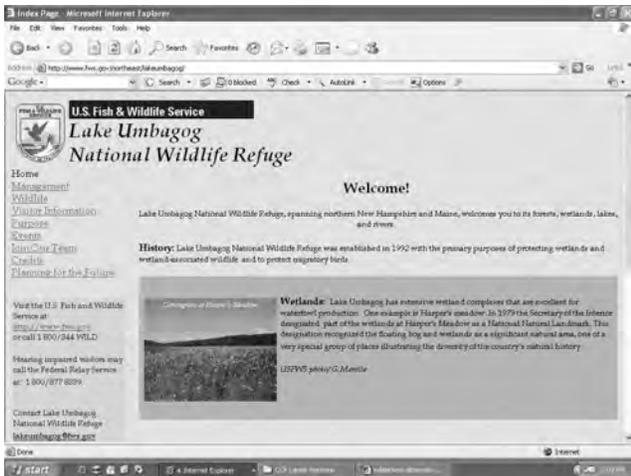
Within 2 years of CCP approval, at least 80% of refuge and Umbagog Lake visitors will be aware of public use programs, management actions, and necessary restrictions put in place to protect federal trust resources while still providing quality public use opportunities.

Rationale: See rationale for objective 5.2.

Strategies

Within 5 years of CCP approval:

- Place informational signs at critical spots (visitor concentration areas)
- Develop and distribute map and other outreach materials for visitors to understand where permitted activities can occur and how they can access; map will portray closed areas, gates, etc; other outreach materials will why area closures and other restrictions are necessary to protect resources
- Utilize refuge web site to distribute information; update and maintain current its information
- Refer to objectives under goal 4 for other specific program recommendations



Refuge webpage

Within 5-10 years of CCP approval:

- Develop a public access management plan, working with States and other partners providing public access to Umbagog Lake; establish thresholds of acceptable change which, when exceeded, may warrant that access restrictions be put in place
- Utilize public forums to raise awareness and explain access restrictions

Objective 5.4 (Environmental Education Opportunities)

Facilitate environmental education opportunities on the refuge, in partnership with other educators, to explain the importance of conserving and managing

the natural resources in the Northern Forest to students, teachers, and other visitors. All who participate in environmental education programs on the refuge will be able to 1) understand the need for migratory bird conservation; 2) identify the refuge's role in the Refuge System and in conserving Northern Forest Federal trust resources, and 3) name at least one refuge focus species and a management action to benefit the species.

Rationale

Environmental education is a process designed to develop a citizenry that has the awareness, concern, knowledge, attitudes, skills, motivations, and commitment to work toward solutions of current environmental problems and the prevention of new ones. Environmental education is identified in the 1997 Refuge Improvement Act as priority public use. Providing high quality environmental education opportunities for the public on a refuge can: promote stewardship of natural resources; develop an understanding of the refuge's purposes and the mission of the National Wildlife Refuge System; and, help raise awareness, understanding, and an appreciation of the role of the refuge in the Northern Forest and its contribution to migratory bird conservation. It also can garner support for other refuge programs.

As we evaluated the future of this program, in comparison to our other priority public use programs, we determined our emphasis will be to facilitate the use of the refuge for educational programs, but look to our partners, Friends Group, and/or volunteers to develop any curriculum and to lead those programs. This recommendation is based on consideration of this plan's 15-year timeframe and what we can reasonably expect for staffing and operational funds, and because we believe our other priority public use programs will be more effective in reaching more visitors. We do not want to imply that we do not value environmental education, but only wish to convey that, on this refuge, the majority of our limited visitor services resources would be best spent in other priority public use programs.

Strategies

Within 5 years of CCP approval:

- Provide educational materials on the refuge web site
- Provide materials to local schools, upon request, as they develop curriculum related to refuge resources
- Facilitate opportunities for state and local partners, colleges or universities, or other educational program coordinators to lead nature-based educational programs on refuge lands

Within 5-10 years of CCP approval:

- Evaluate potential for state and other partners to provide opportunities for adult education programs, such as Elder Hostel
- Work with NHFG, MDIFW, and university extension and conservation education partners to facilitate complementary programs and to seek assistance in implementing program requests

GOAL 6:

Enhance the conservation and management of fish and wildlife resources in the Northern Forest Region through partnerships with public and private conservation groups, private landowners, State and local entities.

Objective 6.1 (Regional and Community Partnerships)

Actively engage in regional and community economic development and conservation partnerships and initiatives, consistent with the Refuge System mission and refuge purposes.

Rationale:

This objective will encourage broader cooperation between the Service and local communities. Partnerships are essential for this refuge to accomplish projects and programs. Further, the Service can provide valuable technical assistance to local conservation organizations, particularly on management of habitat for migratory birds. In addition, the potential for the creation of a regional Umbagog Area Friends Group would be explored.

We will foster relationships with elected officials and business leaders, thereby strengthening political support for the refuge and its programs. This objective will also raise the awareness of opportunities for compatible outdoor recreational uses. These uses will attract visitors to the area and contribute to the local economy.

Law enforcement staff plays an important outreach role on the refuge. Officers not only enforce regulations, but just as importantly, they conduct outreach and serve to raise the visibility of the Service in local communities while out on patrol. As a result of our new programs and regulations described in this CCP, it will be even more important in the future that we have the capability to alert people to these changes and enforce them, as necessary. We believe that a law enforcement partnership could substantially increase our ability to effectively manage and conserve refuge resources.

Strategies

In addition to those strategies listed under “General Refuge Management” affecting this program:

Continue to:

- Work with such partners as:

Conservation organizations: Trust for Public Lands, The Nature Conservancy, Audubon Society of New Hampshire (ASNH), Loon Preservation Committee, New England Forestry Foundation, Mahoosuc Land Trust, Society for the Protection of New Hampshire Forests, Androscoggin Watershed Council, Rangeley Lakes Heritage Trust, The Conservation Fund, Trout Unlimited;

Town and county governments: Towns of Upton, Errol, Magalloway Plantation, and Coos County;

Private entities: FPLE, Wagner Forest Management;

Universities and other educational institutions: Dartmouth College, University of Vermont, University of Massachusetts, Hurricane Island Outward Bound, The Chewonki Foundation, and the Northwoods Stewardship Center; and,

State agencies: MDIFW, NHFG, NH DRED; and, NH Office of Energy and Planning.

Within 5 years of CCP approval:

- Share resources, equipment, and expertise with State and private landowners.
- Become a member of established associations, such as the Upper Androscoggin Advisory Committee

Within 5-10 years of CCP approval:

- Work with conservation partners to achieve common goals; establish MOU, Memorandum of Agreement (MOA) and cooperative agreements as appropriate

Objective 6.2 (Cooperative Management of Umbagog Lake)

Promote responsible use and management of Umbagog Lake, associated rivers, and adjoining uplands in partnership with other jurisdictional and management agencies.

Rationale: See rationale for objective 6.1.

Strategies

In addition to strategies under “General Refuge Management” affecting this program:

Within 5-10 years of CCP approval:

- Exchange with partners, techniques and ideas on managing public use on Umbagog lake, its tributaries, and associated uplands

- Work with States of New Hampshire and Maine to establish an Umbagog Lake Working Group with responsibility to develop consistent regulations and best management practices for activities on the lake and rivers, including:
 - a) wake zones; b) fishing regulations, including fishing tackle; c) boating regulations; d) allowed events/tournaments; e) invasive species management, such as plants and bass; f) outfitter and guide licensing; g) boater ethics program, including waste disposal protocol; h) camp site management; i) other motorized activities, including PWC, float planes; j) promote/develop appropriate locations for access; k) launch sites

- Also, specifically work with Umbagog Lake Working Group to resolve the Rapid River user conflicts among anglers and boaters; develop management strategy (e.g. control access, require permits, schedule launches, limit numbers, etc)

Objective 6.3 (Partner-managed Visitor Facilities)

Within 10 years of CCP approval, develop a visitor contact facility in Errol with partners, where all the visitors to this facility have access to information on outdoor opportunities in the Umbagog area. The Services’ role in the facility is to interpret the refuge’s contribution to the conservation and management of the Northern Forest and its wildlife resources.

Rationale: See rationale for objective 6.1.

Strategies

Within 5 years of CCP approval:

- Explore other opportunities to display refuge visitor contact information at strategic portal areas (e.g., Evans Notch Visitor Center, Colebrook center, Northern Forest Heritage Park)

- Provide map of access sites and areas open to activities (e.g., roads, snowmobile trails, vehicle pull-outs, parking areas, boat launches, river trails)

Within 5-10 years of CCP approval:

- Work with chamber of commerce, NHFG, MDIFW, and New Hampshire Division of Parks and Recreation, Town of Errol, local businesses, conservation organizations to evaluate regional opportunities for visitors services that include the refuge

- With partners, develop an MOU to create a staffed visitor contact facility in town; refuge would only provide supplemental support for staffing. Purpose of facility is to allow visitors to: 1) receive information on what nature-based opportunities are available in the local area; 2) know where to go; and 3) make whatever arrangements and contacts needed for their visit.

- Pursue alternative funding sources (e.g., State highways grants, main street grants, scenic byways, SAFETEA) to maintain partner run facilities that promote refuge vision and goals
- Provide services such as selling hunting permits, providing maps, making reservations. Also, offer limited interpretative program, develop exhibits, provide basic orientation: short video; interactive kiosk, some natural history museum pieces (native wildlife displays)
- Provide visitors with information on programs available on the refuge

GOAL 7:

Develop Umbagog National Wildlife Refuge as an outstanding center for research and development of applied management practices to sustain and enhance the natural resources in the Northern Forest in concert with the Refuge System Land Management Research Demonstration (LMRD) program.

Objective 7.1 (Research and Applied Management)

Within 5 years of CCP approval, establish a forest land management research demonstration (LMRD) program on refuge lands that enhances and promotes the availability of the best available science for making management decisions to benefit wildlife and other resources in the Northern Forest ecosystem.

Surveying vegetation on the refuge



USFWS

Rationale

Fortunately for us, researchers from many universities, state and Federal agencies and non-governmental organizations have conducted research and provided us with valuable information on refuge resources. Without these partnerships, we would not have had the staff or funding to accomplish this important work on our own. We will continue to support cooperative research that benefits the Refuge System, refuge purposes, goals, and objectives. Some of the projects that are on-going, or a priority for us to implement, are discussed under “General Refuge Management” above. Other desirable research projects are identified as strategies under objectives statements.

We describe the Service’s support for an LMRD area to represent the Northern Forest ecosystem in chapter 1 under the Goals discussion. In summary, LMRD areas were envisioned “...to facilitate development, testing, teaching, publishing, and demonstration of state-of-the-art management techniques that support the critical habitat management information needs for fish, wildlife, and plant conservation within the System and other lands”(USFWS 1999).

Umbagog refuge, in partnership with the Nulhegan Division of the Silvio O. Conte Fish and Wildlife Refuge, and the Moosehorn Refuge, developed a proposal to be included in the LMRD program. It was one of 13 LMRD proposals approved at the national level. Through this LMRD program and our partners, as explained in goal 6, we will be able to expand the contribution we are making to focal species by exporting our forest management techniques to easement lands as well as private and public lands beyond our conservation plan. Currently, we do not have funding for this program. Our objectives below outline a course of action to establish an LMRD program on this refuge.

Strategies

In addition to the strategies under “General Refuge Management” affecting this program:

Within 5 years of CCP approval:

- Hire an LMRD coordinator, once sufficient project funding is secured, and integrate with existing refuge staff. Coordinator will work with partners to: a) establish and prioritize forest research needs; b) identify and coordinate with on-going northern forest research projects at universities and other agencies (i.e. Forest Service) in order to complement on-going research and avoid duplication of effort) c) facilitate forest management research on Northern Forest public and private lands; d) coordinate the exchange of research results among Northern Forest landowners; e) publish research findings in peer-reviewed publications
- Conduct a research needs assessment for the refuge; emphasize research projects that evaluate our assumptions, objectives, strategies, and techniques on focal species management.

Within 5-10 years of CCP approval:

- Develop a mission and framework for a research program, including research criteria, protocol, and approval for activities on refuge lands
- Facilitate priority research and publish findings in peer-reviewed publications; all research products, including presentations, posters, and/or journal articles done by others will acknowledge the role of the Service, refuge staff and/or Refuge System lands, as appropriate, as key partners in the research effort.

Objective 7.2 (Outreach for Research and Applied Management Program)

Demonstrate habitat management techniques to partners, the scientific community, and the public to promote conservation of wildlife in the Northern Forest. Distribute findings regularly through various media.

Rationale: See rationale for objective 7.1.

Strategies

Within 5-10 years of CCP approval:

- Facilitate demonstration areas on both refuge, and other ownerships, that showcase habitat management techniques for species of concern in the Northern Forest.
- Cooperate with the Partners for Wildlife Program to accomplish outreach and applied management activities; coordinate with their staff, and funding sources
- Provide forums to present and discuss research findings
- Conduct a series of workshops and courses
- Develop a website for others to access research findings; publish findings

Chapter 5



Bill Zimm/USFWS

Hosting a public meeting

Consultation and Coordination with Others

Background

We presented in chapter 1, figure 1-1, the steps in the comprehensive conservation planning process and how it integrates NEPA requirements including public involvement. What follows is the chronology of public outreach activities we conducted prior to releasing the final CCP/EIS.

Planning Updates, Issues Workbook, and other Newsletters and Publications

<i>August 2001</i>	Distributed newsletter announcing that we were beginning the planning process and to ask if people wanted to be on our mailing list
<i>June 2002</i>	Distributed the issues workbook and planning newsletter to approximately 1,000 names on our mailing list
<i>Fall/Winter 2004</i>	Distributed 219 stakeholder surveys in cooperation with U.S. Geological Survey (USGS)
<i>August 2005</i>	Distributed our “Planning Update” to everyone on our mailing list
<i>November 2005</i>	Distributed the Executive Summary of USGS stakeholder survey
<i>June 2007</i>	Distributed newsletter announcing release of draft CCP/EIS to approximately 1,000 names on our mailing list
<i>July 2007</i>	Distributed Draft CCP/EIS for 77 days of public review and comment. A Federal Register Notice was published and hard copies and cd-roms were distributed at this time. Also, a copy was posted on the National Conservation Training Center website, and news releases and a newsletter were distributed.

Public Scoping Meetings – Meeting Our Refuge Neighbors at Open Houses

<i>July 30, 2002</i>	Number of non-FWS attendants: 44 Location: Errol, NH
<i>August 1, 2002</i>	Number of non-FWS attendants: 21 Location: Berlin, NH
<i>August 2, 2002</i>	Number of non-FWS attendants: 13 Location: Bethel, NH
<i>August 3, 2002</i>	Number of non-FWS attendants: 6 Location: Umbagog Wildlife Festival in Errol, NH
<i>August 28, 2002</i>	Number of non-FWS attendants: 10 Location: Augusta, ME
<i>August 29, 2002</i>	Number of non-FWS attendants: 21 Location: Concord, NH

Updating Various Constituents on Our Progress

August 21, 2001

Number of non-FWS attendants: 1

Location: Phillips Brook Backcountry Recreation Area

Audience: Bill Altenberg, Timberland Trails, Inc.

January 15, 2002

Number of non-FWS attendants: 5

Location: Concord, NH

Audience: Society for the Protection of NH Forests

February 5, 2002

Number of non-FWS attendants: 6

Location: Concord, NH

Audience: The Nature Conservancy in NH

February 6, 2002

Number of non-FWS attendants: 10

Location: Concord, NH

Audience: NH Audubon Society

September 23, 2002

Number of non-FWS attendants: 2

Location: USFWS Regional Office, Hadley, MA

Audience: The Wilderness Society

Meeting with State Partners and Other Conservation Experts

August 22, 2001

Outreach activity: NH Fish and Game - Director's Meeting

Purpose: Discuss refuge programs and how they will be addressed in the CCP.

Number of non-FWS attendants: 4

Audience: Wayne Vetter, Director NHFG; Steve Weber, Division Chief, NHFG; Charlie Bridges, Habitat and Diversity Programs Admin, NHFG; Will Staats, Regional Wildlife Biologist, NHFG; Dan Ashe, Chief, National Wildlife Refuge System; Tony Leger, Regional Chief, National Wildlife Refuge System; Dick Dyer, Refuge Supervisor; Sue McMahon, Chief-Division of Refuges; USFWS Planning Team Members: Paul Casey, Laurie Wunder, Nancy McGarigal

September 11, 2001

Outreach activity: Planning Meeting

Purpose: Discuss land conservation proposal as part of the CCP.

Number of non-FWS attendants: 1

Audience: Phil Bryce, Director of NH Division of Forests and Lands; USFWS Planning Team Members: Paul Casey, Ian Drew, Bill Zinni

September 19, 2001

Outreach activity: Planning Meeting

Purpose: Discuss core team representatives

Number of non-FWS attendants: 4

Audience: NH Fish and Game; USFWS Planning Team Member: Paul Casey

October 30, 2001

Outreach activity: Planning Meeting

Purpose: Identify NH Fish and Game as core team member

Number of non-FWS attendants: 4

Audience: Susan Arnold, Policy Director, Office of the Governor, Wayne Vetter, Steve Weber, Charlie Bridges, USFWS Planning Team Member: Paul Casey.

January 22, 2002

Outreach activity: Planning Meeting

Purpose: To discuss the feasibility of doing the cover type mapping following National Vegetation Classification standards.

Number of non-FWS attendants: 2

Audience: NH Heritage Program; USFWS Planning Team Member: Laurie Wunder, Jennifer Casey

February 11, 2002

Outreach activity: Planning Meeting

Purpose: Forest and woodcock management strategies.

Number of non-FWS attendants: 2

Audience: Will Staats, NHFG, Chuck Hulsey, MDIFW; USFWS Planning Team Member: Ian Drew

August 28, 2002

Outreach activity: Planning Meeting

Purpose: To explain the CCP process to all ME state agencies with jurisdiction or management interest in the refuge, and to discuss any issues, concerns or opportunities with refuge management and refuge resources.

Number of non-FWS attendants: 11

Audience: Meeting with ME state agencies; USFWS Planning Team Members: Paul Casey, Ian Drew, Laurie Wunder, Nancy McGarigal

August 29, 2002

Outreach activity: Planning Meeting

Purpose: To explain the CCP process to all NH state agencies with jurisdiction or management interest in the refuge, and to discuss any issues, concerns or opportunities with refuge management and refuge resources.

Number of non-FWS attendants: 10

Audience: Meeting with NH state agencies; USFWS Planning Team Members: Paul Casey, Ian Drew, Laurie Wunder, Nancy McGarigal

November 20, 2002

Outreach activity: Planning Meeting

Purpose: To discuss available information and information needs for addressing visitor services issues; to discuss a vision related to visitor services on the refuge; and to develop draft goals for visitor services

Number of non-FWS attendants: 6

Audience: David Thurlow, Director of the Northern Forest Heritage Park; Johanna Lyons, NH DRED; Charlie Bridges, NH F&G; Judy Silverberg, NHFG; Chuck Hulsey, MDIFW; Forrest Bonney, MDIFW; USFWS Planning team members: Paul Casey, Ian Drew, Laurie Wunder, Jennifer Tietjen, Nancy McGarigal, Bill Zinni, Sarah Bevilacqua, Susan J. Russo

November 22, 2002

Outreach activity: Planning meeting

Purpose: Discuss use of ELU's in development of the CCP.

Number of non-FWS attendants: 1

Audience: Mark Anderson, TNC, USFWS Planning Team Members: Paul Casey, Laurie Wunder, Jennifer Casey

December 3-5, 2002

Outreach activity: Partners Workshop

Purpose: The purposes were to exchange information and identify species priorities so they could begin an integrated approach to planning in this region.

Number of non-FWS attendants: approximately 30

Audience: North Atlantic Forest (Lake Umbagog Region; BCR 14) NABCI partners; USFWS Planning Team Members: Jennifer Casey, Laurie Wunder

April 2, 2003

Outreach Activity: Planning Meeting

Purpose: To discuss how the Penobscot, Passamaquoddy (Pleasant Point and Indian Township reservations), Micmac, and Maliseet Tribal Governments can best participate in the CCP Process.

Number of non-FWS Attendants: 6

Audience: Steve Crawford, Passamaquoddy Tribe; Fred Corey, Aroostock Band of the Micmacs; Dave Macek, Aroostock Band of the Micmacs; Sharri Venno, Houlton Band of the Maliseet; John Banks, Penobscot Nation; Trevor White, Passamaquoddy Tribe. USFWS Planning Team Members: John Wilson, Nancy McGarigal, D.J. Monette, Stan Skutek, Tom Comish.

April 9, 2003

Outreach activity: Technical Workshop

Purpose: To determine goals and management options for emergent marsh, peatlands, and any adjacent communities that directly influence, or are influenced by, these community types.

Number of non-FWS attendants: 7

Audience: Charlie Bridges, NHFG; Will Staats, NHFG; Chuck Hulsey, MDIFW; Andy Weik, MDIFW; Ron Davis, University of Maine; Curtis Bohlen, Bates College; Jerry Longcore, USGS-BRD; Andrew Milliken, Migratory Bird Program, USFWS; USFWS Planning team members: Paul Casey, Ian Drew, Laurie Wunder, Jennifer Casey, Nancy McGarigal, Bill Zinni, Jennifer Tietjen

April 15, 2003

Outreach activity: Field trip

Purpose: Compare ELU's with actual site and vegetation conditions.

Number of non-FWS attendants: 2

Audience: Mark Anderson, TNC, Greg Kehm, TNC; USFWS Planning Team Members: Paul Casey, Laurie Wunder, Ian Drew, Jennifer Casey.

May 14, 2003

Outreach activity: Technical Workshop

Purpose: To discuss the importance of upland forests and identify goals and management options for this community type.

Number of non-FWS attendants: 11

Audience: Tom Hodgman, MDIFW; Chuck Hulsey, MDIFW; Charlie Bridges, NHFG; Will Staats, NHFG; John Lanier, NHFG; John Kanter, NHFG; Carol Foss, NH Audubon; Kevin Evans, Dartmouth College; Peter Ellis, Univ. of Vermont; Bill Keaton, Univ. of Vermont; Dave Capen, Univ. of Vermont; Randy Dettmers, Migratory Bird Program, USFWS; USFWS Planning team members: Paul Casey, Ian Drew, Laurie Wunder, Jennifer Casey, Nancy McGarigal, Bill Zinni

August 4, 2003

Outreach activity: Planning meeting

Purpose: Develop a more detailed soil survey map.

Number of non-FWS attendants: 2

Audience: Joe Homer and Steve Huntley, NRCS; USFWS Planning Team Member: Laurie Wunder

August 27, 2003

Outreach Activity: Planning meeting with Tribal Natural Resources Coordinators

Purpose: to further develop opportunities/action items identified at April 2, 2003 meeting related to tribal involvement in refuge comprehensive conservation planning and other activities on refuges in Maine.

Number on non-FWS attendants: 6

Audience: Fred Corey, Aroostook Band of Micmacs; John Banks, Penobscot Nation; Steve Crawford, Passamaquoddy Tribe; Trevor White, Passamaquoddy Tribe; Sharri Venno, Houlton Band of Maliseet; Donald Soctomah, Passamaquoddy Joint Council. USFWS Planning Team Members: DJ Monette, Tom Comish, Brian Benedict, John Wilson, Nancy McGarigal.

January 13, 2004

Outreach activity: Planning Meeting

Purpose: To discuss disturbance regimes and forest conditions of pre-settlement New England forests (based on data from mid 1700's to early 1800's); and to use the information obtained to help develop our alternative C.

Number of non-FWS attendants: 2

Audience: Dr. Cogbill, New England Historical Ecologist; Will Staats, NHFG; USFWS Planning Team Member: Laurie Wunder

June 2, 2004

Outreach activity: Field trip

Purpose: Assess lake for Bald Eagle habitat

Number of non-FWS attendants: 3

Audience: Charlie Todd, MDIFW, Chuck Hulse, MDIFW, Will Staats, NHFG; USFWS Planning Team Members: Paul Casey, Ian Drew

June 7, 2004

Outreach activity: Field Trip

Purpose: To visit field locations where trajectory of forest succession was questionable; e.g. given the soils type, the group was to evaluate what the vegetation might look like under unmanaged conditions.

Number of non-FWS attendants: 4

Audience: Steve Fay, Soil Scientist, USFS; Bill Leek, Soil Scientist, USFS; Dave Farick, Forester, NH Division of Forests and Lands; Joe Homer, Soil Survey Leader, NRCS; USFWS Planning team members: Paul Casey, Ian Drew, Laurie Wunder, Jennifer Casey

June 14, 2004

Outreach activity: Field trip

Purpose: Assess Refuge habitat for waterfowl

Number of non-FWS attendants: 1

Audience: Jerry Longcore, USGS; USFWS Planning Team Members: Laurie Wunder, Ian Drew, Paul Casey.

October 26, 2004

Outreach activity: Land acquisition planning meeting with NH Fish and Game Personnel

Purpose: To discuss land acquisition

Number of non-FWS attendants: 4

Audience: Ed Robinson, NH; Jill Kelly, NH; Will Staats, NH; Diane Emerson, NH; USFWS Planning Team Members: Paul Casey, Ian Drew.

March 25, 2005

Outreach activity: CCP Update and Land Acquisition Discussion

Purpose: To discuss topics such as Refuge Improvement Act, CCP, Land Acquisition, Public Use, Habitat Management, and Administration of the Refuge.

Number of non-FWS attendants: 6

Audience: Phil Bryce, State Forester, NH DRED; Lee Perry, Director, NHFG, Charlie Bridges, NHFG; Steve Weber, NHFG; Johanna Lyons, NH DRED; Allison McLean, Director of Parks, NH DRED; USFWS Planning Team
Members: Paul Casey, Ian Drew

Briefing Elected Officials and Others

- October 30, 2001* New Hampshire Governor's Office
- March 14, 2002* NH Senators in Washington, DC
- June 11, 2002* Aides to Senator Gregg in NH
- June 19, 2002* Aides to Representative Bass in NH
- February 15, 2005* Matt Hogan, Acting Director of USFWS
- July 10, 2005* Aide to Senator Sununu in NH
- July 26, 2005* Senator Gregg in NH
- August 16, 2006* Aides to Senator Gregg in NH
- October 28, 2006* Dale Hall, Director USFWS
- June 6, 2007* Aides to Senator Gregg in NH
- June 14, 2007* Aides to Senator Sununu in NH
- July 24, 2007* Aides to Senators Snow and Collins, and Representative Michaud in ME
- July 24, 2008* NH Executive Councilor Raymond Burton, NH State Senator John Gallus, and Berlin Cit Councilor Timothy Donovan
- July 16, 2008* NH Fish and Game Director

Public Release of Draft CCP/EIS

- July 10, 2007**
Information Session
Errol, NH
- July 30, 2007**
Public Hearing
Errol, NH
- July 31, 2007**
Public Hearing
Newry, ME
- August 1, 2007**
Public Hearing
Berlin, NH

August 6, 2007
Public Hearing
Augusta, ME

August 9, 2007
WMOU radio Q&A program
Berlin, NH

August 16, 2007
Information Session
Errol, NH

**Updating Various
Constituents on Draft
CCP/EIS**

June 10, 2008
Audience: Thirteen Mile Woods Association

July 21, 2008
Audience: Dartmouth College Grant Management Committee

2008
Audience: Various; approximately 8 general presentations on the refuge were given during the year, and CCP updates were provided and questions related to the plan were addressed when appropriate. In addition, at least three meetings were held with individuals interested in discussing particulars about the draft CCP/EIS. Details on the presentations or meetings with individuals can be provided upon request.

Glossary



Paul Casey/USFWS

Umbagog Lake in winter

Glossary **(including list of acronyms)**

Glossary

accessibility	the state or quality of being easily approached or entered, particularly as it relates to complying with the Americans With Disabilities Act
accessible facilities	structures accessible for most people with disabilities without assistance; facilities that meet UFAS standards; ADA-accessible [E.g., parking lots, trails, pathways, ramps, picnic and camping areas, restrooms, boating facilities (docks, piers, gangways), fishing facilities, playgrounds, amphitheaters, exhibits, audiovisual programs, and wayside sites.]
adaptation	adjustment to environmental conditions
adaptive management	the process of treating the work of managing natural resources as an experiment, making observations and recording them, so the manager can learn from the experience.
advanced regeneration	tree seedlings or small saplings that develop in the understory prior to the removal of the overstory.
aggregate	many parts considered together as a whole
alternative	a reasonable way to fix an identified problem or satisfy a stated need [40 CFR 1500.2 (cf. “management alternative”)]
appropriate use	a proposed or existing use on a refuge that meets at least one of the following three conditions: <ol style="list-style-type: none"> 1. the use is a wildlife-dependent one; 2. the use contributes to fulfilling the refuge purpose(s), the System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the National Wildlife Refuge System Improvement Act was signed into law; or 3. the use has been determined appropriate as specified in section 1.11 of that act.
approved acquisition boundary	a project boundary that the Director of the U.S. Fish and Wildlife Service approves upon completion of the planning and environmental compliance process. An approved acquisition boundary only design-nates those lands which the Service has authority to acquire or manage through various agreements. The approval of an acquisition boundary does not grant the Service jurisdiction or control over lands within the boundary, and it does not make lands within the refuge boundary part of the National Wildlife Refuge System. Lands do not become part of the System until the Service buys them or they are placed under an agreement that provides for their management as part of the System.
anadromous fish	from the Greek, literally “up-running”; fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed
aquatic	growing in, living in, or dependent upon water

aquatic barrier	any obstruction to fish passage
avian	of or having to do with birds
avifauna	all birds of a given region
barrier	cf. “aquatic barrier”
basin	the land surrounding and draining into a water body (cf. “watershed”)
benthic	living at, in, or associated with structures on the bottom of a body of water
best management practices	land management practices that produce desired results [N.b. Usually describing forestry or agricultural practices effective in reducing non-point source pollution, like reseeding skidder trails or not storing manure in a flood plain. In their broader sense, practices that benefit target species.]
biological diversity or biodiversity	the variety of life and its processes and includes the variety of living organisms, the genetic differences among them, and the communities and ecosystems in which they occur
biological integrity	biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms and communities
biodiversity conservation	the goal of conservation biology, which is to retain indefinitely as much of the earth’s biodiversity as possible, with emphasis on biotic elements most vulnerable to human impacts
biomass	the total mass or amount of living organisms in a particular area or volume
biota	the plant and animal life of a region
bog	a poorly drained area rich in plant residues, usually surrounded by an area of open water, and having characteristic flora
breeding habitat	habitat used by migratory birds or other animals during the breeding season
buffer species	alternate prey species exploited by predators when a more preferred prey is in relatively short supply; i.e., if rabbits are scarce, foxes will exploit more abundant rodent populations
buffer zones	land bordering and protecting critical habitats or water bodies by reducing runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals, plants, and their habitats
candidate species	species for which we have sufficient information on file about their biological vulnerability and threats to propose listing them

canopy	the layer of foliage formed by the crowns of trees in a stand. For stands with trees of different heights, foresters often distinguish among the upper, middle and lower canopy layers. These represent foliage on tall, medium, and short trees. The uppermost layers are called the overstory.
community	the locality in which a group of people resides and shares the same government
community type	a particular assemblage of plants and animals, named for its dominant characteristic
compatible use	“The term ‘compatible use’ means a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the System or the purposes of the refuge.”—National Wildlife Refuge System Improvement Act of 1997 [Public Law 105-57; 111 Stat. 1253]
compatibility determination	a required determination for wildlife-dependent recreational uses or any other public uses of a refuge
Comprehensive Conservation Plan	mandated by the 1997 Refuge Improvement Act, a document that provides a description of the desired future conditions and long-range guidance for the project leader to accomplish purposes of the refuge system and the refuge. CCPs establish management direction to achieve refuge purposes. [P.L. 105-57; FWS Manual 602 FW 1.4]
concern	cf. “issue”
conifer	a tree or shrub in the phylum Gymnospermae whose seeds are borne in woody cones. There are 500–600 species of living conifers (Norse 1990)
connectivity	community occurrences and reserves have permeable boundaries and thus are subject to inflows and outflows from the surrounding landscape. Connectivity in the selection and design of nature reserves relates to the ability of species to move across the landscape to meet basic habitat requirements. Natural connecting features within the ecoregion may include river channels, riparian corridors, ridgelines, or migratory pathways.
conservation	managing natural resources to prevent loss or waste [N.b. Management actions may include preservation, restoration, and enhancement.]
conservation agreements	written agreements among two or more parties for the purpose of ensuring the survival and welfare of unlisted species of fish and wildlife or their habitats or to achieve other specified conservation goals. Participants voluntarily commit to specific actions that will remove or reduce threats to those species.
conservation easement	a non-possessory interest in real property owned by another imposing limitations or affirmative obligations with the purpose of returning or protecting the property’s conservation values.
conservation status	assessment of the status of ecological processes and of the viability of species or populations in an ecoregion.

consultation	a type of stakeholder involvement in which decision makers ask stakeholders to comment on proposed decisions or actions.
cooperative agreement	a usually long-term habitat protection action, which can be modified by either party, in which no property rights are acquired. Lands under a cooperative agreement do not necessarily become part of the National Wildlife Refuge System
cord	an 8-foot-long pile of wood stacked 4 feet high and composed of 4-foot-long pieces.
critical habitat	according to U.S. Federal law, the ecosystems upon which endangered and threatened species depend
cultural resource inventory	<p>a professional study to locate and evaluate evidence of cultural resources within a defined geographic area</p> <p>[N.b. Various levels of inventories may include background literature searches, comprehensive field examinations to identify all exposed physical manifestations of cultural resources, or sample inventories for projecting site distribution and density over a larger area. Evaluating identified cultural resources to determine their eligibility for the National Register follows the criteria in 36 CFR 60.4 (cf. FWS Manual 614 FW 1.7).]</p>
cultural resource overview	<p>a comprehensive document prepared for a field office that discusses, among other things, project prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement of how program objectives should be met and conflicts resolved</p> <p>[An overview should reference or incorporate information from a field office's background or literature search described in section VIII of the Cultural Resource Management Handbook (FWS Manual 614 FW 1.7).]</p>
database	a collection of data arranged for ease and speed of analysis and retrieval, usually computerized
dbh	(diameter at breast height) — the diameter of the stem of tree measure at breast height (usually 4.5 feet above the ground). The term is commonly used by foresters to describe tree size.
dedicated open space	land to be held as open space forever
degradation	the loss of native species and processes due to human activities such that only certain components of the original biodiversity persist, often including significantly altered natural communities
designated wilderness area	an area designated by Congress as part of the National Wilderness Preservation System [FWS Manual 610 FW 1.5 (draft)]
desired future condition	the qualities of an ecosystem or its components that an organization seeks to develop through its decisions and actions.
digitizing	the process of converting maps into geographically referenced electronic files for a geographic information system (GIS)

distribution pattern	the overall pattern of occurrence for a particular conservation target. In ecoregional planning projects, often referred to as the relative proportion of the target's natural range occurring within a give ecoregion (e.g. endemic, limited, widespread, disjunct, peripheral).
disturbance	any relatively discrete event in time that disrupts ecosystem, community, or population structure and changes resources, substrate availability, or the physical environment
donation	a citizen or group may wish to give land or interests in land to the Service for the benefit of wildlife. Aside from the cost factor, these acquisitions are no different than any other means of land acquisition. Gifts and donations have the same planning requirements as purchases.
easement	<p>a non-possessory interest in real property owned by another imposing limitations or affirmative obligations with the purpose of returning or protecting the property's conservation values. An agreement by which landowners give up or sell one of the rights on their property</p> <p>[E.g., landowners may donate rights-of-way across their properties to allow community members access to a river (cf. "conservation easement").]</p>
ecological integrity	native species populations in their historic variety and numbers naturally interacting in naturally structured biotic communities. For communities, integrity is governed by demographics of component species, intactness of landscape-level ecological processes (e.g., natural fire regime), and intactness of internal community processes (e.g., pollination).
ecological land unit (ELU)	mapping units used in large-scale conservation planning projects that are typically defined by two or more environmental variables such as elevation, geological type, and landform (e.g., cliff, stream, summit).
ecological processes	a complex mix of interactions among animals, plants, and their environment that ensures maintenance of an ecosystem's full range of biodiversity. Examples include population and predator-prey dynamics, pollination and seed dispersal, nutrient cycling, migration, and dispersal
ecological process approach	an approach to managing for species communities that manages for ecological process (e.g., flooding, fire, herbivory, predator-prey dynamics) within the natural range of historic variability. This approach assumes that if ecological processes are occurring within their historic range of spatial and temporal variability, then the naturally occurring biological diversity will benefit.
ecological system	Dynamic assemblages of communities that occur together on the landscape at some spatial scale of resolution, are tied together by similar ecological processes, and form a cohesive, distinguishable unit on the ground. Examples are spruce-fir forest, Great Lakes dune and swale complex, Mojave desert riparian shrublands.
ecoregion	a territory defined by a combination of biological, social, and geographic criteria, rather than geopolitical considerations; generally, a system of related, interconnected ecosystems.
ecosystem	a natural community of organisms interacting with its physical environment, regarded as a unit

ecosystem service	a benefit or service provided free by an ecosystem or by the environment, such as clean water, flood mitigation, or groundwater recharge
ecotourism	visits to an area that maintains and preserves natural resources as a basis for promoting its economic growth and development
ecosystem approach	a way of looking at socio-economic and environmental information based on the boundaries of ecosystems like watersheds, rather than on geopolitical boundaries
ecosystem-based management	<p>an approach to making decisions based on the characteristics of the ecosystem in which a person or thing belongs</p> <p>[N.b. This concept considers interactions among the plants, animals, and physical characteristics of the environment in making decisions about land use or living resource issues.]</p>
edge effect	the phenomenon whereby edge-sensitive species are negatively affected near edges by factors that include edge-generalist species, human influences, and abiotic factors associated with habitat edges. Edge effects are site-specific and factor-specific and have variable depth effects into habitat fragments.
emergent wetland	wetlands dominated by erect, rooted, herbaceous plants
endangered species	a Federal- or State-listed protected species in danger of extinction throughout all or a significant portion of its range
endemic	a species or race native to a particular place and found only there
environment	the sum total of all biological, chemical and physical factors to which organisms are exposed
environmental education	curriculum-based education aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve those problems, and motivated to work toward solving them
environmental health	the composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment
Environmental Assessment	(EA) a public document that discusses the purpose and need for an action, its alternatives, and provides sufficient evidence and analysis of its impacts to determine whether to prepare an environmental impact statement or a finding of no significant impact (q.v.) [cf. 40 CFR 1508.9]
Environmental Impact Statement	(EIS) a detailed, written analysis of the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources [cf. 40 CFR 1508.11]
euphotic	relating to the upper, well-illuminated zone of a lake where photosynthesis occurs

eutrophic lake	a lake possessing low or a complete absence of oxygen in the deeper portion in midsummer, rich in nutrients and plankton
eutrophication	enrichment of a body of water by the addition of nutrients which stimulate the growth of aquatic plants and may cause a decrease in the organoleptic properties of the water source.
evaluation	examination of how an organization's plans and actions have turned out — and adjusting them for the future.
even-aged	a stand having one age class of trees
exemplary community type	an outstanding example of a particular community type
extinction	the termination of any lineage of organisms, from subspecies to species and higher taxonomic categories from genera to phyla. Extinction can be local, in which one or more populations of a species or other unit vanish but others survive elsewhere, or total (global), in which all the populations vanish (Wilson 1992)
extirpated	status of a species or population that has completely vanished from a given area but that continues to exist in some other location
exotic species	a species that is not native to an area and has been introduced intentionally or unintentionally by humans; not all exotics become successfully established
extant	in biology, a species which is not extinct; still existing
fauna	all animal life associated with a given habitat, country, area or period
federal land	public land owned by the Federal Government, including national forests, national parks, and national wildlife refuges
federal-listed species	a species listed either as endangered, threatened, or a species at risk (formerly, a “candidate species”) under the Endangered Species Act of 1973, as amended
fee-title acquisition	the acquisition of most or all of the rights to a tract of land; a total transfer of property rights with the formal conveyance of a title. While a fee-title acquisition involves most rights to a property, certain rights may be reserved or not purchased, including water rights, mineral rights, or use reservation (e.g., the ability to continue using the land for a specified time period, such as the remainder of the owner's life).
fen	A type of wetland that accumulates peat deposits. Fens are less acidic than bogs, deriving most of their water from groundwater rich in calcium and magnesium
Finding of No Significant Impact	(FONSI) supported by an environmental assessment, a document that briefly presents why a Federal action will have no significant effect on the human environment, and for which an environmental impact statement, therefore, will not be prepared [40 CFR 1508.13]

fire regime	the characteristic frequency, intensity, and spatial distribution of natural fires within a given ecoregion or habitat
fish passage project	providing a safe passage for fish around a barrier in the upstream or downstream direction
flora	all the plants found in a particular place
floodplain	flat or nearly flat land that may be submerged by floodwaters; a plain built up or in the process of being built up by stream deposition
flyway	any one of several established migration routes of birds
focal species	a species that is indicative of particular conditions in a system (ranging from natural to degraded) and used as a surrogate measure for other species of particular conditions. An element of biodiversity selected as a focus for conservation planning or action. The two principal types of targets in Conservancy planning projects are species and ecological communities.
focus areas	cf. “special focus areas”
forest association	the community described by a group of dominant plant (tree) species occurring together, such as spruce-fir or northern hardwoods
forested land	land dominated by trees [For impacts analysis in CCP’s, we assume all forested land has the potential for occasional harvesting; we assume forested land owned by timber companies is harvested on a more intensive, regular schedule.]
forested wetlands	wetlands dominated by trees
fragmentation	the disruption of extensive habitats into isolated and small patches. Fragmentation has two negative components for biota: the loss of total habitat area; and, the creation of smaller, more isolated patches of habitat remaining.
geographic information system	(GIS) a computerized system to compile, store, analyze and display geographically referenced information [E.g., GIS can overlay multiple sets of information on the distribution of a variety of biological and physical features.]
graminoid	grasses and grasslike plants, such as sedges.
grant agreement	the legal instrument used when the principal purpose of the transaction is the transfer of money, property, services, or anything of value to a recipient in order to accomplish a public purpose of support or stimulation authorized by Federal statute and substantial involvement between the Service and the recipient is <i>not</i> anticipated (cf. “cooperative agreement”)

grassroots conservation organization	any group of concerned citizens who act together to address a conservation need
groundwater	water in the ground that is in the zone of saturation, from which wells and springs and groundwater runoff are supplied
guild	a group of organisms, not necessarily taxonomically related, that are ecologically similar in characteristics such as diet, behavior, or microhabitat preference, or with respect to their ecological role in general
habitat block	a landscape-level variable that assesses the number and extent of blocks of contiguous habitat, taking into account size requirements for populations and ecosystems to function naturally. It is measured here by a habitat-dependent and ecoregion size-dependent system
habitat fragmentation	the breaking up of a specific habitat into smaller, unconnected areas [N.b. A habitat area that is too small may not provide enough space to maintain a breeding population of the species in question.]
habitat conservation	protecting an animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced
habitat	The place or type of site where species and species assemblages are typically found and/or successfully reproduce. [N.b. An organism's habitat must provide all of the basic requirements for life, and should be free of harmful contaminants.]
historic conditions	the composition, structure and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgement, were present prior to substantial human-related changes to the landscape
hydrologic or flow regime	characteristic fluctuations in river flows
hydrology	the science of waters of the earth: their occurrences, distributions, and circulations; their physical and chemical properties; and their reactions with the environment, including living beings
important fish areas	the aquatic areas identified by private organizations, local, state, and federal agencies that meet the purposes of the Conte Act
impoundment	a body of water, such as a pond, confined by a dam, dike, floodgate, or other barrier, which is used to collect and store water for future use
indicator species	a species used as a gauge for the condition of a particular habitat, community, or ecosystem. A characteristic or surrogate species for a community or ecosystem
indigenous	native to an area
indigenous species	a species that, other than a result as an introduction, historically occurred or currently occurs in a particular ecosystem

interjurisdictional fish	populations of fish that are managed by two or more States or national or tribal governments because of the scope of their geographic distributions or migrations
interpretive facilities	structures that provide information about an event, place, or thing by a variety of means, including printed, audiovisual, or multimedia materials [E.g., kiosks that offer printed materials and audiovisuals, signs, and trail heads.]
interpretive materials	any tool used to provide or clarify information, explain events or things, or increase awareness and understanding of the events or things [E.g., printed materials like brochures, maps or curriculum materials; audio/visual materials like video and audio tapes, films, or slides; and, interactive multimedia materials, CD-ROM or other computer technology.]
interpretive materials projects	any cooperative venture that combines financial and staff resources to design, develop, and use tools for increasing the awareness and understanding of events or things related to a refuge
introduced invasive species	non-native species that have been introduced into an area and, because of their aggressive growth and lack of natural predators, displace native species
invasive species	an alien species whose introduction causes or is likely to cause economic or environmental harm or harm to human health
inventory	a list of all the assets and liabilities of an organization, including physical, financial, personnel, and procedural aspects.
invertebrate	any animal lacking a backbone or bony segment that encloses the central nerve cord
issue	any unsettled matter that requires a management decision [E.g., a Service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concern, or the presence of an undesirable resource condition.] [N.b. A CCP should document, describe, and analyze issues even if they cannot be resolved during the planning process (FWS Manual 602 FW 1.4).]
lake	an inland body of fresh or salt water of considerable size occupying a basin or hollow on the earth's surface, and which may or may not have a current or single direction of flow
Land Protection Plan (LPP)	a document that identifies and prioritizes lands for potential Service acquisition from a willing seller, and also describes other methods of providing protection. Landowners within project boundaries will find this document, which is released with environmental assessments, most useful.
Land trusts	organizations dedicated to conserving land by purchase, donation, or conservation easement from landowners

landform	the physical shape of the land reflecting geologic structure and processes of geomorphology that have sculpted the structure
landscape	A heterogeneous land area composed of a cluster of interacting ecosystems that are repeated in similar form throughout.
landscape approach	an approach to managing for species communities that focuses on landscape patterns rather than processes and manages landscape elements to collectively influence groups of species in a desired direction. This approach assumes that by managing a landscape for its components, the naturally occurring species will persist.
large patch	Communities that form large areas of interrupted cover. Individual occurrences of this community type typically range in size from 50 to 2,000 hectares. Large patch communities are associated with environmental conditions that are more specific than those of matrix communities, and that are less common or less extensive in the landscape. Like matrix communities, large-patch communities are also influenced by large-scale processes, but these tend to be modified by specific site features that influence the community.
late-successional	species, assemblages, structures, and processes associated with mature natural communities that have not experienced significant disturbance for a long time
limiting factor	an environmental limitation that prevents further population growth
limits of acceptable change	a planning and management framework for establishing and maintaining acceptable and appropriate environmental and social conditions in recreation settings
local land	public land owned by local governments, including community or county parks or municipal watersheds
local agencies	generally, municipal governments, regional planning commissions, or conservation groups
long-term protection	mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations over the long term
macroinvertebrates	invertebrates large enough to be seen with the naked eye (e.g., most aquatic insects, snails, and amphipods)
management alternative	a set of objectives and the strategies needed to accomplish each objective [FWS Manual 602 FW 1.4]
management concern	cf. “issue” and “migratory nongame birds of management concern”
management opportunity	cf. “issue”

management plan	<p>a plan that guides future land management practices on a tract</p> <p>[N.b. In the context of an environmental impact statement, management plans may be designed to produce additional wildlife habitat along with primary products like timber or agricultural crops (cf. “cooperative agreement”).]</p>
management strategy	<p>a general approach to meeting unit objectives</p> <p>[N.b. A strategy may be broad, or it may be detailed enough to guide implementation through specific actions, tasks, and projects (FWS Manual 602 FW 1.4).]</p>
marshlands	<p>areas interspersed with open water, emergent vegetation (hydrophytes), and terrestrial vegetation (phreatophytes).</p>
matrix forming (or matrix community)	<p>communities that form extensive and contiguous cover may be categorized as matrix (or matrix-forming) community types. Matrix communities occur on the most extensive landforms and typically have wide ecological tolerances. They may be characterized by a complex mosaic of successional stages resulting from characteristic disturbance processes (e.g. New England northern hardwood-conifer forests). Individual occurrences of the matrix type typically range in size from 2000 to 500,000 hectares. In a typical ecoregion, the aggregate of all matrix communities covers, or historically covered, as much as 75-80% of the natural vegetation of the ecoregion. Matrix community types are often influenced by large-scale processes (e.g., climate patterns, fire), and are important habitat for wide-ranging or large area-dependent fauna, such as large herbivores or birds.</p>
mesic soil	<p>sandy-to-clay loams containing moisture-retentive organic matter, well drained (no standing matter)</p>
migratory nongame birds of management concern	<p>species of nongame birds that (a) are believed to have undergone significant population declines; (b) have small or restricted populations; or (c) are dependent upon restricted or vulnerable habitats</p>
mission statement	<p>a succinct statement of the purpose for which the unit was established; its reason for being</p>
mitigation	<p>actions to compensate for the negative effects of a particular project</p> <p>[E.g., wetland mitigation usually restores or enhances a previously damaged wetland or creates a new wetland.]</p>
mosaic	<p>an interconnected patchwork of distinct vegetation types.</p>
National Environmental Policy Act of 1969	<p>(NEPA) requires all Federal agencies to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in planning and implementing environmental actions</p> <p>[Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision-making (cf. 40 CFR 1500).]</p>
National Wildlife Refuge System	<p>(Refuge System) all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish and wildlife, including those that are threatened with extinction</p>

native	a species that, other than as a result of an introduction, historically occurred or currently occurs in a particular ecosystem
native plant	a plant that has grown in the region since the last glaciation, and occurred before European settlement
natural disturbance event	any natural event that significantly alters the structure, composition, or dynamics of a natural community: e.g., floods, fires, and storms
natural range of variation	a characteristic range of levels, intensities, and periodicities associated with disturbances, population levels, or frequency in undisturbed habitats or communities
niche	the specific part or smallest unit of a habitat occupied by an organism
Neotropical migrant	birds, bats, or invertebrates that seasonally migrate between the Nearctic and Neotropics
non-consumptive, wildlife-oriented recreation	wildlife observation and photography and environmental education and interpretation (cf. “wildlife-oriented recreation”)
non-native species	See “exotic species.”
non-point source pollution	a diffuse form of water quality degradation in which wastes are not released at one specific, identifiable point but from a number of points that are spread out and difficult to identify and control (Eckhardt 1998)
nonforested wetlands	wetlands dominated by shrubs or emergent vegetation
nonpoint source	a diffuse form of water quality degradation produced by erosion of land that causes sedimentation of streams, eutrophication from nutrients and pesticides used in agricultural and silvicultural practices, and acid rain resulting from burning fuels that contain sulfur (Lotspeich and Platts 1982)
Notice of Intent	(NOI) an announcement we publish in the Federal Register that we will prepare and review an environmental impact statement [40 CFR 1508.22]
objective	cf. “unit objective”
obligate species	a species that must have access to a particular habitat type to persist
occurrence site	a discrete area where a population of a rare species lives or a rare plant community type grows
outdoor education project	any cooperative venture that combines financial and staff resources to develop outdoor education activities like labs, field trips, surveys, monitoring, or sampling
outdoor education	educational activities that take place in an outdoor setting

palustrine wetlands	“The Palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0%.”—Cowardin et al. 1979
Partners for Wildlife Program	a voluntary, cooperative habitat restoration program among the Service, other government agencies, public and private organizations, and private landowners to improve and protect fish and wildlife habitat on private land while leaving it in private ownership
partnership	a contract or agreement among two or more individuals, groups of individuals, organizations, or agencies, in which each agrees to furnish a part of the capital or some service in kind (e.g., labor) for a mutually beneficial enterprise
passive management	protecting, monitoring key resources and conducting baseline inventories to improve our knowledge of the ecosystem
payment in lieu of taxes	cf. Revenue Sharing Act of 1935, Chapter One, Legal Context
point source	a source of pollution that involves discharge of waste from an identifiable point, such as a smokestack or sewage-treatment plant (Eckhardt 1998)
population	an interbreeding group of plants or animals. The entire group of organisms of one species.
population monitoring	assessing the characteristics of populations to ascertain their status and establish trends on their abundance, condition, distribution, or other characteristics
prescribed fire	the application of fire to wildland fuels, either by natural or intentional ignition, to achieve identified land use objectives [FWS Manual 621 FW 1.7]
priority general public use	a compatible wildlife-dependent recreational use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation
private land	land owned by a private individual or group or non-government organization
private landowner	cf. “private land”
private organization	any non-government organization
proposed wilderness	an area of the Refuge System that the Secretary of the Interior has recommended to the President for inclusion in the National Wilderness Preservation System
protection	mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations at a site (cf. “long-term ~”)

public	individuals, organizations, and non-government groups; officials of Federal, State, and local government agencies; Native American tribes, and foreign nations—includes anyone outside the core planning team, those who may or may not have indicated an interest in the issues, and those who do or do not realize that our decisions may affect them
public involvement	offering an opportunity to interested individuals and organizations whom our actions or policies may affect to become informed; soliciting their opinions. We thoroughly study public input, and give it thoughtful consideration in shaping decisions about managing refuges.
public involvement plan	long-term guidance for involving the public in the comprehensive planning process
public land	land owned by the local, State, or Federal Government
rare species	species identified for special management emphasis because of their uncommon occurrence within a watershed
rare community types	plant community types classified as rare by any State program; includes exemplary community types
recharge	refers to water entering an underground aquifer through faults, fractures, or direct absorption
recommended wilderness	areas studied and found suitable for wilderness designation by both the Director (FWS) and Secretary (DOI), and recommended by the President to Congress for inclusion in the National Wilderness System [FWS Manual 610 FW 1.5 (draft)]
Record of Decision	(ROD) a concise public record of a decision by a Federal agency pursuant to NEPA [N.b. A ROD includes: * the decision; * all the alternatives considered; * the environmentally preferable alternative; * a summary of monitoring and enforcement, where applicable, for any mitigation; and, * whether all practical means have been adopted to avoid or minimize environmental harm from the alternative selected (or if not, why not).]
refuge goals	“descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units.” (Writing Refuge Management Goals and Objectives: A Handbook, FWS January 2004)
refuge purposes	“the terms ‘purposes of the refuge’ and ‘purposes of each refuge’ mean the purposes specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.” (National Wildlife Refuge System Improvement Act of 1997)
refuge lands	lands in which the Service holds full interest in fee title or partial interest like an easement

regenerating	establishing a new age class. Silviculture does this in a way that controls the species composition, seedling density, and other characteristics consistent with the landowner's objectives.
relatively intact	the conservation status category indicating the least possible disruption of ecosystem processes. Natural communities are largely intact, with species and ecosystem processes occurring within their natural ranges of variation.
relatively stable	the conservation status category between <i>vulnerable</i> and <i>relatively intact</i> in which extensive areas of intact habitat remain, but local species declines and disruptions of ecological processes have occurred
restoration	management of a disturbed or degraded habitat that results in the recovery of its original state [E.g., restoration may involve planting native grasses and forbs, removing shrubs, prescribed burning, or reestablishing habitat for native plants and animals on degraded grassland.]
restoration ecology	the process of using ecological principles and experience to return a degraded ecological system to its former or original state
riparian	referring to the interface between freshwater habitats and the terrestrial landscape
riparian forested land	forested land along a stream or river
riparian habitat	habitat along the banks of a stream or river [cf. note above]
riverine	within the active channel of a river or stream
riverine wetlands	generally, all the wetlands and deepwater habitats occurring within a freshwater river channel not dominated by trees, shrubs, or persistent emergents
rotation	the period of time from establishment of an even-aged stand until its maturity
runoff	water from rain, melted snow, or agricultural or landscape irrigation that flows over a land surface into a water body (cf. "urban runoff")
scale	the magnitude of a region or process. Refers to both spatial size—for example, a (relatively small-scale) patch or a (relatively large-scale) landscape; and a temporal rate—for example, (relatively rapid) ecological succession or (relatively slow) evolutionary speciation
Selection cutting/selection system	The silvicultural system used to regenerate and maintain uneven-aged stands. Selection cuttings are used to remove individual or small groups of mature trees to regenerate a new cohort, as well as to thin the immature age classes to promote their growth and improve their quality.
Service presence	Service programs and facilities that it directs or shares with other organizations; public awareness of the Service as a sole or cooperative provider of programs and facilities

shifting mosaic	an interconnected patchwork of distinct vegetation types that may shift across the land surface as a result of dynamic ecosystem processes, such as periodic wildfire or flooding.
shrublands	habitats dominated by various species of shrubs, often with many grasses and forbs
silviculture	tending and regenerating forest stands to realize sought after benefits and sustain them over time
site improvement	any activity that changes the condition of an existing site to better interpret events, places, or things related to a refuge [E.g., improving safety and access, replacing non-native with native plants, refurbishing footbridges and trailways, and renovating or expanding exhibits.]
small patch	communities that form small, discrete areas of vegetation cover. Individual occurrences of this community type typically range in size from 1 to 50 hectares. Small patch communities occur in very specific ecological settings, such as on specialized landform types or in unusual microhabitats. The specialized conditions of small patch communities, however, are often dependent on the maintenance of ecological processes in the surrounding matrix and large patch communities. In many ecoregions, small patch communities contain a disproportionately large percentage of the total flora, and also support a specific and restricted set of associated fauna (e.g., invertebrates or herpetofauna) dependent on specialized conditions.
source population	a population in a high-quality habitat where the birth rate greatly exceeds the death rate, and the excess individuals emigrate
spatial pattern	within an ecoregion, natural terrestrial communities may be categorized into three functional groups on the basis of their current or historical patterns of occurrence, as correlated with the distribution and extent of landscape features and ecological processes. These groups are identified as matrix communities, large patch communities, and small patch communities.
special focus area	an area of high biological value [N.b. We normally direct most of our resources to SFA's that were delineated because of: 1. the presence of Federal-listed endangered and threatened species, species at risk (formerly, "candidate species"), rare species, concentrations of migrating or wintering waterfowl, or shorebird stopover habitat; 2. their importance as migrant landbird stopover or breeding habitat; 3. the presence of unique or rare communities; or 4. the presence of important fish habitat.]

special habitats	wetlands, vernal pools, riparian habitat, and unfragmented rivers, forests and grasslands [N.b. Many rare species depend on specialized habitats that, in many cases, are being lost within a watershed.]
special riparian project	restoring, protecting, or enhancing an aquatic environment in a discrete riparian corridor within a special focus area
species	the basic category of biological classification intended to designate a single kind of animal or plant. Any variation among the individuals may be regarded as not affecting the essential sameness which distinguishes them from all other organisms.
species assemblage	the combination of particular species that occur together in a specific location and have a reasonable opportunity to interact with one another
species at risk	a species being considered for Federal listing as threatened or endangered (formerly, a “candidate species”)
species of concern	species not Federal-listed as threatened or endangered, but about which we or our partners are concerned
species diversity	usually synonymous with “species richness,” but may also include the proportional distribution of species
species richness	a simple measure of species diversity calculated as the total number of species in a habitat or community (Fiedler and Jain 1992)
stand	an area of trees with a common set of conditions (e.g., based on age, density, species composition, or other features) that allow a single management treatment throughout
state agencies	natural resource agencies of State governments
state land	State-owned public land
state-listed species	cf. “Federal-listed species”
step-down management plan	a plan for dealing with specific refuge management subjects, strategies, and schedules, e.g., cropland, wilderness, and fire [FWS Manual 602 FW 1.4]
stopover habitat	habitat where birds rest and feed during migration
strategy	a specific action, tool, technique, or combination of actions, tools, and techniques for meeting unit objectives
strategic management	the continual process of inventorying, choosing, implementing, and evaluating what an organization should be doing.
stratification	thermal layering of water both in lakes and streams

structure	the horizontal and vertical arrangement of trees and other vegetation having different sizes, resulting in different degrees of canopy layering, tree heights, and diameters within a stand.
succession	the natural, sequential change of species composition of a community in a given area
surface water	all waters whose surface is naturally exposed to the atmosphere, or wells or other collectors directly influenced by surface water
sustainable development	the attempts to meet economic objectives in ways that do not degrade the underlying environmental support system. Note that there is considerable debate over the meaning of this term...we define it as “human activities conducted in a manner that respects the intrinsic value of the natural world, the role of the natural world in human well-being, and the need for humans to live on the income from nature’s capital rather than the capital itself.”
terrestrial	living on land
territory	an area over which an animal or group of animals establishes jurisdiction
thinning	reducing the density of trees in a stand primarily to improve the growth and condition of residual trees and prevent mortality. The term describes treatments in immature even-aged stands that do not attempt to establish regeneration.
threatened species	a Federal-listed, protected species that is likely to become an endangered species in all or a significant portion of its range
tiering	incorporating by reference the general discussions of broad topics in environmental impact statements into narrower statements of environmental analysis by focusing on specific issues [40 CFR 1508.28]
tributary	a stream or river that flows into a larger stream, river, or lake, feeding it water
trust resource	a resource that the Government holds in trust for the people through law or administrative act [N.b. A Federal trust resource is one for which responsibility is given wholly or in part to the Federal Government by law or administrative act. Generally, Federal trust resources are nationally or internationally important no matter where they occur, like endangered species or migratory birds and fish that regularly move across state lines. They also include cultural resources protected by Federal historic preservation laws, and nationally important or threatened habitats, notably wetlands, navigable waters, and public lands like state parks and national wildlife refuges.]
trust responsibility	In the federal government, a special duty required of agencies to hold and manage lands, resources, and funds on behalf of Native American tribes.
turbidity	refers to the extent to which light penetrates a body of water. Turbid waters are those that do not generally support net growth of photosynthetic organisms
understory	the lower layer of vegetation in a stand, which may include short trees, shrubs, and herbaceous plants

uneven-aged	a stand having three or more age classes of trees with distinctly different ages
unfragmented habitat	large, unbroken blocks of a particular type of habitat
unit objective	desired conditions that must be accomplished to achieve a desired outcome [N.b. Objectives are the basis for determining management strategies, monitoring refuge accomplishments, and measuring their success. Objectives should be attainable, time-specific, and stated quantitatively or qualitatively (FWS Manual 602 FW 1.4).]
upland	dry ground (i.e., other than wetlands)
urban runoff	water from rain, melted snow, or landscape irrigation flowing from city streets and domestic or commercial properties that may carry pollutants into a sewer system or water body
vernal pool	depressions holding water for a temporary period in the spring, and in which various amphibians lay eggs
vision statement	a concise statement of what the unit could achieve in the next 10 to 15 years
watchable wildlife	all wildlife is watchable [N.b. A watchable wildlife program is one that helps maintain viable populations of all native fish and wildlife species by building an active, well informed constituency for conservation. Watchable wildlife programs are tools for meeting wildlife conservation goals while at the same time fulfilling public demand for wildlife-dependent recreational activities (other than sport hunting, sport fishing, or trapping).]
watershed	the geographic area within which water drains into a particular river, stream, or body of water. A watershed includes both the land and the body of water into which the land drains.
watershed-wide education networks	systems for sharing educational information, like curriculum development projects, student activities, and ongoing data gathering; a combination of telecommunications and real-life exchanges of information
well-protected	in CCP analysis, a rare species or community type is considered well protected if 75 percent or more of its occurrence sites are on dedicated open space
wetlands	lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. These areas are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of vegetation typically adapted to life in saturated soil conditions. “Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.”—Cowardin et al 1979

wilderness study areas	lands and waters identified by inventory as meeting the definition of wilderness and being evaluated for a recommendation they be included in the Wilderness System (cf. “recommended wilderness”) [N.b. A wilderness study area must meet these criteria: 1. generally appears to have been affected primarily by the forces of nature, with the imprint of man’s work substantially unnoticeable; 2. has outstanding opportunities for solitude or a primitive and unconfined type of recreation; 3. has at least 5,000 contiguous, roadless acres, or sufficient size to make practicable its preservation and use in an unimpaired condition. (FWS Manual 610 FW 1.5 (draft)).]
wilderness	cf. “designated wilderness”
wildfire	a free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands [FWS Manual 621 FW 1.7]
wildland fire	every wildland fire is either a wildfire or a prescribed fire [FWS Manual 621 FW 1.3]
wildlife-dependent recreational use	a use of a national wildlife refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation (National Wildlife Refuge System Administration Act of 1966).
wildlife management	manipulating wildlife populations, either directly by regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors
wildlife-oriented recreation	recreational activities in which wildlife is the focus of the experience [“The terms ‘wildlife-dependent recreation’ and ‘wildlife-dependent recreational use’ mean a use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.”—National Wildlife Refuge System Improvement Act of 1997]
working landscape	the rural landscape created and used by traditional laborers [N.b. Agriculture, forestry, and fishing all contribute to the working landscape of a watershed (e.g., keeping fields open by mowing or by grazing livestock).]

Acronyms

Acronym	Full Name
ADA	Americans with Disabilities Act
AMC	Appalachian Mountain Club
ASNH	Audubon Society of New Hampshire
ATV	all-terrain vehicles
BAER	Burned Area Emergency Rehab
BCR	Bird Conservation Region
BI	Burn Index
BMP	Best Management Practices
BRI	Biodiversity Research Institute
CCF	C unit, 100 cubic feet of solid wood
CCP	Comprehensive Conservation Plan
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CWCS	Comprehensive Wildlife Conservation Strategy
dbh	diameter breast height
DDT	Dichloro-Diphenyl-Trichloroethane
EA	Environmental Assessment
EIS	Environmental Impact Statement
ELU	Ecological Land Unit
EMAP	Environmental Monitoring and Assessment Program
EPA	Environmental Protection Agency
ERC	Energy Release Component
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FINNL	Floating Island National Natural Landmark
FMO	Fire Management Officer
FMP	Fire Management Plan
FMU	Fire Management Unit
Friends group	Friends of Umbagog National Wildlife Refuge

FPA	Fire Program Analysis
FPLE	Florida Power & Light Energy Hydro Maine, LLC
FPU	Fire Planning Unit
FY	fiscal year
GIS	Geographical Information Systems
GPRA	Government Performance and Results Act
HMP	Habitat Management Plan
HPO	Historical Preservation Office
IAFWA	International Association of Fish and Wildlife Agencies
ICS	Incident Command System
IMP	Habitat and Species Implementation and Monitoring Plan
IMPLAN	Impact Analysis for Planning
IQCS	Incident Qualifications and Certification System
KBDI	Keetch-Byram Drought Index
LMRD	Land Management Research and Development
LOAEL	Lowest Observed Adverse Effect Level
LPC	Loon Preservation Committee
LPP	Land Protection Plan
LUNWR	Lake Umbagog National Wildlife Refuge
MDEP	Maine Department of Environmental Protection
MDIFW	Maine Department of Inland Fisheries and Wildlife
MDOC	Maine Department of Conservation
MFS	Maine Forest Service
MGM2	Money Generation Model Version 2
MIST	Minimum Impact Suppression Tactics
MMS	Maintenance Management System
MNAP	Maine Natural Areas Program
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
msl	Mean sea level
NABCI	North American Bird Conservation Initiative
NAWCP	North American Waterbird Conservation Plan

NAWMP	North American Waterfowl Management Plan and Joint Ventures
NECC	Northeast Dispatch Coordination Center
NEFA	North East State Foresters Association
NEFRTC	Northeast Furbearer Resources Technical Committee
NEPA	National Environmental Policy Act
NERA	New England Regional Assessment
NFDRS	National Fire Danger Rating System
NFFL	Northern Forest Fire Laboratory
NFPORS	National Fire Plan Operating and Reporting System
NHFSSWT	New Hampshire Forest Sustainability Standards Work Team
NGO	Non-Governmental Organization
NHCR	National State Agency Herpetological Conservation Report
NHDES	New Hampshire Department of Environmental Services
NHDRED	New Hampshire Department of Resources and Economic Development
NHFG	New Hampshire Fish and Game Department
NHNHB	New Hampshire Natural Heritage Bureau
NHPA	National Historic Preservation Act
NNL	National Natural Landmark
NPS	National Park Service
NRCC	Natural Resource Conservation Service
NRCM	Natural Resources Council of Maine
NSHFWR	National Survey of Fishing, Hunting, and Wildlife Associated Recreation
NSRE	National Survey on Recreation and the Environment
NVCS	National Vegetation Classification System
NWCG	National Wildfire Coordinating Group
NWR	National Wildlife Refuge
NWRS	National Wildlife Refuge System
PARC	Partners in Amphibian and Reptile Conservation
PIF	Partners In Flight
PNV	present net value
PPE	personal protective equipment
RFA	Rural Fire Assistance Program

RFMC	Regional Fire Management Coordinator
RM	Refuge Manager
ROD	Record of Decision
RONs	Refuge Operation Needs System
RRS	Refuge Revenue Sharing
SAMMS	Service Asset Maintenance Management System
SAV	submerged aquatic vegetation
SC	Spread Component
SCORP	Statewide Comprehensive Outdoor Recreation Plan
SERA	Syracuse Environmental Research Associates, Inc.
Service	United States Fish and Wildlife Service
SHPO	State Historic Preservation Office
SPACE	Statewide Program of Action to Conserve Our Environment
SUP	Special Use Permit
SWG	State Wildlife Grant Program
TIEE	Teaching Issues and Experiments in Ecology
TNC	The Nature Conservancy
TWS	The Wildlife Society
US SCP	U.S. Shorebird Conservation Plan
USDA	United States Department of Agriculture
USDOI	United States Department of Interior
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UWP	Union Water Power Company
VDFPR	Vermont Department of Forest, Parks, and Recreation
VSP	Visitor Services Professional
WAP	Wildlife Action Plan
WFSA	Wildland Fire Situation Analysis
WMU	Wildlife Management Unit
WUI	Wildlife-urban interface
YCC	Youth Conservation Corps

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Common loon on nest

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Appendix A



Bill Zimm/USFWS

View of upland forest on the refuge

Land Protection Plan for Umbagog National Wildlife Refuge

**(This plan was approved by the
Director of the U.S. Fish and Wildlife
Service on October 28, 2008.)**



United States Department of the Interior

FISH AND WILDLIFE SERVICE
300 Westgate Center Drive
Hadley, MA 01035-9589



In Reply Refer To:
FWS/R5/NWRS/038342

SEP 24 2008

Memorandum

To: Director

From: Regional Director, Region 5

Subject: Land Protection Plan for the Lake Umbagog National Wildlife Refuge
Request for Directorial Action

We request your review and approval of our final Land Protection Plan (LPP) for Lake Umbagog National Wildlife Refuge, which lies in Coos County, New Hampshire and Oxford County, Maine. The LPP would expand the refuge's acquisition boundary consistent with our preferred alternative B in the Comprehensive Conservation Plan (CCP) and Final Environmental Impact Statement (EIS) and the Director's approval of a Preliminary Project Proposal on May 11, 2001.

Attachment 1 describes how our LPP relates to the proposed threshold standards for the strategic growth of the National Wildlife Refuge System, as well as its impacts on public access for recreation and refuge operations and maintenance costs. We have also attached the full LPP, which we will distribute with the final documents once approved.

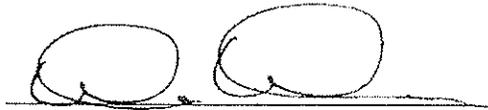
When fully implemented, the LPP would allow us to acquire 47,807 acres (56 percent in fee; 44 percent in easements), contribute to a very active regional land conservation partnership consisting of 463,000 acres, and sustain important habitats for Federal trust resources and other species of conservation concern in the Northern Forest ecosystem. Many of those species appear in the North American Waterfowl Management Plan—Atlantic Coast Joint Venture, Partners in Flight, North American Bird Conservation Initiative, and the comprehensive wildlife conservation strategies of New Hampshire and Maine.

In developing our final plan, we worked closely with the New Hampshire Department of Fish and Game and the Maine Department of Inland Fisheries and Wildlife, after consulting with many regional conservation organizations and local community officials directly involved in land conservation. Both state fish and wildlife agencies are in full support. We distributed the Draft CCP/EIS for a 77-day public comment period. Most responses we received on the expansion were supportive; those that did not support it expressed concern that federal ownership might restrict access and produce additional burdensome regulations. Our Final EIS, Appendix

O – "Summary of Comments on the Draft CCP/EIS and the Service's Response to Them," details our intent to implement the same public use programs that we have on current refuge lands.

With your approval, we will distribute the LPP with the CCP and Final EIS this fall to affected landowners, our conservation partners, state agencies of New Hampshire and Maine, and other affected or interested individuals for another 30-day review. We also plan to hold public information sessions.

If you would like more information, please feel free to contact Anthony D. Léger, Regional Chief, National Wildlife Refuge System, at 413-253-8550.



Attachments

APPROVE *Kenneth Stowell*
Date 10.28.8

DISAPPROVE _____
Date _____

Land Protection Plan for Umbagog National Wildlife Refuge

(This plan was approved by the Director of the U.S. Fish and Wildlife Service on October 28, 2008.)

I. Introduction

We propose to expand the land acquisition boundary of the Lake Umbagog National Wildlife Refuge by 47,807 acres. We also recognize the importance of communicating our interest in acquiring and conserving that land to our partners in conservation, the local community, and the public.

This land protection plan (LPP) explains our interests and intentions to owners of land near the refuge, to state agencies in New Hampshire and Maine, our conservation partners, local communities and the public. It also presents methods the Service and landowners interested in selling their land can use in accomplishing the wildlife habitat objectives of alternative B, our preferred alternative in the final comprehensive conservation plan (CCP) and environmental impact statement (EIS) for the refuge.

We developed this LPP at the same time and in conformance with that final CCP and EIS. We believe our acquisition of additional land in fee title and conservation easements will contribute significantly to the conservation of federal trust resources in the Upper Androscoggin River watershed.

- The purposes of this LPP are to inform landowners of our long-standing policy of acquiring land only from willing sellers. If an owner is not interested in selling, we will not purchase that land or an easement on it.
- to inform the public clearly and concisely about resource protection needs, our priorities and policies for protecting land, the extent of our proposal, and potential conservation methods;
- to describe the impacts of our proposal; and
- to describe our intentions for managing the land we acquire.

Attachment A.1 of this LPP contains maps and a table of ownership information to help owners of lands in the area understand our interest in conserving those lands. The maps (attachment A.1, map tiles 1–6) show the present refuge boundary, our proposed fee title acquisition and conservation easement areas, and the parcels of land in those areas. Table A.8 identifies each parcel, its tax map number, acreage, ownership, and our priority and recommended option for protecting its wildlife habitat.

II. Project Description

The Present Refuge

The Lake Umbagog refuge now comprises 21,650 acres in Coos County, New Hampshire, and Oxford County, Maine (see map A–1). Its purposes are to provide long-term protection for unique wetlands, threatened or endangered species and migratory birds of conservation concern, and sustain regionally significant concentrations of wildlife. About half of the refuge consists of forested and non-forested wetland habitat and water, and half of forested upland habitat typical of the Northern Forest ecosystem.

Umbagog Lake, located in the northern part of the Androscoggin River watershed, is the most downstream of the lakes in the Rangeley chain. We established the refuge after years of partnership planning with the States of New Hampshire and Maine, other conservation organizations, timber companies and private landowners. That planning led to our current ownership of 21,650 acres

of wetland and forested upland habitat adjacent to the lake, within the present 29,132-acre approved refuge boundary.

Our environmental assessment of 1991 states that the refuge was created

“to ensure the long-term protection of unique wetland habitats adjacent to Lake Umbagog, on the northern New Hampshire/Maine border. These extensive wetlands serve as important breeding and migration habitat for many wetland-dependent migratory wildlife species of current concern to the Service. The refuge includes wetlands and portions of associated surrounding uplands, and would protect habitat for the endangered bald eagle and peregrine falcon, waterfowl species of priority such as the declining black duck, and many species of federal and state management concern including the common loon, northern harrier, American woodcock, and others. The refuge will serve to protect unique habitats that support a variety of migratory bird and resident mammal, fish, reptile, amphibian, invertebrate and rare plant species, and will thereby contribute to the conservation of biological diversity in the northeastern United States.”

The refuge was established for the following purposes, under the following authorities.

“the conservation of wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions” [16 U.S.C. §3901(b); Emergency Wetlands Resources Act of 1986]; *“for use as an inviolate sanctuary, or for any other management purpose, for migratory birds”* [16 U.S.C. § 715d; Migratory Bird Conservation Act];

“for the development, advancement, management, conservation, and protection of fish and wildlife resources” [16 U.S.C. §742f(a)(4); Fish and Wildlife Act of 1956]; and

“for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude” [16 U.S.C. §742f(b)(1); Fish and Wildlife Act of 1956].

The refuge and the area around it support more than 166 wildlife species of elevated conservation concern identified in national, regional, and state plans (see CCP appendix B for a list of species and habitats of conservation concern). They include 141 species of birds, 10 mammals, 11 fish and 4 amphibians. All of the birds and three of the fish are federal trust resources. Many of the birds that depend on the area for breeding purposes are Neotropical or short-distance migrants. In addition, we identified 38 plants and 12 natural communities of importance.

The refuge is regionally significant for waterfowl, the bald eagle, osprey, and common loon, and contains other resources of importance, such as designated deer wintering sites. It contains a regionally significant wetland complex, identified in the Regional Wetlands Concept Plan, prepared in 1990 under the Emergency Wetlands Resources Act of 1986. Refuge lands have the potential to support additional rare species, including the federal-listed Canada lynx, known to use habitats in the area. The Eastern Brook Trout Joint Venture Plan identifies native brook trout as a high priority species of concern for the refuge area, and a native brook trout population relies on Umbagog Lake and its tributary, the Magalloway River, as wintering habitat.

The North American Waterfowl Management Plan Atlantic Coast Joint Venture (ACJV) identifies the lake and its associated wetlands as a high priority waterfowl focus area in New Hampshire. They support significant concentrations of waterfowl, including black duck, wood duck, ring-necked duck, common and hooded merganser, goldeneye and other species. The refuge also supports the highest concentrations of nesting black ducks in New Hampshire, a species of concern because of historic population decline. The regional importance of the Lake Umbagog area for waterfowl was one of the reasons for establishing the refuge. The black duck is a species of highest priority for conservation in Bird Conservation Region (BCR) 14, the Atlantic Northern Forest. The Umbagog area also has the highest nesting concentration of ring-necked ducks in New Hampshire, and is extremely important for the American woodcock, a species of highest concern for BCR 14.

Additional reasons for establishing the refuge were to provide permanent protection for loon, bald eagle and osprey breeding activity, and support other forest and wetland-dependent species. Only three refuges support significant numbers of breeding common loons in the lower 48 states. Common loons are a species of management concern for the Northeast and one of high priority for conservation in BCR 14. The bald eagle was formerly federal-listed as a threatened species under the Endangered Species Act, and is state-listed by New Hampshire as endangered and by Maine as threatened.

We have acquired land for the refuge primarily by purchasing full fee title at market value from willing sellers. Our funding has come primarily from two sources: the Land and Water Conservation Fund, appropriated annually by Congress, and the Migratory Bird Conservation Fund, derived from the sale of Federal Duck Stamps. Table A.1 describes the history of refuge land acquisition. The Service owns all of that acreage in full fee simple, except a conservation easement on 6 acres.

Table A.1. History of refuge land acquisition (*as of January 1, 2008)

Calendar Year	Acres*	Funding Source#
1992	128	LWCF
1993	41	LWCF
1995	5,986	LWCF, MBCF
1996	203	LWCF
1998	214	MBCF
1999	2,488	LWCF, MBCF
2000	1,309	LWCF, MBCF
2001	8,847	LWCF, MBCF
2002	191	LWCF
2003	1	LWCF
2004	8	LWCF
2005	1,097	LWCF, MBCF
2006	406	MBCF
2007	727	MBCF
Total	21,650	

Our Proposed Expansion

In support of the priorities, habitat goals, and objectives identified in alternative B of the CCP, we propose to expand the existing, approved refuge boundary by 47,807 acres. We would combine acquisitions in fee simple (56 percent) with conservation easements (44 percent) from willing sellers. All of the lands we plan to acquire are undeveloped. They are either high quality wildlife habitat, or potentially could be. They occur in amounts and distributions that provide us management flexibility in achieving our habitat goals and objectives. Collectively, they would form a land base that affords vital linkage among other conserved lands in the Upper Androscoggin River watershed and Northern Forest region. As we acquire lands in fee, we would manage them according to the goals, objectives, and strategies in CCP alternative B.

Our land conservation objectives would complement the management of adjacent conserved lands, both public and private, thus enhancing our contribution to wildlife management on the regional landscape. Working in partnership with surrounding landowners would be crucial in successfully implementing this LPP. We developed it cooperatively with our New Hampshire and Maine fish and wildlife agency partners. Our land conservation partners working in the Northern Forest also support it.

We designed alternative B to emphasize the conservation of specific habitat types to which the refuge can make the most important ecological contribution in the Upper Androscoggin River watershed, the larger region of the Northern Forest, and the Refuge System. Those habitat types support a wide variety of federal trust species: in particular, birds of conservation concern identified in BCR 14 (CCP appendix B). For each objective for each type of habitat, we identified focal species whose life requirements would guide our management of that type. We selected those focal species because we believe their habitat needs broadly represent the habitat requirements for most of the other wildlife that depend on that habitat type, including other federal trust resources and species of conservation concern.

Our highest priority continues to be protecting the biological integrity, diversity, and environmental health of Umbagog Lake and significant wetlands in that area. The CCP proposes that we promote and sustain a spruce-fir/northern hardwoods forest with a high conifer component, viewed from the landscape scale of the entire Upper Androscoggin River watershed basin. Our analysis indicates that site capability and natural potential of the refuge places it in a unique position to make an important contribution to that mixed forest type in the watershed, the larger Northern Forest region, and the Refuge System. The CCP also proposes to implement actions that would improve habitat for the American woodcock.

III. Continuing Partnerships

Before the mid-1980s, conservation in Coos and western Oxford counties focused primarily on the White Mountain National Forest, with limited effort toward conserving waterfront in the Rangeley and Connecticut lakes. Large timber companies owned most of the land in the North Country, and worked it to supply their mills. In the 1980s, the long-standing tradition of timber companies owning the mills and the land shifted. The companies started to sell lands once thought to be held in perpetuity. Development pressure on the shoreline increased. Access to those lands, once considered a given in the North Country, became questionable.

That did not happen overnight, but has slowly progressed to a point that, today, very little forestland in Coos and western Oxford County is attached to local mills. That shift in ownership, the subdivision of large, contiguous timberlands, and the increasing demand for development spawned attempts to conserve large, contiguous blocks of forest and key ecologically sensitive areas in the Northern

Forest. Notably, the Nash Stream State Forest (see map A-2) was established when, in 1988, Diamond International offered 90,000 acres for sale in northern New Hampshire and Vermont, part of 1.5 million acres of forestland across northern New England and New York split off from the mills by an investor and resold in smaller parcels for development.

In response to rising concerns over the loss of forestlands, in 1990, Congress established the Northern Forest Lands Council, which grew out of a multi-state Governor’s Task Force study commission and a related Northern Forest Lands Study. Its mission included promoting economic stability for the communities of the area by maintaining large areas of forest, encouraging the production of a sustainable yield of forest products, and protecting recreational, wildlife, scenic, and wild land resources. The council presented its recommendations in *Finding Common Ground: Conserving the Northern Forest*. That report focuses on four priority topics: (1) foster the stewardship of private lands, (2) protect exceptional resources, (3) strengthen the economies of rural communities, and (4) promote decisions that are more informed.

The council developed a plan for the landscape-scale conservation of the Northern Forest that recognizes two very important realities:

- 1) the Northern Forest “is a complex, dynamic interrelationship of people, communities, land, water, plants and animals” that needs to “be considered as an entire package”; and,
- 2) “no single person or organization can achieve the broad goals in this report”; it needs to be done in partnership.

As the Nash Stream State Forest was being created, partnership planning began for the conservation of Lake Umbagog based on its unique wildlife values and ACJV status. That partnership among New Hampshire and Maine, conservation organizations, timber companies, local private landowners, and the Service targeted the conservation of the large wetland complexes along the lake and its shoreline, in response to increasing pressure for their development. That resulted in the creation of the refuge in 1991 and the expansion of Umbagog Lake State Park.

Conservation in the region has evolved into a dynamic, landscape-level, multi-partner effort. Through the council’s recommendations, state agencies, private conservation organizations, local communities, private businesses, the Service, and other federal agencies have collaborated to accomplish conservation goals in the area. Federal programs, such as Forest Legacy, have provided support.

Accomplishments (see map A-2)

- Nash Stream State Forest (1988)
- Umbagog Lake State Park (1990)
- Lake Umbagog NWR (1992)
- Rapid River Corridor State Easement (1997)
- Pingree Forest Partnership Conservation Easement (2001)
- Pond of Safety (2001)
- Randolph Community Forest (2001)
- The Nature Conservancy Bunnel Tract (2001)

- Connecticut Lakes Headwaters (2003)
- Rapid River Shoreline - Rangeley Lakes Heritage Trust (2004)
- Boundary Headwaters Project (2005)
- Errol Town Forest (2005)
- Grafton Notch-Mahoosucs Forest Legacy project (#1 Forest Legacy project, FY 2007)

The Service Role

The council's picture of the Northern Forest is one "of a landscape of interlocking parts and pieces, inseparable, reinforcing each other: local communities, industrial forest land, family and individual ownerships, small woodlots, recreation land, and public and private conservation land." The ongoing, multi-partner conservation partnership has applied that vision to the Upper Androscoggin River watershed. The refuge provides a federal component focusing on the conservation of migratory birds and core wetlands and forestlands in the area of Lake Umbagog.

The partnership continues to plan at the landscape level, focusing on improving connectivity between existing conservation tracts and preserving working forest and public access. That is particularly important in light of increasing trends in subdividing timberland. Both states and other partners expect the refuge, centrally located between tracts of conservation land, to play a key role in further improving linkage among them. Our proposed expansion will improve connections between tracts of the Maine Bureau of Parks and Lands (MBPL), the Pingree easements, the Grafton Notch Forest Legacy project, state park land of New Hampshire, the Errol Town Forest, and the Second College Grant (Dartmouth College). In conjunction with expanding the refuge, additional activity by our partners will focus on linkages in the surrounding area.

IV. Status of Resources to Be Protected

Wildlife and Habitat Resources

The comprehensive conservation planning team identified species of conservation concern and associated habitats as a focus for refuge management. Factors considered include the geographic location of the refuge; local site capabilities; relative abundance and distribution of species; respective species' status in national and regional conservation plans; and a determination of the most important and effective ecological contribution of the refuge to the Northern Forest ecosystem and the Refuge System. We compiled the species and habitats of concern in CCP appendix B from the following sources.

- North American Waterfowl Management Plan—Atlantic Coast Joint Venture
- Partners in Flight Plan—Physiographic Area 28
- North American Bird Conservation Initiative (NABCI)—Bird Conservation Region 14—Atlantic Northern Forest
- Federal Threatened and Endangered Species list
- Maine Natural Areas Program—State Threatened and Endangered Species list
- New Hampshire Natural Heritage Bureau—State Threatened and Endangered Species list
- Northeast States Nongame Technical Committee

- Maine and New Hampshire State Comprehensive Wildlife Conservation Plans
- New Hampshire Natural Heritage Inventory
- USFWS Birds of Conservation Concern—Region 5
- FERC Errol Dam license
- Eastern Brook Trout Joint Venture Plan

We also identified high- and moderate-priority habitats for the refuge, and developed a list of “refuge focal species” associated with them. We selected species whose habitat needs broadly represent the habitat requirements for other native wildlife dependent on these same habitat types, including other federal trust species. Table A.2 lists those priority habitats and focal species. The conservation of wetlands and waters continues to be our highest priority for managing this refuge. Maine and New Hampshire assisted in selecting habitats and species and developing refuge goals and objectives. The wetlands and related wildlife resources identified as refuge priorities overlap state wetland management goals.

Table A.2. Priority habitats and focal species

High Management Priority Habitats	Refuge Focal Species
Fen and Flooded Meadow	American Black Duck Ring-necked Duck Common Loon
Wooded Floodplain	American Black Duck Cavity Nesting Waterfowl Northern Parula Rusty Blackbird
Shrub-Scrub Wetland	American Woodcock American Black Duck Canada Warbler
Open Water and Submerged Aquatic Vegetation	Native Brook Trout Eagle and Osprey Common Loon
Mixed Forest – “Mixed Woods” Habitat Type	Blackburnian Warbler Canada Warbler Black-throated Green Warbler
Mixed Forest – Spruce/fir Habitat Type	Blackburnian Warbler Black-throated Green Warbler
Moderate Management Priority Habitats	Refuge Focal Species
Boreal Fen and Bog	Floating Island National Natural Landmark Rare Plant Communities
N. White Cedar Swamp	Rare Plant Community
Lakeshore Pine Hemlock	Eagle and Osprey Nest Sites
Mixed Forest – Northern Hardwood Habitat Type	Canada Warbler American Woodcock

Although the regional importance of the Umbagog area for wildlife has much to do with its unique wetland complex and waters, we cannot view those habitats as separate from the surrounding forestlands. Their interrelationship is such that the future management of those lands potentially could affect water quality and the ecological integrity of the entire system. Those lands provide both important forested habitat and essential habitat many wetland-related species need for nesting, feeding, moving, or other purposes. One of our main goals for the refuge is to manage upland forest habitats consistent with their site capabilities to benefit federal trust species and other species of conservation concern.

Historically, the forest in the basin of the Upper Androscoggin River watershed was a spruce-fir/northern hardwood mix. That forest included more conifers than today, particularly in the lowlands. Present conditions reflect 150 years of logging and the selection of softwoods, resulting in the higher presence of hardwood species and even-aged stands. Most of the acreage the refuge acquired was cut heavily before sale. Our review of historic aerial photographs for the surrounding landscape shows heavy cutting of conifer forest since the mid-1980s. An important opportunity exists to restore and maintain the mixed spruce-fir/northern hardwood forest both on the refuge and on the landscape around it.

Because of our species/landscape analysis and the decision to sustain mixed spruce-fir/northern hardwood forest, we chose the Blackburnian and black-throated green warblers as focal species representative of that upland forest habitat. In managing the refuge, we will promote the conifer component in the mixed forest landscape to benefit those species. That will also benefit other species dependent upon that forest type: many of conservation concern. For example, the bay-breasted and Cape May warblers, both species of highest concern for BCR 14, appear on the refuge in low abundance because of their preference for extensive, contiguous, mature conifer forests. Our management, designed to increase the conifer component in the refuge landscape and promote larger blocks of mature spruce-fir, would benefit those species increasingly over time.

We designed the proposed expansion to provide the refuge with opportunities to accomplish several important objectives:

- 3) these lands are crucial for ensuring the future water quality for refuge core wetlands and waters, at a time of increasing uncertainty over the future ownership and management of surrounding timberlands;
- 4) these adjacent lands contain significant wetland and forest resources that will support refuge wildlife and habitat objectives; and
- 5) these acquisition areas were configured to allow the Service to expand its partnership role by improving connectivity among conservation lands nearby.

Refuge lands located along the lake and the Magalloway, Androscoggin, Rapid and Dead Cambridge rivers contribute to the Northern Forest Lands Council priority for protecting water quality in that region's rivers, streams and lakes. Proposed fee and easement areas would expand that protection to include remaining lands flowing directly into the core waters and wetlands of the refuge, including lands along the Rapid River, and B Pond and B Brook to the east, the Swift Cambridge River to the south, and the Magalloway River and Sturtevant Pond to the north. The lands we propose along the Mollidgewock and Bog brooks to the southwest will contribute to the protection of water quality in the Androscoggin River.

We designed our proposal to acquire lands in fee to provide a high level of protection and management capability for significant wetlands along the

Magalloway and Swift Cambridge rivers, the Mollidgewock, Bog Brook, and B Pond and B Brook, and several related ponds. The location of those lands relative to the refuge, their topography, soil types, and their interspersed wetlands and uplands provide the best opportunity for their restoration, maintenance, and long-term management.

Regarding forest types, we analyzed site capabilities as part of the comprehensive conservation planning both for refuge lands and proposed expansion lands. We assessed current vegetation using national land cover data, and predicted potential vegetation based on computer-modeled “ecological land units” (ELUs) provided by The Nature Conservancy. Past and present harvesting has influenced forest composition on those lands. We propose to manage them based on site capability, and promote and sustain mixed spruce-fir/hardwood forest. Other areas of BCR 14 and the northeastern United States provide opportunities to manage and sustain other forest types, such as conifer forest and hardwood forest, and we expect surrounding landowners to continue to conduct management as in the past, driven by the timber market, resulting in a higher hardwood component and a higher presence of hardwood-dependent land bird species.

Service management would contribute to federal, state and BCR partnership goals for land bird species tied to the mixed spruce-fir/hardwood forest, and provide habitat for other species of concern. The rivers, brooks, and ponds in the proposal area, and their associated forested, shrub, and emergent wetlands, provide important habitat for waterfowl, wading birds, shorebirds; wetland-dependent mammals such as the beaver, otter, mink, muskrat, and moose; and a host of reptile, amphibian, and other wildlife species. Worthy of special note, the many small streams, beaver ponds, and shrub wetlands in the expansion area support most of the black duck breeding activity, and early-successional re-growth in extensive cutover areas near wetlands provide important nesting habitat for that species of concern. The same areas provide important breeding and feeding habitat for the American woodcock, and provide opportunities for woodcock management (map A-3). At the same time, they support other high-priority BCR target species, such as the Canada warbler, another focal species.

The mixed forest will provide connectivity of habitats for mammals with large home ranges and protect many critical white-tailed deer wintering areas both states identified in the expansion area (map A-4). Proposed expansion lands include wildlife habitat identified as significant through special zoning designations, including the Mollidgewock and Bog Brook drainages, designated PD-3. That zoning ordinance, adopted by Coos County for unincorporated townships, identifies areas recommended by the New Hampshire Department of Fish and Game (NHFG) and designated by the County Board as critical wetland wildlife habitat areas. They are recognized as critical wetland habitat and streamside coniferous travel corridors for boreal wildlife that use spruce/fir habitat, thereby maintaining viable populations for species such as deer, moose, lynx, marten, osprey, eagle, spruce grouse, black backed and three-toed woodpecker, black bear, fisher and 122 additional vertebrate species of wildlife.

The present refuge and its expansion lands are also known to have high fisheries values, particularly for the brook trout, the only trout native to much of the eastern United States. In 2004, in recognition of the need to address regional and range-wide threats, the Eastern Brook Trout Joint Venture (EBTJV) formed to halt the decline of brook trout and restore fishable populations. The EBTJV comprises fish and wildlife agencies from 17 states, federal agencies, national conservation organizations, and academic institutions, and considers the protection of forested watersheds a high priority. In New Hampshire, 7 percent of sub-watersheds are known to support intact, self-reproducing populations of brook trout. Those sub-watersheds, including the upper Connecticut River

system and Umbagog's Magalloway, Dead Diamond and Swift Diamond rivers represent most of the brook trout habitat remaining intact outside Maine. Maine is considered the last true stronghold for brook trout in the eastern United States, with as many intact watersheds as all the other states in the eastern range combined.

The easement lands we propose for the expansion offer an opportunity to ensure the continuation of compatible, long-term forest management, water quality protection, and public access and recreation. Those lands can be considered as providing a "supporting natural landscape" function for fee tracts containing or bordering significant wetlands and waters.

Threats to Resources

The Northern Forest is changing. In the last decade, significant changes in land use have threatened the natural landscape, culture, and communities of the region. Its large forest landholdings, many owned by multinational corporations, are being sold at an increasing rate. Many large tracts are being divided and sold to developers or institutional investment corporations, including insurance companies and bank trusts. Those sales have raised concerns about the rising trend of unsustainable timber cutting, forest subdivision, and other permanent development, particularly around lakefronts and secluded forest tracts. In addition to fragmenting the forests, those trends can affect wildlife habitat, restrict public access, degrade water quality, spoil the remote, scenic beauty of the forest, and undermine the hope of a sustainable forest-based economy to support Northern Forest communities.

The most pervasive human influence on the natural landscape has been commercial timber harvesting and production. Their cumulative effects in the region have been a change in the age structure of the forest and a gradual shift toward greater dominance by northern hardwoods. Although a century of timber harvesting in this region has not resulted in the significant loss of species or populations of forest birds, changes in wildlife mainly have involved changes in local composition and relative abundance, as the mix of successional stages and conifer vs. hardwood forests shifted across the landscape.

Conservation planning in this region must reconcile the needs of long-term, sustainable timber production, the habitat needs of high-priority wildlife species, and the need to preserve public access. The loss of the economic sustainability of commercial forestry could result in the conversion of forest habitats to urban development or other, less wildlife-friendly landscapes. The recent trend in the region for unsustainable timber cutting and subdivision of large tracts of forestland has caused concern among wildlife agencies and the conservation community. That trend also offers a crucial opportunity for partners to work together to permanently conserve the ecological integrity of the Northern Forest, preserve public recreational opportunities, and promote the economic sustainability of the forest-based economy. Many successful partnerships have formed around those goals; several have included a Service role.

V. Proposed Action and Objectives

Proposed Acquisition Area

This LPP expands the land acquisition area for the refuge by the 47,807 acres we propose to acquire in CCP alternative B: 26,840 acres by purchasing fee title and 20,967 acres by purchasing conservation easements (see attachment A.1, map tiles 1–6 and table A.8). That expansion is vitally important for meeting the refuge habitat goals and objectives for priority wetland and forestland wildlife species we set forth in the CCP. It also serves to strengthen our ongoing partnership with the States of New Hampshire and Maine and several conservation organizations to ensure the continued existence of the unique wetland, wildlife, forest and recreational resources of the area around Lake Umbagog.

We based our proposals to acquire land in fee title or conservation easements on several factors. We propose fee acquisition for lands in both New Hampshire and Maine along the Magalloway River, Sturtevant Pond, the Dead Cambridge and Swift Cambridge rivers, and the Mollidgewock and Bog Brook drainages. We proposed fee acquisition for lands that

- 1) contain a significant amount of wetland and associated water bodies of high wildlife resource value;
- 2) lie in the immediate drainage area of present core refuge lands, so that they play a role in ensuring the protection of water quality for important wetland and wildlife resources;
- 3) ensure habitat connectivity between the refuge and the surrounding network of conservation lands; and
- 4) fall under a high degree of threat of permanent habitat loss, such as the potential for subdivision and development of shore land next to wetlands and bodies of water with high resource value.

We propose conservation easement protection for the B Pond/Rapid River area, lands south of Sturtevant Pond, the Mt. Dustan area, the Mollidgewock headwaters area, and along the Androscoggin River. Some land originally proposed for fee protection in the draft CCP has been shifted to easement protection, in the area between Sturtevant Pond and Umbagog, and to the south of Upton. The tables below show the acreage by each method of acquisition in towns in New Hampshire (table A.3) and Maine (table A.4).

Table A.3. Acres by acquisition method in New Hampshire

Town	Fee	Easement	Town Total
Cambridge	7,153	6,706	13,859
Errol	4,514	472	4,986
Wentworth Location	1,041	2,170	3,211
Subtotals	12,708	9,348	
Total			22,056

Table A.4. Acres by acquisition method in Maine

Town	Fee	Easement	Town Total
Grafton	2,489	0	2,489
Upton	7,866	7,446	15,312
Magalloway Plantation	3,774	4,195	7,969
Subtotals	14,129	11,641	
Total			25,770

**Note: Acreages for Tables A.3 and A.4 are based on GIS measurements and are approximate*

The boundaries of our proposed expansion correspond to property boundaries or identifiable features such as existing roads. We are interested in protecting and restoring wildlife habitat. Therefore, we have excluded specific lands from the refuge acquisition area: the town centers of Errol and Upton, and the more developable lands along routes 16 and 26, to allow for necessary future town development and economic growth.

We plan to manage forested habitat to benefit the focal species we have identified, using accepted forest silviculture practices and following best management practices, on lands with low to moderate resource sensitivity. That approach will support all wildlife species associated with the mixed spruce-fir/northern hardwood forest type. Appendix E of the CCP details our management plans.

One of our main objectives is to create corridor connections and linkages to the larger conservation land network in the upper Androscoggin River watershed. This proposal connects the refuge to lands under conservation easement protection to the east in Maine, including the large Pingree tracts along Upper and Lower Richardson Lake and in C Surplus. To the south, in Maine, is the Grafton Notch State Park, and to the west, along the Androscoggin River, protected lands include the 13-Mile Woods Forest Legacy conservation easement and the Errol Town Forest.

Current refuge lands are open to the public for hunting, fishing, wildlife observation and photography, environmental education and interpretation, camping in designated areas, and provide designated corridor connections for the interstate snowmobile trail network. The land we acquire in the proposed expansion area would support these same activities, and would be open for long-term public access for compatible, priority public use (see maps A-5 and A-6). We will structure Service easements like Forest Legacy easements, to support continued timber management and public access.

Land Cover and Land Use

We mapped the broad habitat types the CCP team developed for the area (see table A.5). Most of the land we included in the proposed acquisition area is undeveloped forest and wetland (map A-7). We do not assume in alternative B that we would actively manage land the Service does not own in fee, unless we establish a cooperative management agreement with the landowner.

Table A.5. Acquisition method by habitat type

Habitat Type	Expansion Proposal (Results under management; >100 years)	
	Fee Acres	Easement Acres
Fen and Flooded Meadow	103	20
Boreal Fen and Bog	2,277	407
Northern White Cedar	0	0
Scrub-Shrub Wetlands	790	77
Open Water & Submerged Aquatic Vegetation	46	23
Wooded Floodplain	123	13
Lakeshore Pine-Hemlock	0	0
Spruce-fir	14,476	11,085
Mixed Wood	5,221	5,731
Northern Hardwoods	3,804	3,611
Recently Harvested	not predicted	not predicted
Fields/Residences	0	0
Cliff	0	21
Total	26,840	20,988

Maps and Ownership Table

Attachment A.1 at the end of this LPP lists all land parcels in map tiles 1–6 and table A.8. We produced the maps and table using available tax parcel boundaries and tax database information for Errol, Wentworth Location, Cambridge, Upton, Magalloway Plantation and Grafton.

On the maps, a parcel number keyed to the table identifies each parcel. The table provides the following information:

- LPP Number
- Tax parcel identification number
- State
- Town
- Acquisition method
- Acquisition priority
- Acres estimated by our Geographic Information System

Land Protection Priorities

All of the lands we included in this expansion proposal have significant resource values and high potential for ensuring habitat connectivity between the refuge and surrounding conservation lands. In general, the actual order of land acquisition and the level of conservation (fee, easement) will be influenced by the interest and availability from willing sellers, and the availability of funding at that time. However, as landowners offer parcels of land in the proposed acquisition area to the Service, and as funds become available, we will base priority for acquisition on several factors. We have assigned one of the following three priority categories to those lands.

Priority 1—the remaining 5,255 acres of land we have not acquired in the original land acquisition boundary, approved in 1991. The Service role in the original partnership for the area (Lake Umbagog Study Team) focused on protecting the unique wetland complex and associated wetland-dependant wildlife from increased human activity, disturbance, and degradation of water quality. That included the intention to ensure that sections of lakeshore were not left vulnerable to major subdivision and high-density development.

Priority 2—the 26,840 acres of lands identified for fee acquisition. These lands center on wetlands and water bodies of high value, and in many cases they drain into the existing refuge and affect water quality. We intend fee ownership to provide maximum long-term protection and management capability.

Priority 3—the 20,967 acres of land identified for conservation easement protection.

When willing sellers offer more than one parcel at the same time and funding is limited, we will determine our level of interest on the following criteria developed for ranking and prioritizing land parcels:

- 1) the presence of significant amounts of wetland habitat
- 2) the amount of wetlands of high wildlife resource value

- 3) the degree of threat of permanent habitat loss, such as potential for subdivision and development of shore land adjacent to high resource value wetlands and bodies of water
- 4) the location within the immediate drainage area to existing core refuge lands, and subsequent role in ensuring protection of water quality for important wetland/wildlife resources
- 5) the presence of high upland resource values

We configured our proposed boundaries for fee and easement areas with the criteria above in mind. For example, the fee boundary in the Cambridge/south Errol portion of the project area is intended to offer a high level of protection and management capability for the significant Mollidgewock Brook drainage and its associated wetland complex. Because a number of factors also influence acquisition priority, including the availability of willing sellers and the availability of funding, we reserve the right to be flexible with that priority list. In addition, we must be flexible with our methods of acquisition (fee versus easement) and priorities to meet the needs of individual landowners.

VI. Protection Options

We considered these four protection options in developing our proposed action:

Option 1.— no Service action

Option 2.— management or acquisition by others

Option 3.— less-than-fee acquisition by the Service

Option 4.— fee acquisition by the Service

Our proposal includes a combination of the protection options outlined below, including providing assistance and support to conservation partners and landowners, acquisition and management by others, and the purchase of lands or conservation easements by the Service. Service land protection policy is to acquire only the minimum interest necessary to meet refuge goals and objectives, and acquire it only from willing sellers.

We believe this combination approach is a cost-effective way of providing the minimal level of protection needed to accomplish refuge objectives while also attempting to meet the needs of landowners. However, as parcels become available in the future, changes in the protection option for a specific parcel may be warranted to ensure we are using the option that best fits the situation at that time.

Option 1.—No Action

In option 1, we would not expand the refuge acquisition boundary or otherwise attempt to protect and manage additional habitat in the vicinity of the refuge. The final CCP evaluates this option as part of Alternative A, No Action (Current Management). We did not select this approach as part of our proposed action because

- it does not provide permanent long-term protection to important wetland and upland habitat and Federal trust resources in the project area;
- our State and non-profit conservation partners have recommended and supported Service action as part of continuing cooperative conservation in northern New Hampshire and western Maine; and,
- we feel an opportunity exists to help provide connectivity between existing conservation lands of high resource value, and that opportunity will be lost as timberlands in the area are further subdivided, fragmented and resold.

Regulatory land use controls do exist to various extents, and offer varying degrees of protection in different portions of the project area. Examples include county/local zoning such as the Coos County PD3 zoning district, and land use restrictions afforded under the Maine Land Use Regulatory Commission. The county's Master Plan reflects local support of the area's natural resources and forestlands seen as vital to the community's economic well-being. However, this area of New Hampshire and Maine is experiencing accelerating subdivision, development, and recreational pressures.

Option 2.—Management or Acquisition by Others

In option 2, we would continue to support the activities of our partner organizations and agencies in the project area:

- the New Hampshire Fish and Game Department;
- the New Hampshire Division of Parks and Recreation, the New Hampshire Division of Forests and Lands and its Bureau of Natural Heritage, within the New Hampshire Department of Resources and Economic Development;
- the Maine Department of Inland Fisheries and Wildlife;
- the Maine Bureau of Parks and Lands, the Maine Forest Service and the Maine Natural Areas Program, within the Maine Department of Conservation;
- the New Hampshire Audubon Society;
- The Nature Conservancy;
- the Trust for Public Land;
- the Society for the Protection of New Hampshire Forests; and,
- other conservation partners and interested local landowners.

Although our partners provide some level of protection for land, they often do not have the financial or administrative resources to buy all those lands or conservation easements, nor can they always manage the parcels actively to protect our priority species. The proposed action (attachment A.1, map tiles 1-6) assumes these groups will continue to buy lands or easements in the project area, subject to their own funding limitations. Partnership proposals will continue to be submitted to compete for funding consideration through programs such as Forest Legacy. However, without a continuing role for Service protection of land near the refuge, many lands identified as important for wildlife would continue to be sold, further subdivided, and converted to other uses over time. The collective partnership has identified a Service acquisition and management role as crucial in the long-term protection of those significant natural resources.

Option 3.—Less than fee Acquisition

In option 3, we would accomplish our habitat objectives by purchasing only a partial interest, in the form of a conservation easement. The parcel would remain in private ownership, while allowing us some ability to manage land use. The easement would be structured to assure the permanent protection of existing forest lands, allow habitat management/improvement, manage access if endangered or threatened species are present, and provide public use opportunities if the landowner is willing.

In order to accomplish these objectives, we would purchase easements, which, at a minimum, would meet the conditions in Forest Legacy easements now being used in New Hampshire and Maine. Easements are property rights, and

are usually perpetual. If a landowner sells his or her property after selling an easement to us, that easement continues as part of the title. Properties subject to easements generally remain on the tax rolls, although the reduction in their market value may reduce their assessments. The Service does not pay revenue sharing for easement rights (see section IX for more on revenue sharing payments).

In general, an easement maintains the land in its current configuration with no further subdivision. Easements are appropriate for use when

- only minimal management of the resource is needed, but there is a desire to ensure the continuation of current undeveloped uses and to prevent fragmentation over the long term;
- a landowner is interested in maintaining ownership of the land, does not want it to be further developed, and would like to realize the financial benefits of selling development rights.

The determination of value for the purchase of a conservation easement involves an appraisal of the rights we are buying, based on recent market conditions in the area. “Acquisition Methods,” below, further describes our proposed easement conditions and structure.

Option 4.—Fee Acquisition

In option 4, we would acquire parcels in fee title from willing sellers, thereby purchasing all rights of ownership. Fee ownership provides the greatest degree of permanent protection for existing forested and wetland habitats, and allows us to

- conduct such activities as habitat management, improvement, and restoration;
- provide public use opportunities and manage access; and
- manage for endangered or threatened species.

Fee purchase at market value is the most expensive method of acquisition, but allows us maximum flexibility in managing the land. It allows us to conduct habitat improvement and restoration projects, and allows the refuge the greatest ability to provide additional opportunities for public use. We identified fee purchase as the preferred method for core lands in the project area. It may become necessary in the future to convert a conservation easement to fee acquisition: for example, when an owner is interested in selling the remainder of his or her interest in land on which we have acquired an easement. We will evaluate that need for each case.

VII. Acquisition Methods

If landowners are interested, we can use three methods of acquiring either a full or a partial interest in parcels within the proposed acquisition boundary:

- 1) purchase (e.g., fee title, or a partial interest like a conservation easement),
- 2) donation, and (3) exchange. Attachment A.1 (map tiles 1–6) lists our proposed method for each tract in the project boundary.

Purchase

For most of the tracts in the boundary, the proposed method is listed as *Fee* or *Easement*; however, the method we use ultimately depends partly on the wishes of the landowner.

Fee purchase involves buying the parcel of land outright from a willing seller in fee title (all rights, complete ownership), as the availability of funding allows.

Easement purchase refers to the purchase of limited rights (less than fee) from an interested landowner. The landowner would retain ownership of the land, but would sell certain rights identified and agreed upon by both parties. Our proposed conservation easement objectives and conditions, at a minimum, would meet conditions in Forest Legacy easements now in use in New Hampshire and Maine. These lands generally have been under continuous forest management for many years; are recognized as an important resource for outdoor recreational activities; include important surface water and surrounding wetland resources; and provide valuable wildlife habitat including habitat for migratory birds, other priority species, and deer wintering areas.

We will maintain areas of conservation easement as undeveloped lands in support of forest and wildlife management activities, natural-resource-based education, and outdoor recreation. We will conduct those in accordance with generally accepted best management practices for the sites, soils and terrain of the property. We may designate certain areas as “Deer Wintering Areas” or “Riparian Areas” identified for special management. The easement will prevent further subdivision of a tract, and will support continued public pedestrian access for low-impact, natural outdoor recreation and education activities such as hiking, nature study, bird watching, hunting, fishing, cross country skiing, snowshoeing, and snowmobile use on designated trails.

As with Forest Legacy easements, Service easements will strive to

- conserve open spaces and scenic values, including the conservation of productive forest land, for their wildlife resource benefits;
- conserve waterfront, streams, riparian areas, wetlands, and the quality of groundwater and surface water resources, fish and wildlife habitats, rare and exemplary plants and natural communities, and the ecological processes that sustain these natural heritage features and cultural resources;
- provide public pedestrian access, which will allow the public to participate in hunting, fishing, wildlife observation, photography, environmental education and interpretation; and
- retain the property in perpetuity as an economically viable and sustainable tract of land for the production of timber, wildlife resources, and aesthetic values.

Donation

We encourage donations in fee title or conservation easement within the approved areas, assuming that management concerns such as contaminants are not major issues. Owners sometimes choose to donate all or a portion of their land because of tax advantages or as a lasting memorial. We are not aware of any opportunities to accept donations of parcels within our proposed boundary; but we would evaluate each case as it arises.

Exchange

We have the authority to exchange land in Service ownership for other land that has greater habitat or wildlife value. Inherent in that concept is the requirement to get dollar-for-dollar value, occasionally with an equalization payment. Exchanges are attractive because they usually do not increase federal land holdings or require purchase funds; however, they also may be very labor-intensive, and take a long time to complete.

Service Land Acquisition Policies

Once a refuge acquisition boundary has been approved, we contact landowners to determine if any are interested in selling. If a landowner expresses interest

and gives us permission, a real estate appraiser will appraise the property to determine its market value. Once an appraisal has been approved, we can present an offer for the landowner's consideration.

Our long-established policy is to work with willing sellers as funds become available. We will continue to operate under that policy. Appraisals conducted by Service or contract appraisers must meet federal as well as professional appraisal standards. Federal law requires us to purchase properties at market value based on comparable sales of similar types of properties.

We based the acquisition boundary on the biological importance of key habitats. It gives the Service the approval to negotiate with landowners that may be interested, or may become interested in selling their land in the future. With those internal approvals in place, the Service can react more quickly as those important lands become available. Lands within that boundary do not become part of the refuge unless their owners sell or donate them to the Service.

A landowner may choose to sell land to the Service in fee simple and retain the right to occupy an existing residence. That is a life use reservation. It applies during the seller's lifetime, but can also apply for a specific number of years. At the time we acquire the parcel, we would discount from the appraised value of the buildings and land the term of the reservation. The occupant would be responsible for the upkeep on the reserved premises. We would own the land, and pay revenue sharing to the appropriate taxing authority.

In rare circumstances, at the request of a seller, we can use friendly condemnation. Although the Service has a long-standing policy of acquiring land only from willing sellers, it does have the power of eminent domain, like other federal agencies. We use friendly condemnation when the Service and a seller cannot agree on property value, and both agree to allow a court to determine fair market value. We also may consider friendly condemnation when the Service and the seller decide that a court order is necessary to clear up a cloud on a title. We do not expect to use friendly condemnation very often, if at all. We would not use condemnation otherwise, as it counters good working relations with the public.

Funding for Fee or Easement Purchase

Much of our funding to buy land comes from the Land and Water Conservation Fund (LWCF), which derives from certain user fees, the proceeds from the disposal of surplus federal property, the federal tax on motor boat fuels, and oil and gas lease revenues. About 90 percent of that fund now derives from Outer Continental Shelf oil and gas leases. The federal government receives 40 percent of that fund to acquire and develop nationally significant conservation lands. Another source of funding to purchase land is the Migratory Bird Conservation Fund (MBCF), which derives from Federal Duck Stamp revenue.

We plan to use both funds to buy either full or partial interests in lands in the project area. We will use LWCF funds to acquire land and easements that consist mainly of upland forest, which represents most of the proposed expansion area. We may use MBCF funds for properties that include large tracts of forested, shrub or emergent wetlands and waters important for waterfowl. Another potential source for funding in that category is the North American Wetland Conservation Act.

VIII. Coordination

The original establishment of the refuge arose from the collaboration among the Service, New Hampshire and Maine, conservation organizations, and three principal landowners: James River Company, Boise Cascades Paper Group, and Seven Islands Land Company. The final proposal resulted from a federal-state partnership to cooperate in protecting and managing nationally significant habitats in the area. The Service role was to establish the refuge on core lands

identified in the partnership, while the states of New Hampshire and Maine were to pursue the acquisition of conservation easements in portions of the project area.

Service participation in the loosely organized Lake Umbagog Study Team planning group began in the late 1980s. That local partnership promoted and facilitated the protection of the area's important natural resources, while encouraging sustainable timber management, economic development and ecotourism. The partnership included these participants:

- New Hampshire Department of Fish and Game
- New Hampshire Land Conservation Investment Program
- Maine Department of Inland Fisheries and Wildlife
- Land for Maine's Future Program
- Audubon Society of New Hampshire
- Audubon Loon Preservation Committee
- James River Corporation
- Boise Cascade
- Seven Islands Land Management Company
- Local landowner representatives
- U.S. Fish and Wildlife Service

Since that time, conservation in the region has evolved into a dynamic, landscape-level, multi-partner effort. State agencies, many private conservation organizations, local communities, private businesses and the Service continue to work on additional conservation goals in the area. Additional active partners include

- Appalachian Mountain Club
- Town of Errol
- Forest Society of Maine
- New England Forestry Foundation
- New Hampshire's Land and Community Heritage Investment Program
- Northern Forest Alliance
- Rangeley Lakes Heritage Trust
- Society for the Protection of New Hampshire Forests
- The Nature Conservancy
- Trust for New Hampshire Lands
- Trust for Public Land

We continue to work closely with the New Hampshire Department of Fish and Game and the Maine Department of Inland Fisheries and Wildlife. Both agencies participated as full core team members in developing the Lake Umbagog refuge CCP and LPP. Agency representatives attended essentially all team meetings, and contributed guidance and perspective in the development of our refuge goals, objectives and strategies. Representatives of additional state agencies, such as the New Hampshire Department of Resources and Economic Development Division of Parks and Recreation, provided input on specific topics at various times during the process. Other federal agencies that provided input include the

U.S. Forest Service and the USDA Natural Resources Conservation Service. The New England Field Office of our Division of Ecological Services also provided support. Several meetings solicited input from experts on freshwater wetlands, forest management and bird conservation, and forest ecologists from academic institutions and state and federal agencies.

We distributed this LPP to all affected landowners, our conservation partners, county and town offices, and the public for public review and comment. We hosted public meetings in Errol, Berlin, and Concord, New Hampshire, and in Newry and Augusta, Maine.

IX. Socioeconomic and Cultural Impacts

The following discussion of impacts assumes the implementation of CCP alternative B, including our expansion proposal. By maintaining land in an undeveloped, natural condition, the refuge contributes to the economy of Errol and Upton, and Coos and Oxford counties. Studies of the cost of community services show that open space costs towns less than residential or commercial development, which requires town services such as schools, utilities, and emergency services. Although such development increases a town's tax base, the expenses for increased services outweigh the taxes generated from new residential and commercial uses. Appendix G of the Final CCP/EIS provides a detailed economic analysis of this proposal. We have taken the highlights below from that report.

The refuge contributes directly to the local economy through annual refuge revenue sharing (RRS) payments. Payments are made to the following localities based on the acreage and appraised value of refuge lands: Errol, Cambridge and Wentworth Location in New Hampshire; and Upton and Magalloway Plantation in Maine. The federal government does not pay property tax, but the Service makes annual payments based on a maximum of three-quarters of 1 percent of the market value of refuge lands, determined by an appraisal every 5 years. The actual amount distributed each year varies, based on Congressional appropriations for that year. The amount distributed also changes as we acquire new lands. Table A.6, below, depicts the amounts we distributed to the local municipalities between 2001 and 2007.

Table A.6. Refuge revenue sharing payments to towns, 2001-2007

Township	2001	2002	2003	2004	2005	2006	2007
Magalloway, ME	\$5,543	\$5,657	\$5,285	\$5,709	\$5,049	\$5,702	\$5,278
Upton, ME	\$5,911	\$6,828	\$7,079	\$6,804	\$6,018	\$10,376	\$10,936
Cambridge, NH	\$744	\$759	\$709	\$681	\$603	\$681	\$630
Errol, NH	\$11,517	\$11,755	\$22,948	\$22,056	\$19,509	\$25,973	\$24,039
Wentworth Location, NH	\$3,112	\$4,959	\$6,057	\$6,119	\$6,467	\$7,304	\$7,041

We compared lost property taxes and RRS payments for all lands proposed for fee acquisition. Although we calculated these amounts for all fee lands in the expansion area, acquisition generally occurs slowly over time, as lands and funding become available. We estimated the loss in local property tax revenue using the 2005 current value assessments for each land type and the 2005 tax rates for each potentially affected community. The Service does not pay RRS for easements. We calculated the RRS payments at the full, appropriated level and at the level of funding authorized in FY05. We estimated the market value for lands in the acquisition area at \$500/acre based on recent sales of forestland to the refuge.

Table A.7 shows the estimated change in property taxes collected and the RRS Payments, if we were to acquire all fee lands identified in the expansion area under Alternative B. Land acquisition will result in an annual loss of \$18,862 in property tax collections in Coos and Oxford Counties and an annual loss of \$14,947 in Maine tree growth reimbursement payments for Magalloway Plantation and Upton. RRS payments at the current authorized funding level of 41% would result in an annual payment of \$42,846 which would offset the loss in property tax collections and Maine tree growth reimbursement payment resulting in an annual net gain of \$9,037. Due to the differences between RRS and reimbursement for lands under tree growth, Magalloway Plantation and Upton would experience an actual annual net loss of \$3,005 and \$5,073 respectfully. Cambridge does not assess property taxes and would benefit the most from the RRS payments under Alternative B. Accounting for the base FY05 RRS payments of \$37,646 used in the CCP analysis (Alternative A) and the \$42,847 predicted increase for new land acquisition, RRS payments would total \$80,493 if we were to acquire all proposal lands under Alternative B.

Table A.7. Property tax and RRS impacts of land acquisition

Township	Tax assessed values	Change in taxes collected	Change in ME State Revenue Sharing payment	Full Refuge Revenue Sharing (RRS) payment	41% of RRS payment	Overall Change in Taxes & ME State Revenue Sharing Payment Collected Net of 41% RRS Payments
Grafton	\$311,125	-\$2,800	\$0	\$9,334	\$3,827	\$1,027
Magalloway Plantation	\$471,750	-\$3,949*	-\$4,859	\$14,153	\$5,803	-\$3,005
Upton	\$983,250	-\$7,079*	-\$10,088	\$28,498	\$12,094	-\$5,073
Cambridge	\$443,583	\$0		\$26,824	\$10,998	\$10,998
Errol	\$339,682	-\$4,243		\$19,268	\$7,900	\$3,657
Wentworth Location	\$101,031	-\$791		\$5,426	\$2,225	\$1,434
Totals	\$2,650,421	-\$18,862	-\$14,947	\$104,501	\$42,846	\$9,037

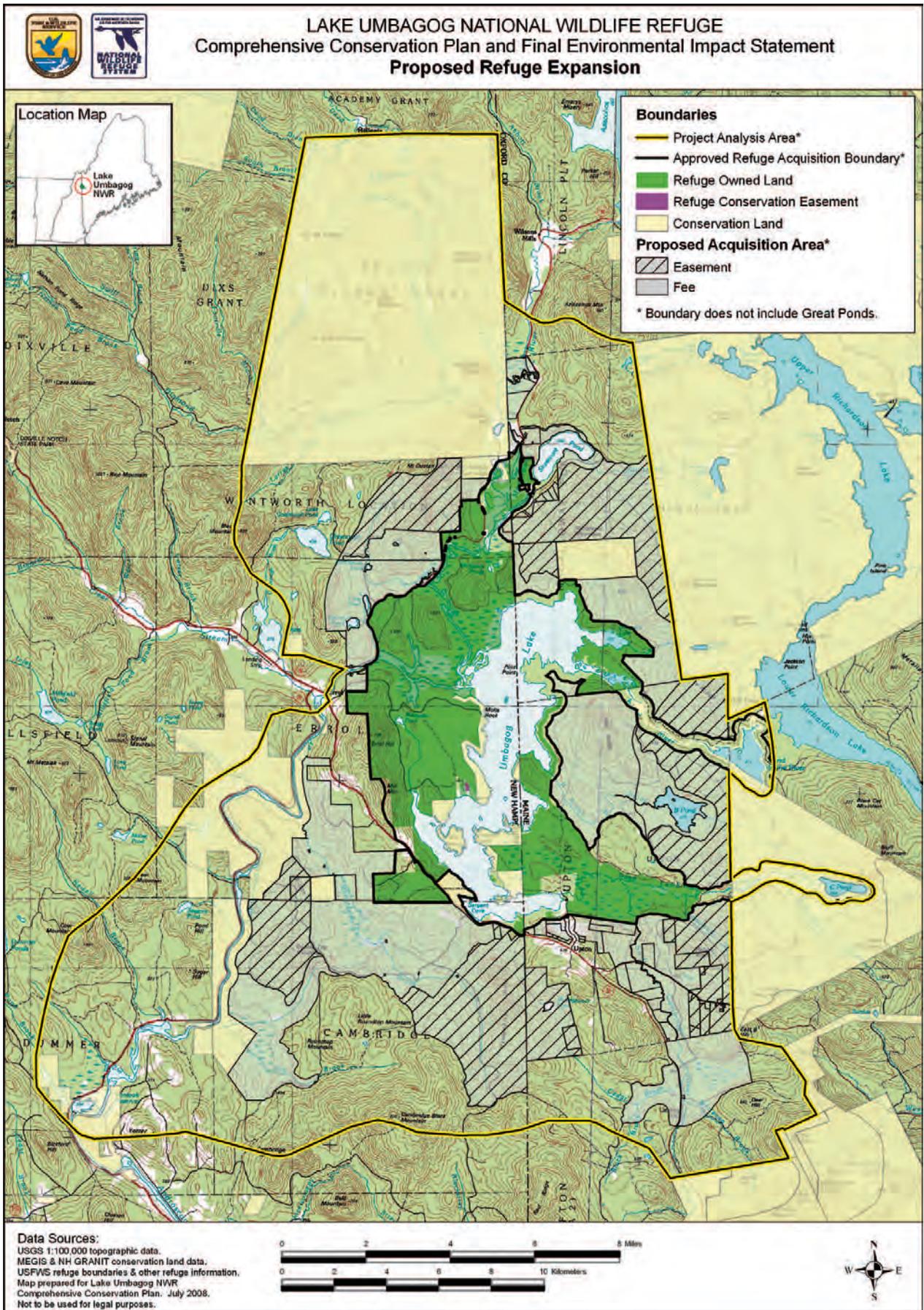
We estimated the additional economic impacts of alternative B using IMPLAN, a computerized database and modeling system that provides a regional analysis of economic activity developed by the USDA Forest Service. Using that model, we predicted that RRS payments would generate total annual economic impacts of \$110,200 in local output, \$65,800 in personal income, and 2.2 jobs in Coos and Oxford Counties. A portion (\$44,781) of the increase in RRS payments under Alternative B offsets the loss in private property tax collections and Maine tree growth reimbursement payments, which does not represent a real increase

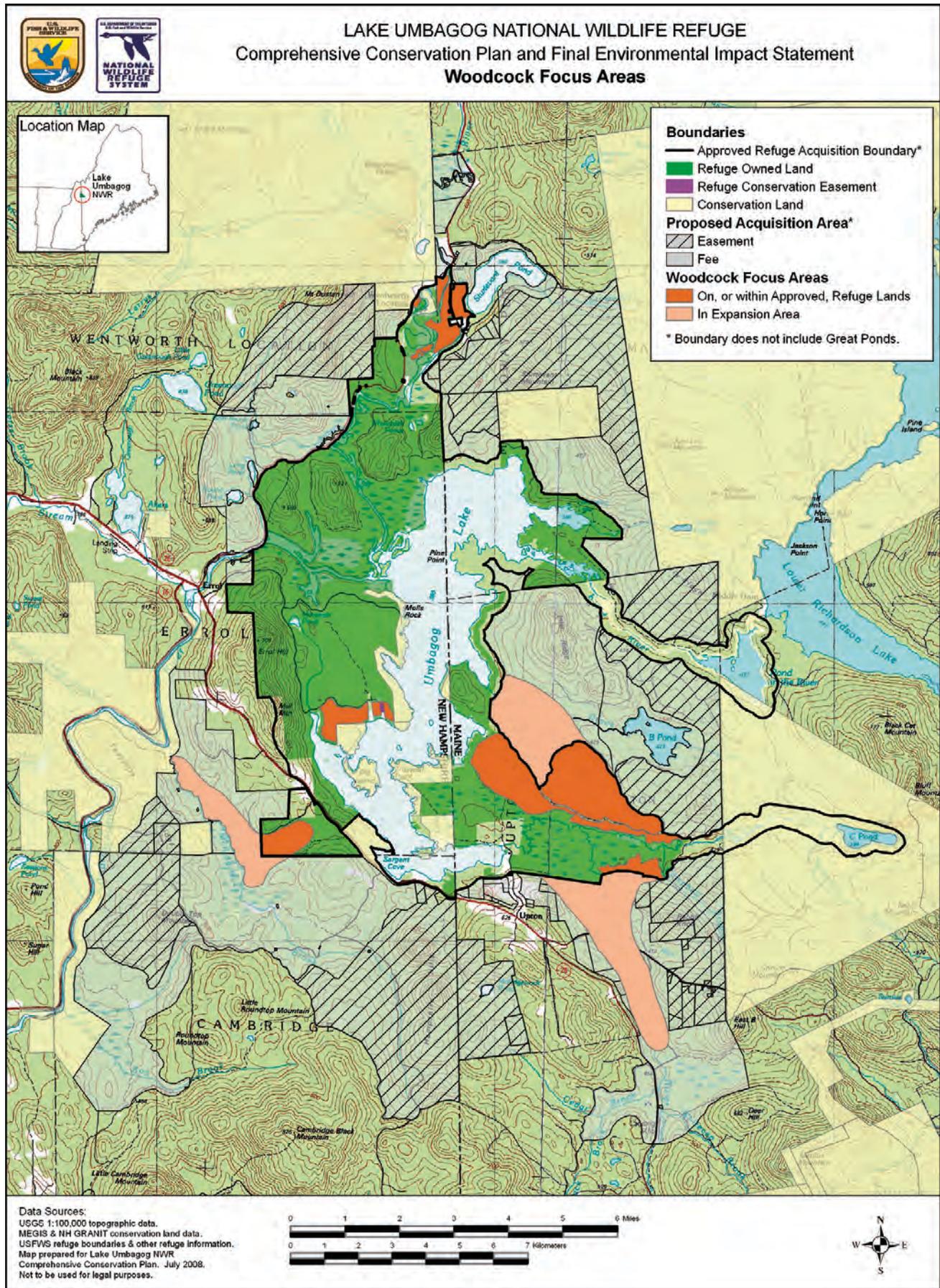
economic activity to the area. Accounting for the loss in property tax collections, RRS payments under Alternative B would generate new total economic impacts of \$49,100 in local output, 1 job, and \$29,200 in personal income (USFWS Lake Umbagog CCP).

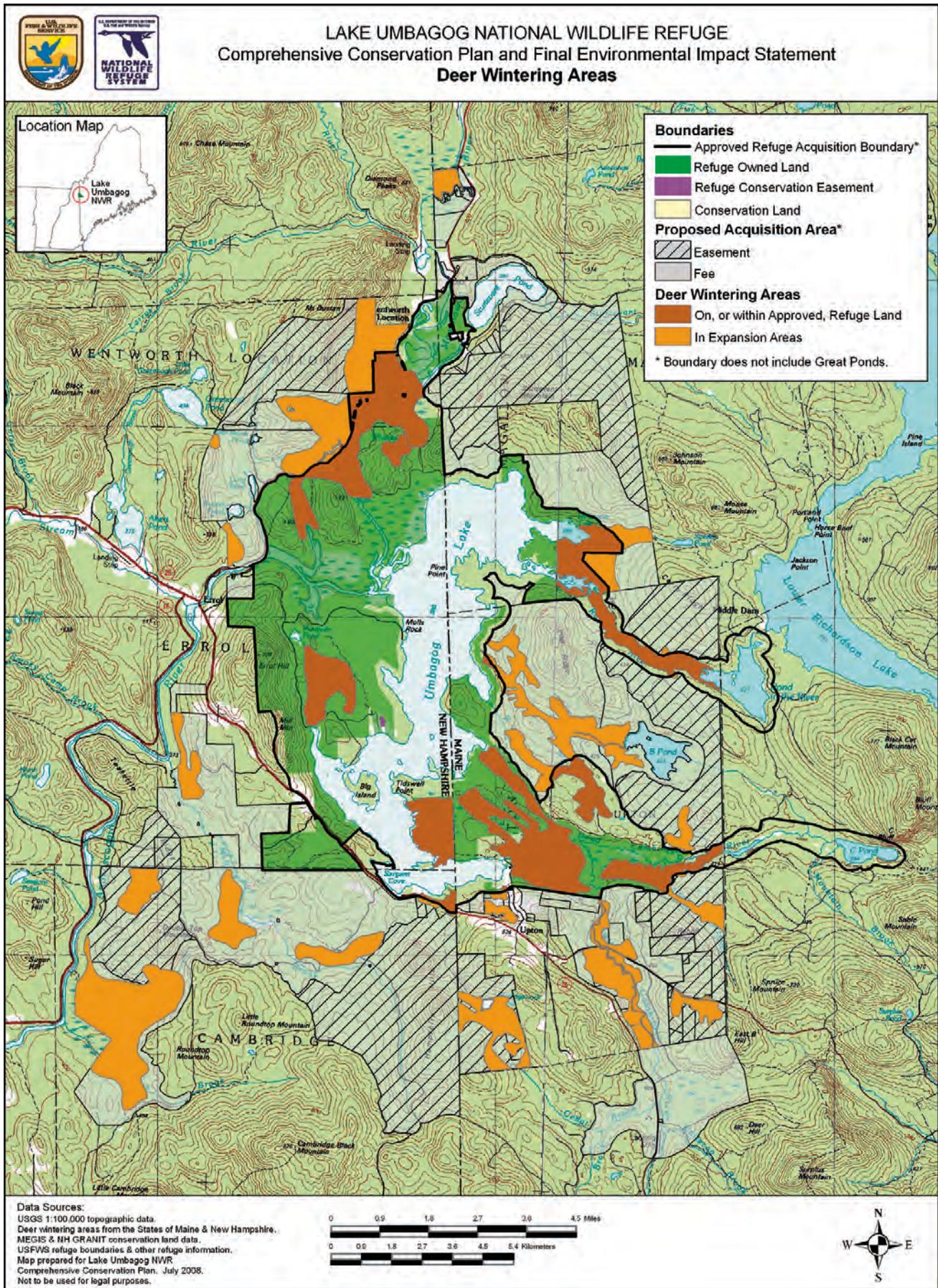
We also analyzed recreational opportunities and levels of visitation. We predict those levels would increase, due to refuge land acquisition, additional public use infrastructure, and regional visitation trends. Estimates were made for visitation levels associated with each major visitor activity: fishing, hunting, use of trails and water, other wildlife viewing and observation, and snowmobiling on trails, and total annual economic impacts associated with non-local visitation were estimated. Much of the predicted increase in visitation is based on the number of people that currently recreate on lands proposed for acquisition by the refuge, so that portion does not represent a real increase in visitation or economic activity to the area. Of the increase, 2,985 out of the 3,569 wildlife viewing related visitor days were determined to be an actual increase in visitation and economic activity to the area that would generate total economic impacts of \$150,900 in local output, 2.4 jobs and \$53,000 in personal income. It is worth noting that refuge land acquisition maintains access for the public recreational activities listed above that otherwise cannot be guaranteed.

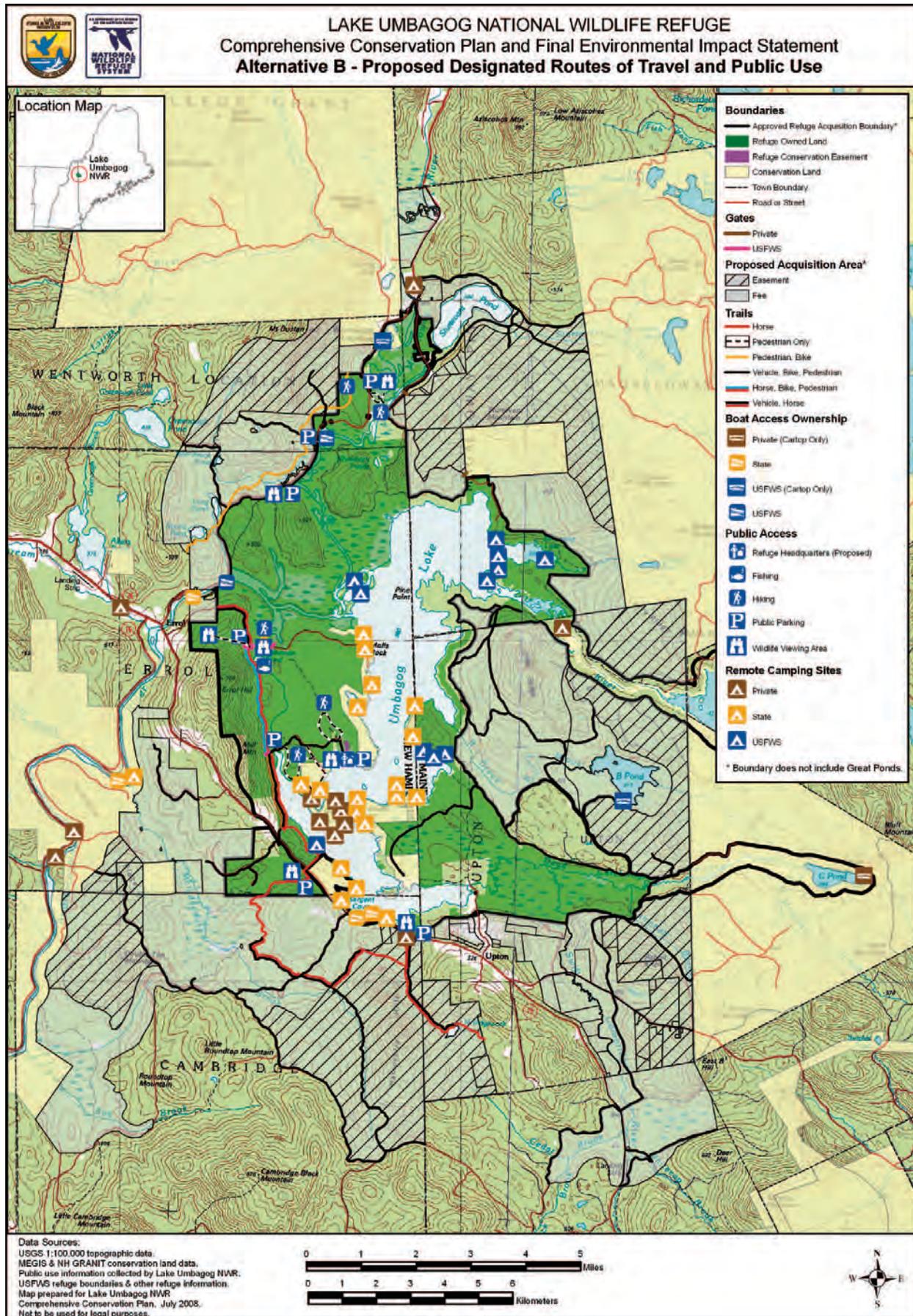
Now that the refuge owns a substantial amount of acreage, we have identified timber harvest quantities for refuge lands (saw timber, pulp, and fuel wood) based on a 15 percent management unit harvest in 15-year intervals. We based annual harvest quantities on two major assumptions: (1) we base harvest numbers on current refuge lands at current stocking volumes; and, (2) as we acquire land, the private owner would have harvested it before the sale. We expect the stocking volumes on those lands to be low enough to prevent additional harvesting within the 15-year planning horizon of the CCP. The private owner would realize all economic gains before Service ownership. Therefore, we expect no economic impacts associated with timber production for forestlands we acquire in the expansion area until they have grown harvestable again.

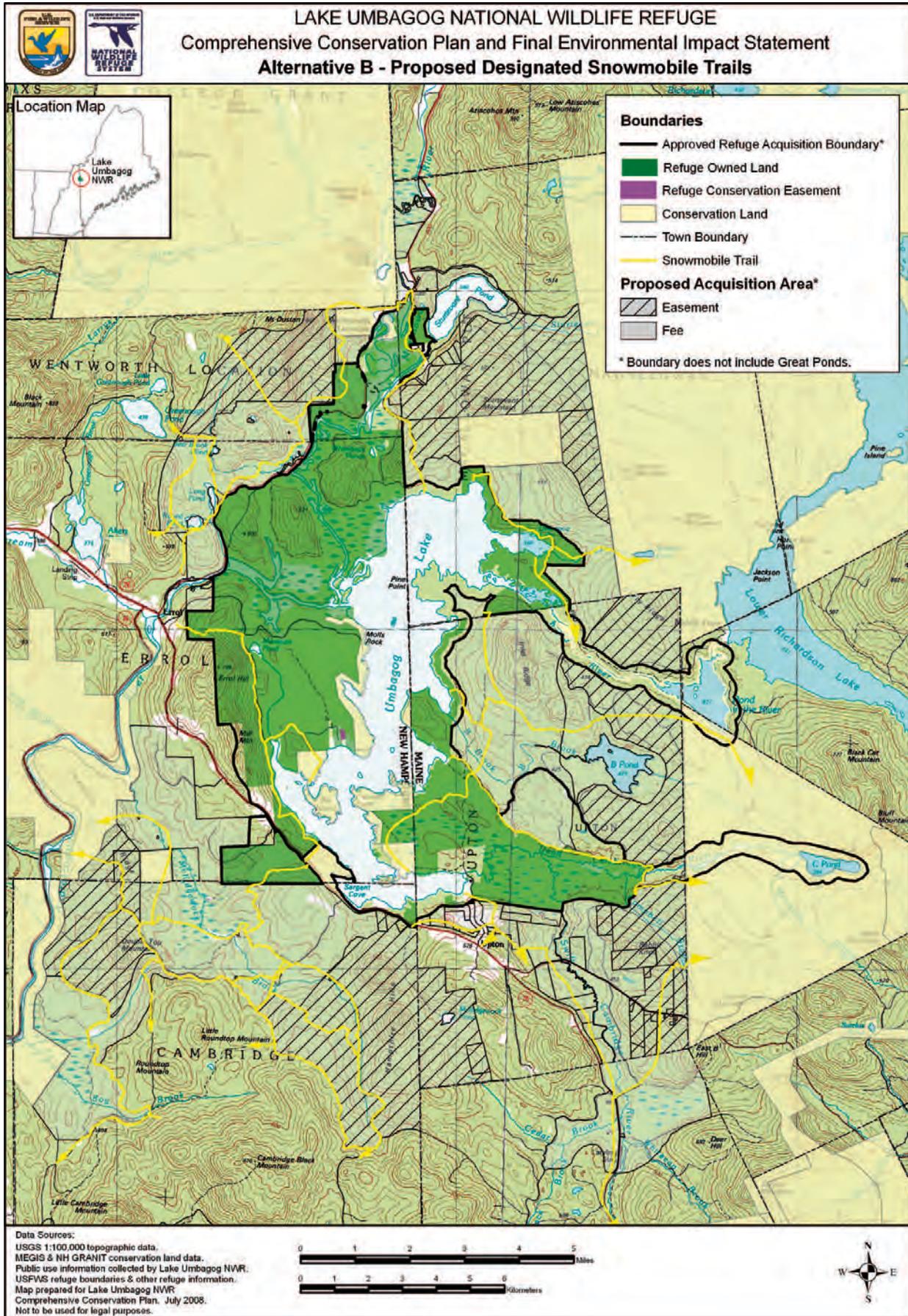
As for cultural resources, refuge ownership would increase their protection on any additional lands we acquire. Although we have not done a records or field inventory on those privately owned lands, we know of no recorded sites. The National Historic Preservation Act and Archaeological Resources Protection Act mandate that federal agencies protect cultural resources. Service ownership would protect known cultural sites against vandalism, and would protect yet unidentified or undeveloped cultural sites from disturbance or destruction. Our environmental education and interpretation programs will continue to promote public understanding and appreciation of the area's rich cultural resources.

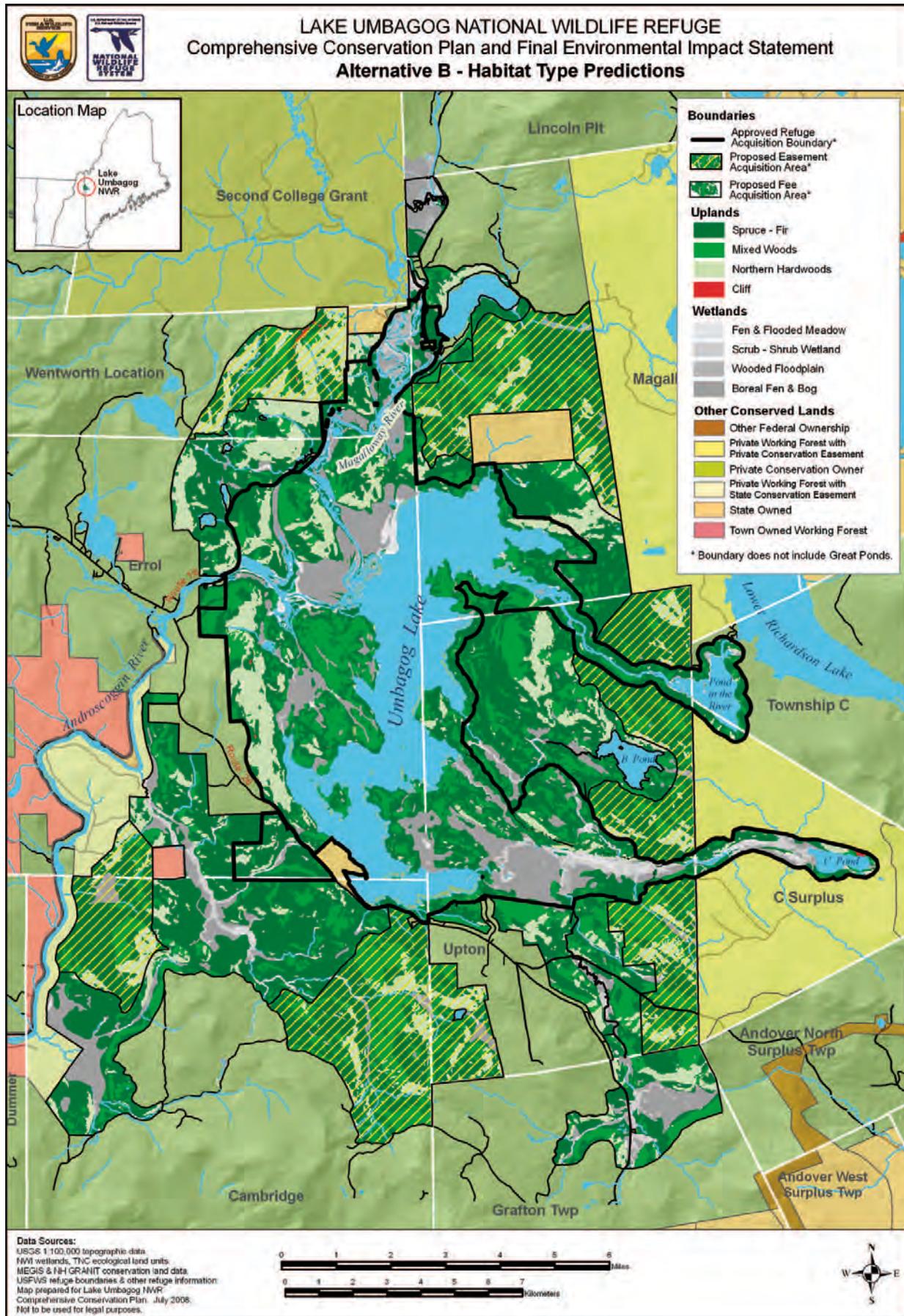












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Attachment A.1 Parcel Maps and Table

The following set of six maps (map tiles 1–6) show the present refuge and all parcels of land in our proposed acquisition area. The corresponding table (table A.8) lists each parcel, its tax parcel identification number, state and town, acreage, our recommended method and priority for its acquisition, and its size, estimated by our Geographic Information System. We based that information on town and county tax data.

We will acquire either full or partial interest in land parcels by purchase, when willing sellers make them available and funding is available. These are the definitions of each column head in that table.

LPP Number	Land Protection Plan map identification number
Parcel	Existing town or county tax parcel identification number
State	Maine or New Hampshire
Town	Town Name
Acquisition Method	Purchase in fee title or conservation easement (see discussion in Acquisition Method, above)
Acquisition Priority	<p>Priority 1 – Lands remaining unacquired within the original refuge acquisition boundary</p> <p>Priority 2 – Fee lands within the proposed expansion boundary</p> <p>Priority 3 – Conservation easement lands within the proposed expansion boundary</p>
Acres (GIS)	Acreage measured by our Geographic Information System (GIS); represents approximate acreage of portion of parcel within Fee or Easement boundary

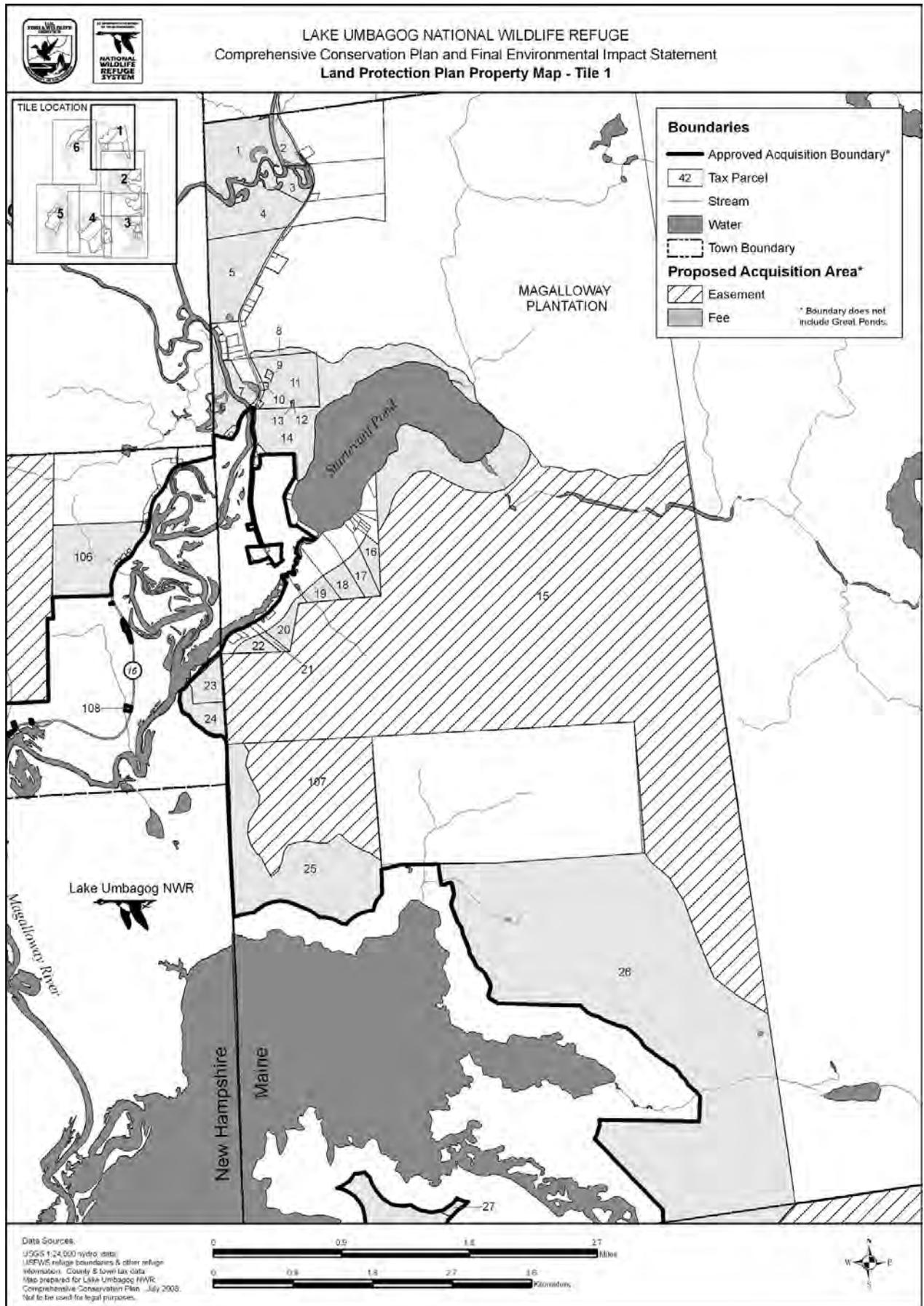
Table A.8. Umbagog NWR Land Protection Parcel List

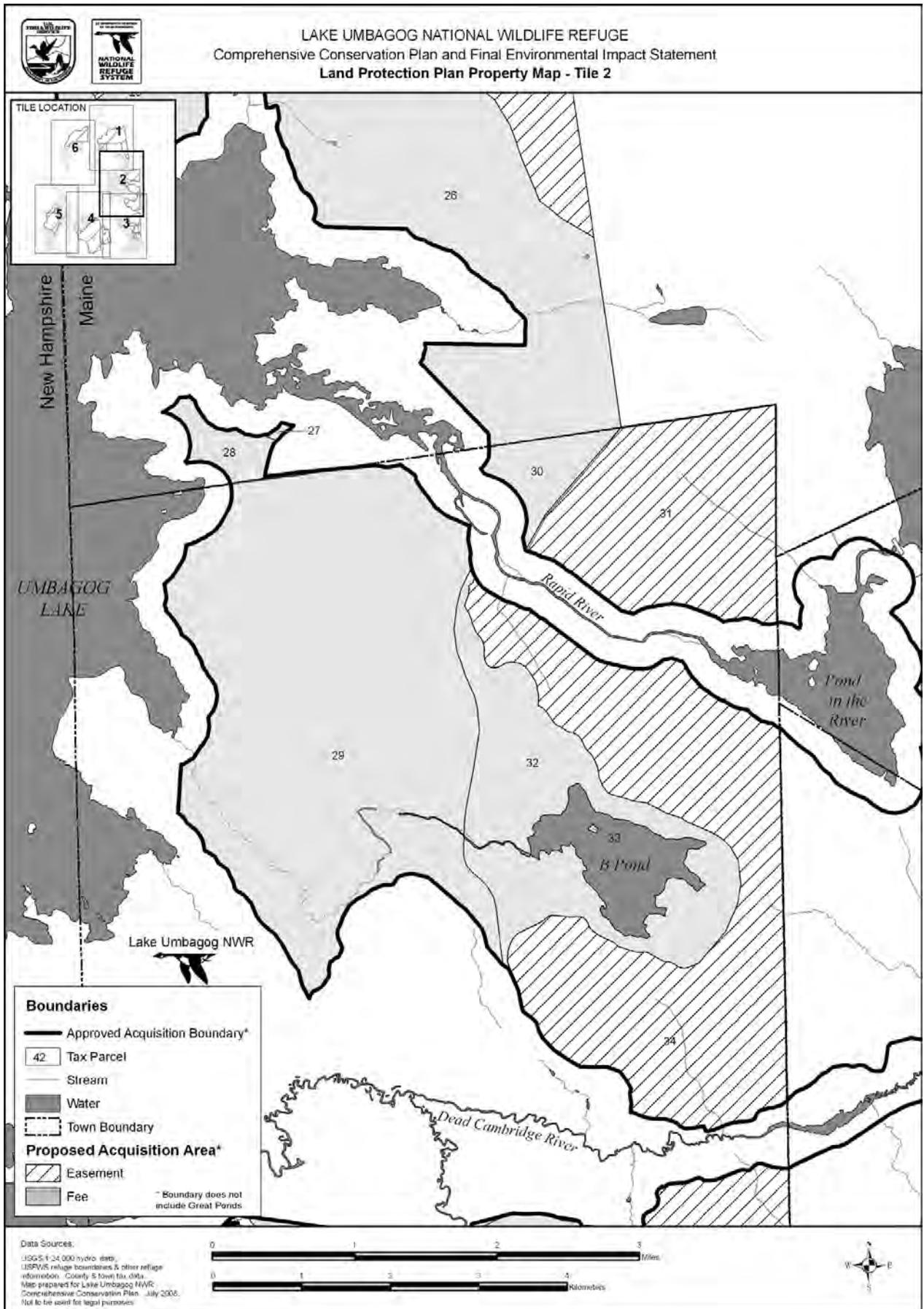
FWS NUMBER	PARCEL	STATE	TOWN	ACQUISITION METHOD	PRIORITY	ACRES (GIS)
1	1-31	ME	Magalloway	fee	2	145
2	1-30	ME	Magalloway	fee	2	30
3	1-27	ME	Magalloway	fee	2	22
4	1-24	ME	Magalloway	fee	2	113
5	1-16	ME	Magalloway	fee	2	137
6	2-42	ME	Magalloway	fee	2	47
7	2-49	ME	Magalloway	fee	2	21
8	6-1	ME	Magalloway	fee	2	10
9	2-52	ME	Magalloway	fee	2	2
10	2-51	ME	Magalloway	fee	2	1
11	2-50	ME	Magalloway	fee	2	96
12	2-53	ME	Magalloway	fee	2	0
13	2-53	ME	Magalloway	fee	2	0
14	6-1	ME	Magalloway	fee	2	427
15	6-1	ME	Magalloway	easement	3	3877
16	2-17	ME	Magalloway	fee	2	19
17	2-14	ME	Magalloway	fee	2	26
18	2-13	ME	Magalloway	fee	2	26
19	2-12	ME	Magalloway	fee	2	18
20	2-10	ME	Magalloway	fee	2	24
21	2-5	ME	Magalloway	fee	2	6
22	2-1	ME	Magalloway	fee	2	16
23	218-1	NH	Wentworth Location	fee	2	34
24	218-2	NH	Wentworth Location	fee	2	44
25	3-1	ME	Magalloway	fee	2	367
26	6-1	ME	Magalloway	fee	2	1954
27	4-9	ME	Magalloway	fee	2	7
28	4-14	ME	Magalloway	fee	2	132
29	000-7	ME	Upton	fee	2	3702
30	6-6	ME	Upton	fee	2	201
31	6-6	ME	Upton	easement	3	1249
32	000-8	ME	Upton	fee	2	1171
33	7-1	ME	Upton	fee	2	2
34	000-4	ME	Upton	easement	3	2529
35	2-81	ME	Upton	fee	2	21
36	2-84	ME	Upton	fee	2	55
37	2-98	ME	Upton	fee	2	41

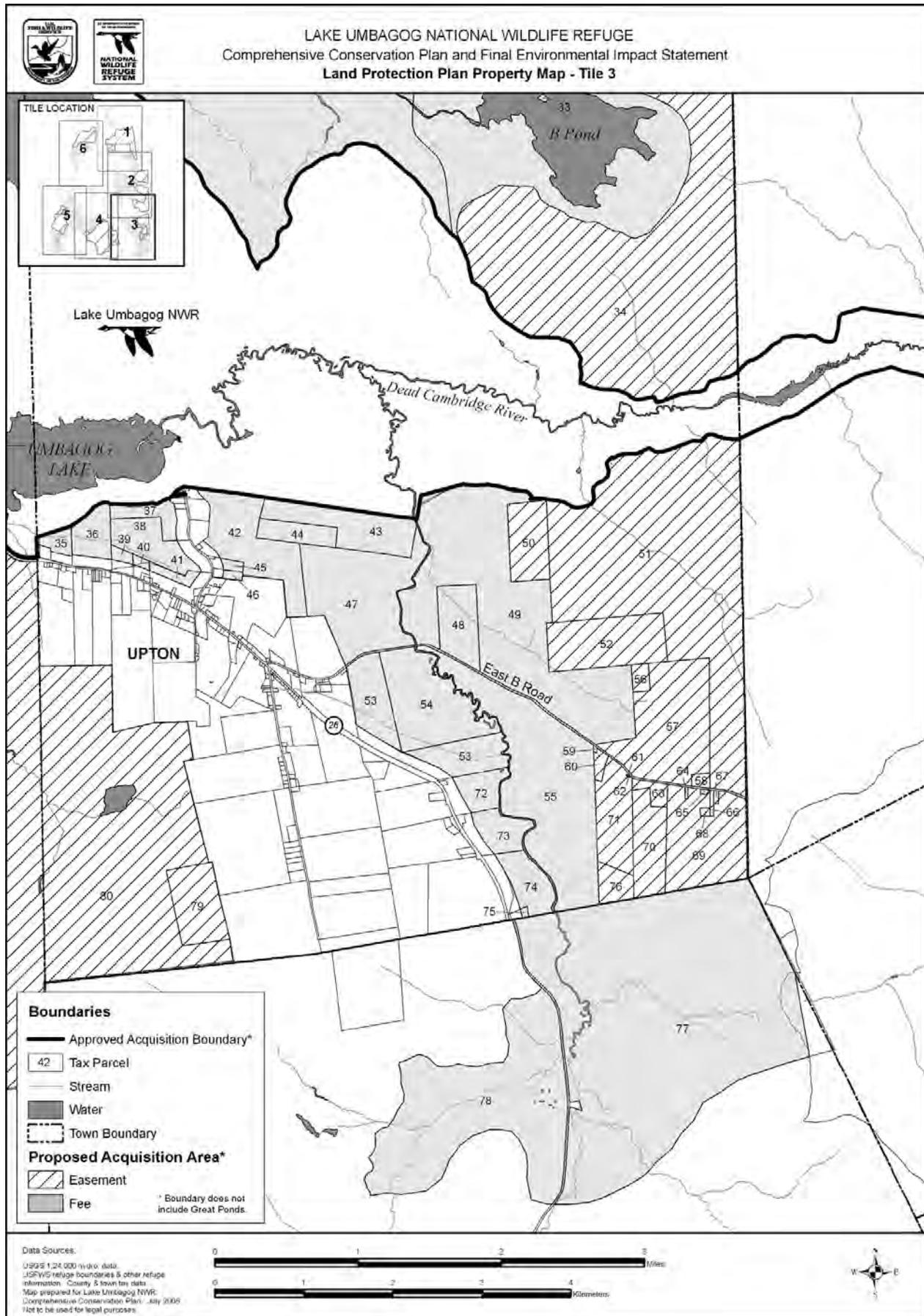
Table A.8

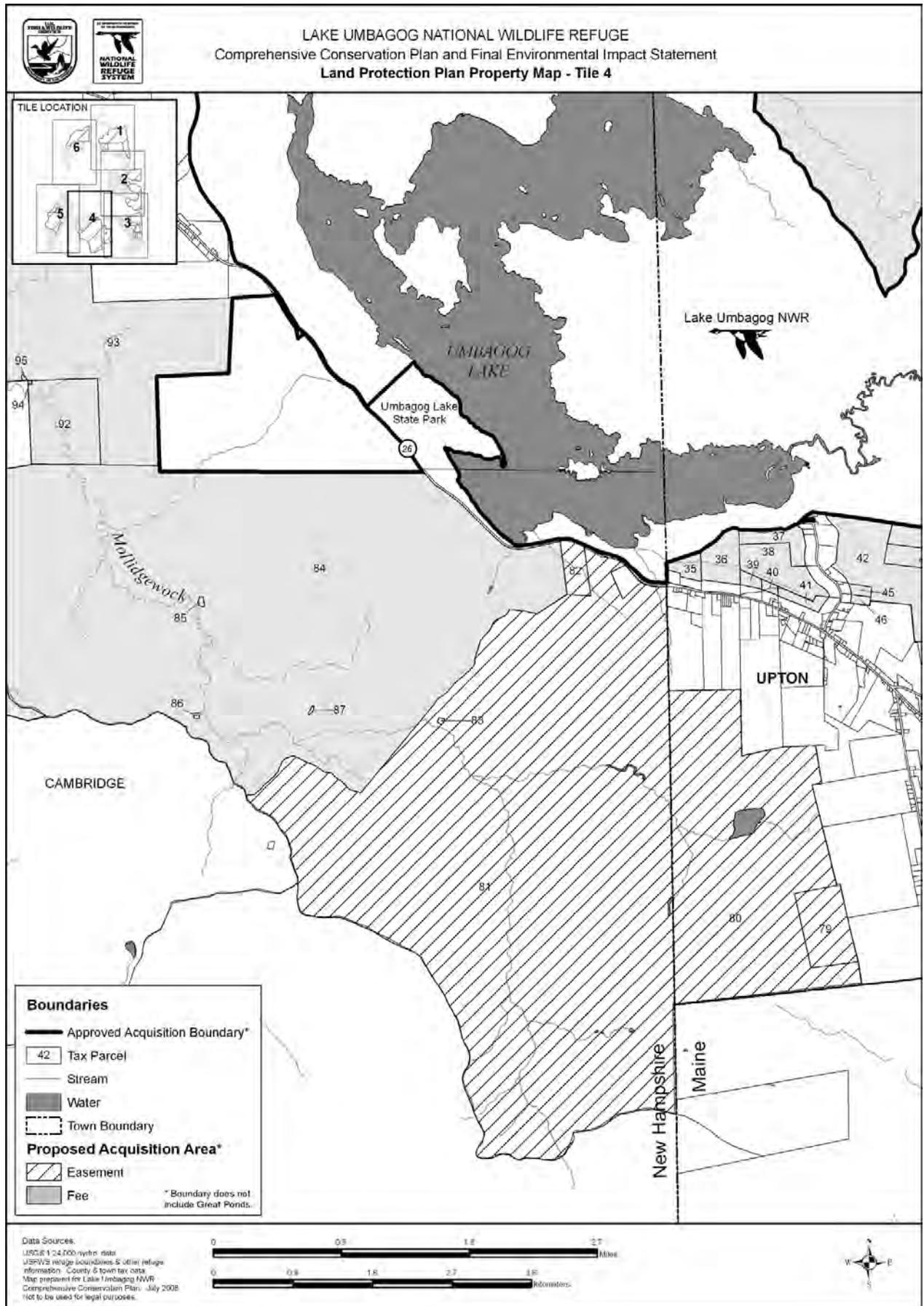
FWS NUMBER	PARCEL	STATE	TOWN	ACQUISITION METHOD	PRIORITY	ACRES (GIS)
38	2-97	ME	Upton	fee	2	85
39	2-85	ME	Upton	fee	2	9
40	2-85B	ME	Upton	fee	2	5
41	2-92	ME	Upton	fee	2	15
42	2-131	ME	Upton	fee	2	190
43	2-123	ME	Upton	fee	2	143
44	2-124	ME	Upton	fee	2	50
45	2-133	ME	Upton	fee	2	7
46	2-134	ME	Upton	fee	2	5
47	2-160	ME	Upton	fee	2	310
48	9-2	ME	Upton	fee	2	92
49	000-6	ME	Upton	fee	2	749
50	9-3	ME	Upton	easement	3	96
51	000-5	ME	Upton	easement	3	1177
52	9-4	ME	Upton	easement	3	181
53	10-20	ME	Upton	fee	2	179
54	10-19	ME	Upton	fee	2	220
55	10-18	ME	Upton	fee	2	515
56	10-1	ME	Upton	easement	3	15
57	10-2	ME	Upton	easement	3	289
58	10-3	ME	Upton	easement	3	8
59	10-17	ME	Upton	easement	3	1
60	10-16	ME	Upton	easement	3	10
61	10-14	ME	Upton	easement	3	0
62	10-13	ME	Upton	easement	3	0
63	10-10	ME	Upton	easement	3	18
64	10-9	ME	Upton	easement	3	1
65	10-8	ME	Upton	easement	3	1
66	10-5	ME	Upton	easement	3	3
67	10-4	ME	Upton	easement	3	2
68	10-6	ME	Upton	easement	3	3
69	10-7	ME	Upton	easement	3	232
70	10-11	ME	Upton	easement	3	102
71	10-15	ME	Upton	easement	3	114
72	10-22	ME	Upton	fee	2	49
73	10-24	ME	Upton	fee	2	56
74	10-25	ME	Upton	fee	2	70
75	10-26	ME	Upton	fee	2	2

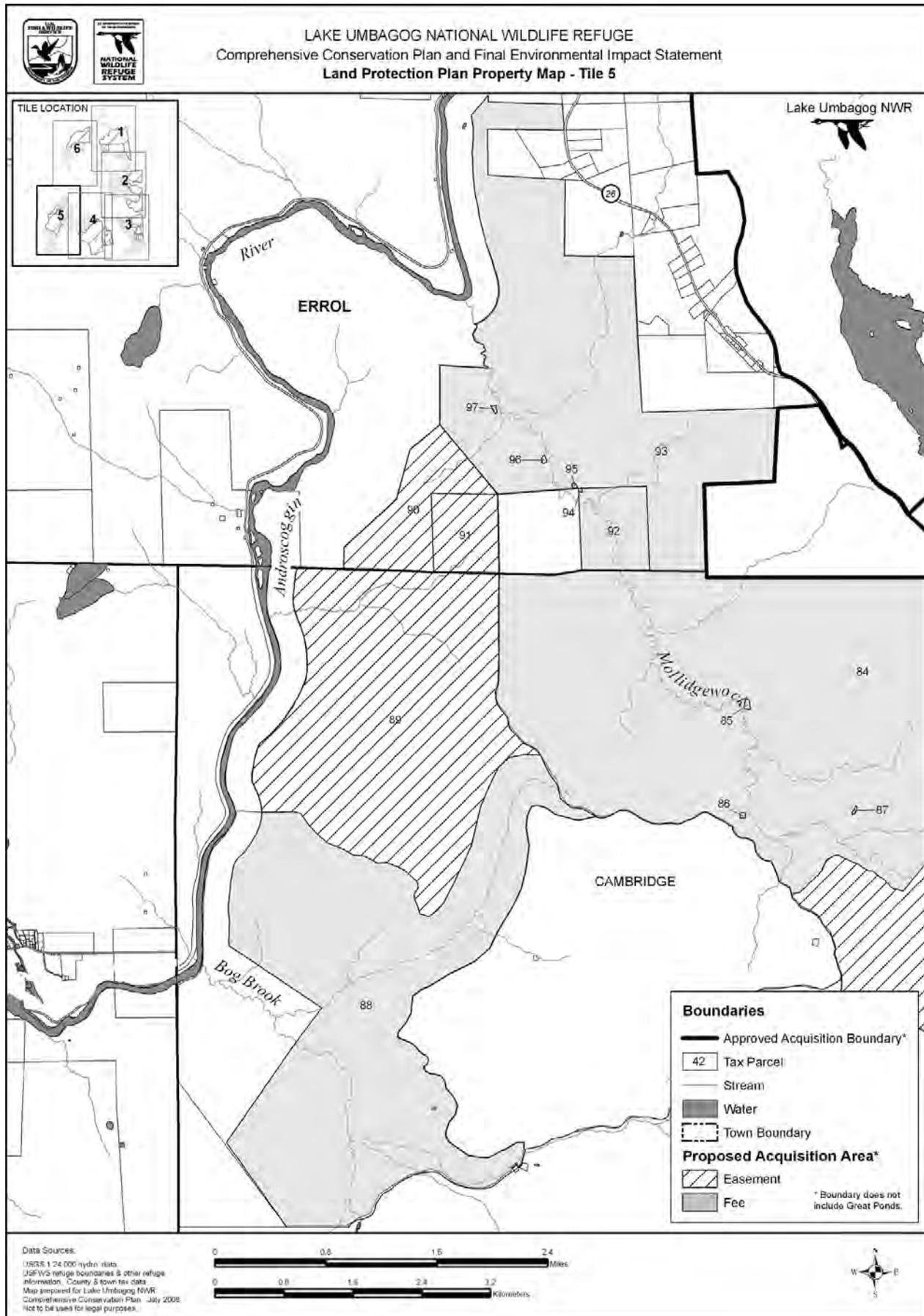
FWS NUMBER	PARCEL	STATE	TOWN	ACQUISITION METHOD	PRIORITY	ACRES (GIS)
76	10-12	ME	Upton	easement	3	37
77	OX00217	ME	Grafton Twp	fee	2	1798
78	OX00211	ME	Grafton Twp	fee	2	707
79	1-34	ME	Upton	easement	3	115
80	1-64	ME	Upton	easement	3	1276
81	1619-1.2	NH	Cambridge	easement	3	4643
82	206-34	NH	Cambridge	easement	3	4643
83	1619-2	NH	Cambridge	easement	3	1
84	1619-1.2	NH	Cambridge	fee	2	4533
85	1619-3	NH	Cambridge	fee	2	2
86	1619-5	NH	Cambridge	fee	2	1
87	1619-4	NH	Cambridge	fee	2	1
88	1619-1.2	NH	Cambridge	fee	2	2628
89	161-1.2	NH	Cambridge	easement	3	2048
90	r2-22	NH	Errol	easement	3	307
91	r3-5	NH	Errol	easement	3	174
92	r3-3	NH	Errol	fee	2	188
93	r2-22	NH	Errol	fee	2	2102
94	r3-2	NH	Errol	fee	2	0
95	r3-1	NH	Errol	fee	2	1
96	r3-6	NH	Errol	fee	2	1
97	r3-7	NH	Errol	fee	2	1
98	r15-2	NH	Errol	fee	2	132
99	r15-2	NH	Errol	fee	2	4
100	r15-2	NH	Errol	fee	2	16
101	r15-4	NH	Errol	fee	2	2131
102	1624-3	NH	Wentworth Location	fee	2	802
103	216-1	NH	Wentworth Location	fee	2	0
104	1624-3	NH	Wentworth Location	easement	3	2189
106	220-1	NH	Wentworth Location	fee	2	162
107	3-1	ME	Magalloway	easement	3	435
108	218-62	NH	Wentworth Location	fee	2	1
Lands Remaining Unacquired in Original Acquisition Boundary				fee	1	5255

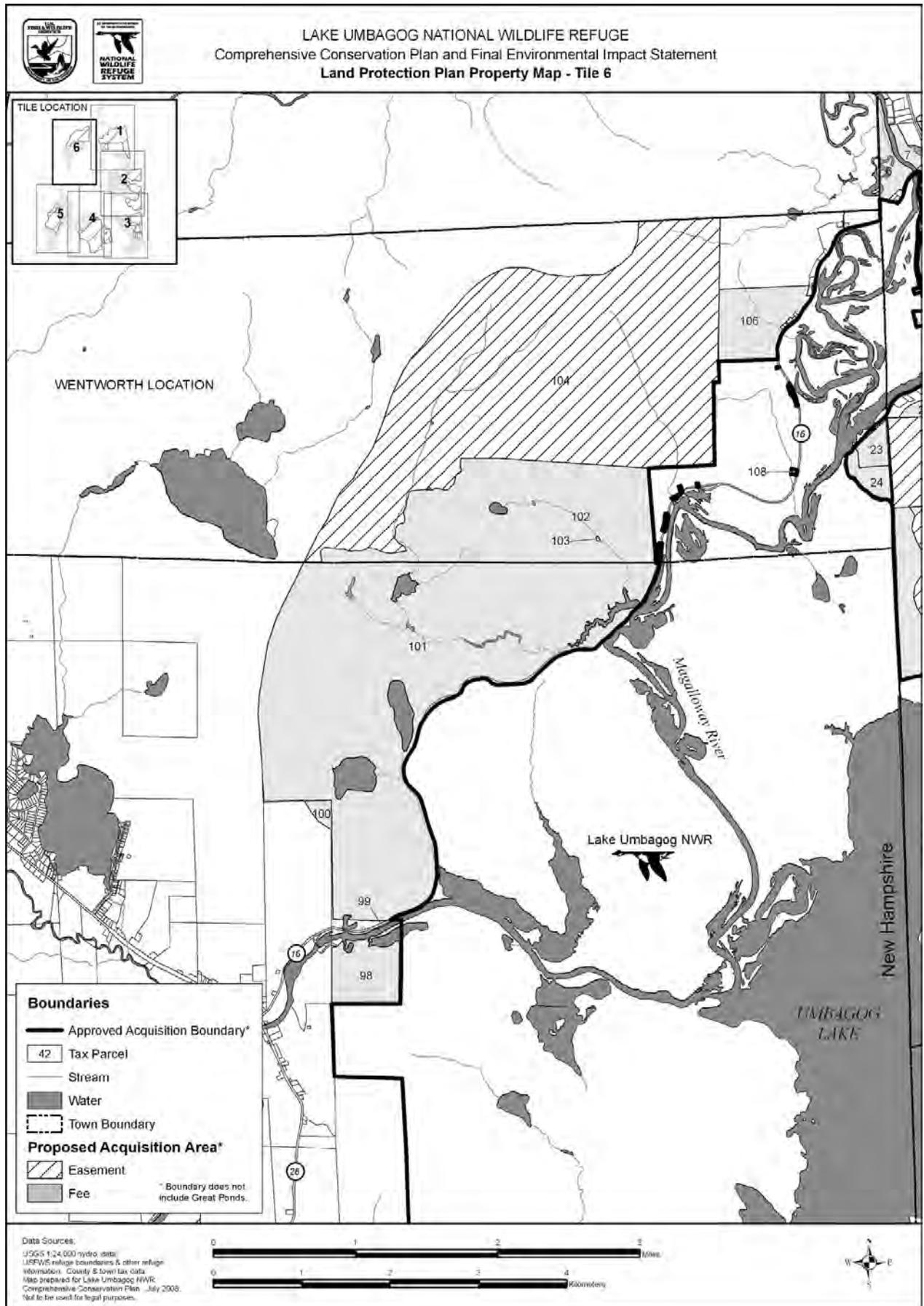












Appendix B



Ian Drew/USFWS

Sweet Meadow

Species and Habitats of Conservation Concern Known or Suspected on the Refuge

Species and Habitats of Conservation Concern Known or Suspected on the Refuge – Bird List

Species	Federal Legal Status ¹	NH Legal Status ¹	ME Legal Status ¹	NH Wildlife Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴	BCC 2002 ⁵	BCR 14: Atlantic Northern Forests	PIF ⁶	NAWCP ⁷	NAWMP ACJV ⁸	U.S. SCP ⁹	Breeding Status ¹⁰
Alder Flycatcher										IV				B
American Bittern				x	2	S3B			Moderate Priority	IV				B
American Black Duck				x	2				Highest Priority	IA		High Priority (B); Highest Priority (NB)		B
American Kestrel										IV				B
American Pipit		SC	E(PEB)	x			S3N							
American Redstart					3				High Priority					B
American Three-toed Woodpecker		T	SC	x	2	S1	S3			IV				
American Wigeon					3		S3N							
American Woodcock				x	2				Highest Priority	IA			4	B
Bald Eagle		E(PT)	T	x	2	S1	S4B		Moderate Priority	III				B
Baltimore Oriole					2									B
Bank Swallow					3				Moderate Priority					B
Barn Swallow					2				Moderate Priority					B
Barred Owl					2									B
Barrow's Goldeneye			SC(PT)		2		S2S3N		Highest Priority					
Bay-breasted Warbler				x	2			x	Highest Priority	IA				B
Black and White Warbler					2									B
Black-bellied Plover					3		S3S4N		High Priority				3	
Black Scoter					3		S3S4N		High Priority					

Species and Habitats of Conservation Concern Known or Suspected on the Refuge

Species	Federal Legal Status ¹	NH Legal Status ¹	ME Legal Status ¹	NH Wildlife Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴	BCC 2002 ⁵	BCR 14: Atlantic Northern Forests	PIF ⁶	NAWCP ⁷	NAWMP ACJV ⁸	U.S. SCP ⁹	Breeding Status ¹⁰
Black Tern			E		1						Moderate concern			
Black-backed Woodpecker					3	S3S4			Moderate Priority	IV				B
Black-billed Cuckoo					2				Moderate Priority					B
Blackburnian Warbler					2				Moderate Priority					B
Blackpoll Warbler					3			x	Moderate Priority	IV				
Black-throated Blue Warbler					2				High Priority	IIB				B
Black-throated Green Warbler					2				Moderate Priority					B
Blue-winged Teal					3	S3B				IV		Moderately High Priority		B
Bobolink					2				High Priority	IIA				B
Bohemian Waxwing							S3S4N							
Bonaparte's Gull											Moderate concern			
Boreal Chickadee									High Priority					B
Broad-winged Hawk					3									B
Brown Creeper									Moderate Priority					B
Brown Thrasher					2	S3				IV				B
Buffhead														
Canada Warbler				x	2			x	Highest Priority	IA		Moderately High (NB)		B
Cape May Warbler					2			x	High Priority	IIB				B

Species and Habitats of Conservation Concern Known or Suspected on the Refuge

Species	Federal Legal Status ¹	NH Legal Status ¹	ME Legal Status ¹	NH Wild-life Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴	BCC 2002 ⁵	BCR 14: Atlantic Northern Forests	PIF ⁶	NAWCP ⁷	NAWMP ACJV ⁸	U.S. SCP ⁹	Breeding Status ¹⁰
Chestnut-sided Warbler					2			x	High Priority	IIA				B
Chimney Swift					2				High Priority					B
Common Goldeneye					3	S3B			Moderate Priority					B
Common Loon		T		x	2	S3B			Moderate Priority	IV				B
Common Moorhen			SC(PT)	x	2	S2								
Common Nighthawk		T(PE)		x	2				High Priority	IV				
Common Raven										IV				B
Common Tern		E(PT)	SC	x	2	S1		x	High Priority	IIA				
Common Yellowthroat					3									B
Cooper's Hawk		T(PN)	SC	x	3	S2B	S3S4B			IV				B
Dunlin							S3N						3	
Eastern Kingbird					2									B
Eastern Meadowlark			SC	x	2					IV				
Eastern Wood-Pewee					3				High Priority	IV				B
Evening Grosbeak					3									B
Field Sparrow					2	S3	S3S4B							B
Fox Sparrow					3		S2N							
Golden Eagle		E	E	x	2	SHB	S1N			IV				
Gray Jay									Moderate Priority	IV				B
Great Black-backed Gull					3									
Great Blue Heron				x	2									B
Great Cormorant			SC(PTB)				S3N		Highest Priority		Moderate concern			
Great-crested Flycatcher					2									B

Species and Habitats of Conservation Concern Known or Suspected on the Refuge

Species	Federal Legal Status ¹	NH Legal Status ¹	ME Legal Status ¹	NH Wild-life Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴	BCC 2002 ⁵	BCR 14: Atlantic Northern Forests	PIF ⁶	NAWCP ⁷	NAWMP ACJV ⁸	U.S. SCP ⁹	Breeding Status ¹⁰
Greater Scaup					2		S3S4N		Moderate Priority			High (NB)		
Greater Yellowlegs					2								3	
Green Heron					3									
Green-winged Teal					3	S3B								B
Herring Gull					3				High Priority					B
Hooded Merganser												High Priority		B
Horned Grebe					3				Moderate Priority					
Horned Lark				x			S3S4N		Moderate Priority	IV				
Killdeer					3				Moderate Priority				3	B
Lapland Longspur							S2S3N							
Least Flycatcher					3									B
Least Sandpiper									Moderate Priority				3	
Lesser Scaup					3		S1S3N					High (NB)		
Lesser Yellowlegs													3	
Long-tailed Duck					3				Moderate Priority					
Mallard					3							High Priority (B); Moderate Priority (NB)		B
Marsh Wren					2	S3								B
Merlin					3	S3B	S3B							B
Morning Warbler										IV				B
Northern Flicker					2				Moderate Priority					B

Species	Federal Legal Status ¹	NH Legal Status ¹	ME Legal Status ¹	NH Wild-life Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴	BCC 2002 ⁵	BCR 14: Atlantic Northern Forests	PIF ⁶	NAWCP ⁷	NAWMP ACJV ⁸	U.S. SCP ⁹	Breeding Status ¹⁰
Northern Goshawk			SC	x	3	S3	S3?B		Moderate Priority	III				B
Northern Harrier		E		x	3	S2B			Moderate Priority	IV				B
Northern Parula					2				Moderate Priority	IIB				B
Northern Pintail					3		S3S4N					Moderate Priority (NB)		
Northern Saw-whet Owl										IV				B
Northern Shrike							S2S3N							
Olive-sided Flycatcher			SC		2			x	High Priority	IB				B
Osprey		T		x		S2B				IV				B
Ovenbird					3				Moderate Priority	IIB				B
Palm Warbler				x	3	S3B			Moderate Priority					B
Pectoral Sandpiper							S2S3N							
Peregrine Falcon		E(PT)	E(PEB)	x	1	S1	S2B	x	Moderate Priority	III				B
Pied-billed Grebe		E(PT)		x	2	S1B			Moderate Priority	IV				B
Pine Grosbeak									Moderate Priority					
Purple Finch				x	2				High Priority	IIA				B
Red Crossbill					2		S3S4B							B
Red-necked Grebe							S3S4N		High Priority					
Red-necked Phalarope			SC		2		S3S4N		Highest Priority				3	
Red-shouldered Hawk		SC		x	3	S3	S3N			III				

Species and Habitats of Conservation Concern Known or Suspected on the Refuge

Species	Federal Legal Status ¹	NH Legal Status ¹	ME Legal Status ¹	NH Wild-life Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴	BCC 2002 ⁵	BCR 14: Atlantic Northern Forests	PIF ⁶	NAWCP ⁷	NAWMP ACJV ⁸	U.S. SCP ⁹	Breeding Status ¹⁰
Red-throated Loon					3		S2S3N		Moderate Priority					
Ring-necked Duck					3	S3B			Moderate Priority	IIA				B
Rose-breasted Grosbeak					2				Moderate Priority					B
Rough-legged Hawk							S2S3N							
Ruffed Grouse				x	3				Moderate Priority					B
Rusty Blackbird		SC	SC	x	2	S2	S3S4B		High Priority	IA				B
Sanderling					2				Moderate Priority				4	
Savannah Sparrow										III				B
Scarlet Tanager					2									B
Semipalmated Plover									Moderate Priority					
Semipalmated Sandpiper				x	2				Highest Priority				3	
Sharp-shinned Hawk							S3S4B			IV				B
Short-billed Dowitcher					3				High Priority				4	
Snow Goose							S3N							
Solitary Sandpiper					3		S3S4N						4	
Sora					3	S3B				IV				B
Spruce Grouse				x	3	S3				IIA				B
Surf Scoter					3		S3S4N		Moderate Priority			Moderately High (NB)		
Tennessee Warbler					3									B
Tree Swallow					3									B
Turkey				x										
Veery				x	2				High Priority	IIA				B
Virginia Rail					3									B

Species	Federal Legal Status ¹	NH Legal Status ¹	ME Legal Status ¹	NH Wildlife Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴	BCC 2002 ⁵	BCR 14: Atlantic Northern Forests	PIF ⁶	NAWCP ⁷	NAWMP ACJV ⁸	U.S. SCP ⁹	Breeding Status ¹⁰
Whip-poor-will		SC		x	2				Moderate Priority	IV				
White-throated Sparrow					3									B
White-winged Crossbill					3		S3S4B							B
White-winged Scoter					3							Moderately High (NB)		
Wilson's Snipe													3	B
Wilson's Warbler						S3B	S3S4B			IV				B
Wood Duck									Moderate Priority			High Priority (B, NB)		B
Wood Thrush				x	2			x	Highest Priority	IB				B
Yellow-bellied Flycatcher									Moderate Priority					B
Yellow-bellied Sapsucker					2				High Priority					B
Yellow Warbler					3									B

¹Federal and State Legal Status Codes (under Federal & State Endangered Species Acts)

E = Federal or State Endangered T= Federal or State Threatened SC= State species of Special Concern (Administrative category without legal standing)
 PT = Proposed Threatened PE= Proposed Endangered PN= Proposed None PTB= Proposed threatened (breeding only) PEB= Proposed Endangered (breeding only)

²N. H. Wildlife Action Plan: Species of greatest conservation concern

³Maine's Comprehensive Wildlife Conservation Plan

Priority 1 (Very High) = High potential for state extirpation without management intervention and/or protection.
 Priority 2 (High) = Moderate to high potential for state extirpation without management intervention and/or protection.
 Priority 3 (Moderate) = Low to moderate potential for state extirpation, YET, there are some remaining concerns regarding restricted distribution, status, and/or extreme habitat specialization.

4New Hampshire and Maine Natural Heritage Inventory Rarity Ranks

- S1 = Critically imperiled.
- S2 = Imperiled
- S3 = Either very rare or uncommon, vulnerable
- S4 = Widespread, abundant, apparently secure
- S5= Secure
- SH = Historical.
- B = Breeding
- N = Non-breeding

Species included in table only if Srank in either state < S3

5Birds of Conservation Concern 2002 (Bird Conservation Region 14 List)

6Partners in Flight Bird Conservation Plan for Eastern Spruce-Hardwood Forest: Physiographic Area 28, 2003 Update Codes

- IA = High continental concern & high regional responsibility
- IB = High continental concern & low regional responsibility
- IIA = High regional concern
- IIIB = High regional responsibility
- III = Additional Federal listed
- IV = Additional State listed

7North American Waterbird Conservation Plan Categories of Conservation Concern

Highly Imperiled: includes all species with significant population declines and either low populations or some other high risk factor.

High Concern: Species that are not Highly Imperiled. Populations of these species are known or thought to be declining, and have some other known or potential threat as well.

Moderate Concern: Species that are not Highly Imperiled or High Concern. Populations of these species are either a) declining with moderate threats or distributions; b) Species included in table only if > moderate

8North American Waterfowl Management Plan, Atlantic Coast Joint Venture

- B = breeding species prioritization
- NB = non-breeding species prioritization

Conservation Tier Priorities = Highest, High, Moderately High, Moderate, Moderately Low, Low
Species included in table only if priority moderate or higher

9U.S. Shorebird Conservation Plan Codes

- 5 = Highly imperiled
 - 4 = Species of high concern
 - 3 = Species of moderate concern
 - 2 = Species of low concern
 - 1 = Species not at risk
- Species included in table only if >3

10Breeding Status
(B = Breeds on Refuge)

Species and Habitats of Conservation Concern Known or Suspected on the Refuge – Mammals List

Common Name	NH Legal Status ¹	ME Legal Status ¹	NH Wildlife Action Plan ²	Maine CWCS ³	NH Rarity Rank ⁴	ME Rarity Rank ⁴
American Beaver				3		
Big Brown Bat		SC		3		
Bobcat	SC		x			
Black Bear			x			
Hoary Bat	SC	SC	x	3		
Little Brown Bat		SC		3		
Marten	T		x		S2	S5
Moose			x			
Northern Long-eared Bat		SC	x	3		
White-tailed Deer			x			

¹New Hampshire and Maine State Legal Status (under State Endangered Species Act)

E = Endangered T = Threatened SC = Species of Special Concern (Administrative category without legal standing)

²New Hampshire Wildlife Action Plan: Species of greatest conservation concern (bear, moose, white-tailed deer in NH Big Game Plan)

³Maine's Comprehensive Wildlife Conservation Strategy

Priority 1 (Very High) = High potential for state extirpation without management intervention and/or protection.

Priority 2 (High) = Moderate to high potential for state extirpation without management intervention and/or protection.

Priority 3 (Moderate) = Low to moderate potential for state extirpation, there are some remaining concerns regarding restricted distribution, status, and/or extreme habitat specialization.

⁴New Hampshire and Maine Natural Heritage Inventory Rarity Ranks

S1 = Critically imperiled.

S2 = Imperiled

S3 = Either very rare or uncommon, vulnerable

S4 = Widespread, abundant, apparently secure

S5 = Secure

SH = Historical.

Species and Habitats of Conservation Concern Known or Suspected on the Refuge – Fish List

Common Name	NH Wildlife Action Plan ¹	Maine CWCS ²	NH Rarity Rank ³	ME Rarity Rank ³
Alewife	x			
American Eel	x	1		
Eastern Brook Trout	x	2		
Finescale Dace(?)	x		S2	S4
Lake Chub		3		
Lake Trout	x	1		
Lake Whitefish	x		S3	
Landlocked Atlantic Salmon	x	2		S3
Longnose sucker		2		
Northern Redbelly	x		S3	
Rainbow Smelt	x	2		
Slimy Sculpin	x	3		

? = occurrence at Lake Umbagog not confirmed in recent years

¹New Hampshire Wildlife Action Plan: [Species of greatest conservation concern](#)

²Maine's Comprehensive Wildlife Conservation Strategy

Priority 1 (Very High) = High potential for state extirpation without management intervention and/or protection.

Priority 2 (High) = Moderate to high potential for state extirpation without management intervention and/or protection.

Priority 3 (Moderate) = Low to moderate potential for state extirpation, there are some remaining concerns regarding restricted distribution, status, and/or extreme habitat specialization.

³New Hampshire and Maine Natural Heritage Inventory Rarity Ranks

S1 = Critically imperiled.

S2 = Imperiled

S3 = Either very rare or uncommon, vulnerable

S4 = Widespread, abundant, apparently secure

S5 = Secure

SH = Historical.

Species and Habitats of Conservation Concern Known or Suspected on the Refuge - Amphibians & Reptiles List

Common Name	NH Legal Status ¹	ME Legal Status ¹	NH Wildlife Action Plan ²	ME CWCS ³
<i>Amphibians</i>				
Blue-spotted Salamander			x	2
Mink Frog			x	
Northern Leopard Frog	SC	SC	x	3
Spring Salamander		SC		3
<i>Reptiles</i>				
Wood Turtle	SC	SC	x	2

¹State Legal Status (under State Endangered Species Acts)

E = Endangered T = Threatened SC = Species of Special Concern (Administrative category without legal standing)

²New Hampshire Wildlife Action Plan: Species of greatest conservation concern

³Maine's Comprehensive Wildlife Conservation Strategy

Priority 1 (Very High) = High potential for state extirpation without management intervention and/or protection.
 Priority 2 (High) = Moderate to high potential for state extirpation without management intervention and/or protection.
 Priority 3 (Moderate) = Low to moderate potential for state extirpation, there are some remaining concerns regarding restricted distribution, status, and/or extreme habitat specialization.

Species and Habitats of Conservation Concern Known or Suspected on the Refuge – Plant List

Common Name	NH Legal Status	ME Legal Status ¹	NH Rarity Rank ²	ME Rarity Rank ²
Dragon's mouth	T		S2	
Golden sedge	E		S1	
Creeping sedge	E		S1	
Meagre sedge	E		S1	
Hayden's sedge			S3	
Livid sedge	E	SC	S1	S2
Sparse-flower sedge	E	SC	S1	S2
American willow-herb			Ind	
Narrow-leaved cotton grass	E		S1	
Marsh horsetail	E		S1	
Hollow Joe pye weed	E	SC	S1	S2
Moor rush	E	SC	S1	S2
Broad-leaved twayblade	T		S2	
Heart-leaved twayblade	T		S2	
Water lobelia			S3	
Alternative-flowered water milfoil			S3	
Comb water milfoil			S3	
Slender waternymph			Ind	
Dwarf ragwort	T		S2	
Jack pine	E		S1	
Knotty pondweed	E		S1	
Budding pondweed	E		SH	
Pink wintergreen	E		S1	
Arrow-head (wapato)	E		SH	
Bog willow			S3	
Satin willow	E		S1	
Podgrass			S3	
Torrey's threesquare			S3	
Stiffly hairy goldenrod			Ind	
Pursh's goldenrod			Ind	

Common Name	NH Legal Status	ME Legal Status	NH Rarity Rank ¹	NH Rarity Rank ²	ME Rarity Rank ²
Branched bur-reed	E			SH	
Contorted sphagnum peat moss	T			S2	
Peat moss				S3	
Floating bladdersort				A3	
Canada violet		E			S1

? = occurrence at Lake Umbagog not confirmed

¹State Legal Status (Under State Endangered Species Acts)

E = Endangered

T = Threatened

SC = Special Concern (Administrative category without legal standing)

²New Hampshire & Maine Natural Heritage Inventory State Rarity Ranks

S1 = critically imperiled

S2 = imperiled

S3= rare or uncommon; state watch species

S4 = widespread & apparently secure

S5 = widespread & secure

SH = historical

Ind = indeterminate (thought to be rare but in need of more information to determine status)

Species and Habitats of Conservation Concern Known or Suspected on the Refuge - Plant Communities List

New Hampshire Community Type	NH Natural Heritage Inventory State Rarity Rank	ME Natural Areas Program State Rarity Rank	Maine Community Type
Acidic northern white cedar swamp	S1	S4	Northern white cedar swamp
Leather-leaf - black spruce bog	S3		
Circumneutral-calcareous flark	S1	S2	Shrubby cinquefoil-sedge circumneutral fen
Lowland spruce-fir forest	S3	S4	Spruce-fir broom-moss forest
Northern hardwood-black ash-conifer swamp	S2		
Northern white cedar- balsam fir swamp	S2	S4	North white cedar swamp
Silver maple-false nettle-sensitive fern floodplain forest	S2		
Large cranberry-short sedge moss lawn (sphagnum pulchrum-quagmire sedge variant)	S3		
Sphagnum rubellum- small cranberry moss carpet	S3		
Large cranberry-short sedge moss lawn (sphagnum torreyanum variant)	S3		
Northern white cedar circumneutral string	S1	S4	Northern white cedar woodland fen
Highbush blueberry-mountain holly wooded fen	S3S4		

New Hampshire Heritage Inventory Exemplary Natural Communities: Open Peatland Complexes

Site
Borderline Fen (patterned fen system)
Harper's Meadow (medium level fen system)
Leonard Marsh (medium level fen system)
Sweat Meadows (medium level fen system)
Whaleback Ponds (poor level fen/bog system)

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Appendix C

Tom Meredith/USFWS



Canoes on Magalloway River

Findings of Appropriateness and Compatibility Determinations

COMPATIBILITY DETERMINATION

USE: Wildlife observation, photography, environmental education and interpretation

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901 (b))
2. Migratory Bird Conservation Act (16 U.S.C. 715d)
3. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4))
4. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1))

PURPOSE(S) FOR WHICH ESTABLISHED:

1. ...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions...16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)
2. ...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds... 16 U.S.C. 715d (Migratory Bird Conservation Act)
3. ...for the development, advancement, management, conservation, and protection of fish and wildlife resources... 16 U.S.C. 742f(a)(4) (Fish and Wildlife Act of 1956)
4. ...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The uses are wildlife observation, photography, environmental education and interpretation. Wildlife observation, photography, environmental education and interpretation are priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(b) Where would the use be conducted?

Wildlife observation, photography, environmental education and interpretation will be allowed to occur on designated roads, trails, pull-outs, overlooks, and visitor contact facilities throughout the refuge. Excellent opportunities for wildlife observation and photography will also occur on the water. The refuge will provide a self guided river trail on the Magalloway River, and photography opportunities in waterfowl blinds. Remote camp sites will also provide and facilitate unique opportunities for wildlife observation. The exact location of where a particular activity, event, or workshop would be allowed to occur will be at the discretion of the Refuge Manager.

(c) When would the use be conducted?

Wildlife observation, photography, environmental education and interpretation will be allowed on the refuge daily, year-round, from half-hour before sunrise to half-hour after sunset, unless a conflict with a management activity or an extenuating circumstance necessitates deviating from these procedures. Closures for snow and ice storms or other events affecting human safety, or for nesting season and other sensitive times of the year are examples that would require these uses to be temporarily suspended.

(d) How would the use be conducted?

Wildlife observation, photography, environmental education and interpretation will be allowed to occur on the refuge. As an integral part of this program we will incorporate the strategies found in Goal 4, Alternative B (Proposed Action) of the Draft CCP/EA for Lake Umbagog National Wildlife Refuge.

Refuge staff will be responsible for on-site evaluations to resolve public use issues; monitor and evaluate impacts; maintain boundaries and signs; meet with adjacent landowners and interested public; recruit volunteers; prepare and present interpretive programs; expand existing trails and overlooks; revise leaflets and develop new ones; install kiosks and continually update kiosk information; develop needed signage; organize and conduct Refuge events; conduct regularly scheduled programs for the public; display off-site exhibits at local events; develop relationships with media; provide law enforcement and respond immediately to public inquiries.

(e) Why is this use being proposed?

Wildlife observation, wildlife photography, environmental education, and interpretation are Priority Public Uses as defined by The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57), and if compatible, are to receive enhanced consideration over other general public uses.

These uses will be conducted to provide compatible educational and recreational opportunities for visitors to enjoy the resource and to gain understanding and appreciation for fish and wildlife, wildlands ecology and the relationships of plant and animal populations within the ecosystem, and wildlife management. They will enhance the public's understanding of natural resource management programs and ecological concepts to enable the public to better understand the problems facing our wildlife/wildlands resources, to realize what effect the public has on wildlife resources, to learn about the Service's role in conservation, to better understand the biological facts upon which Service

management programs are based, and to foster an appreciation as to why wildlife and wildlands are important to them. The authorization of these uses will produce a more informed public, and advocates for Service programs. Likewise, these uses will provide opportunities for visitors to observe and learn about wildlife and wildlands at their own pace in an unstructured environment and to observe wildlife habitats firsthand.

Professional and amateur photographers will also be provided opportunities to photograph wildlife in their natural habitats. Photographic opportunities obviously will result in increased publicity and advocacy for Service programs. These uses will also provide wholesome, safe, outdoor recreation in a scenic setting, with the realization that those who come strictly for recreational enjoyment will be enticed to participate in the more educational facets of the public use program, and can then become advocates for the refuge and the Service.

Availability of Resources:

Sufficient Refuge resources in terms of personnel and budget are available to administer wildlife observation, photography, environmental education and interpretations.

Cost Breakdown

The following is the list of costs to the refuge required to administer and manage the refuge programs for wildlife observation and photography and environmental education and interpretation.

<i>Routine maintenance:</i>	\$4,000	annually. This is the expected cost to maintain the Refuge public use facilities including the maintenance of parking areas, removal of garbage, and restroom maintenance.
<i>Install kiosks:</i>	\$3,000	one time expense.
<i>Trail expansion:</i>	\$10,000	one time expense.
<i>Supplies and materials:</i>	\$5,000	this includes signs, kiosks information, nesting site closure signs, interpretative and Refuge brochures.
<i>Monitoring:</i>	\$2,000	annually. To be carried out in cooperation with the States.
<i>Law Enforcement:</i>	\$3,000	annually for a Refuge Officer.
<i>Total:</i>	\$27,000	(\$9,000 annually)

Anticipated Impacts of the Use:

Wildlife Observation and Photography, Environmental Education, and Interpretation can produce positive or negative impacts to the wildlife resource. A positive effect of public involvement in these priority public uses will be a better appreciation and more complete understanding of the wildlife and habitats associated with northern New England ecosystems. This can translate into more widespread and stronger support for the Refuge, the National Wildlife Refuge System and the Service.

Direct Effects

Direct impacts are those where the activity has an immediate affect on wildlife. Anticipated direct impacts include disturbance to wildlife by human presence which typically results in a temporary displacement without long-term effects to individuals or populations. Some species will avoid areas frequented by people, such as developed trails and the buildings, while others seem unaffected or even drawn to human presence. Overall, effects should not be significant because the majority of the Refuge will experience minimal public use.

Indirect Effects

People can be vectors for invasive plants when seeds or other propagules are moved from one area to another. Once established, invasives can out compete native plants, thereby altering habitats and indirectly impacting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring, and when necessary, treatment. Staff will work to eradicate the invasives and educate the visiting public.

Cumulative Effects

Effects that are minor when considered alone, but collectively may be important are known as cumulative effects. The principal concerns are repeated disruptions of nesting, foraging, and/or resting birds.

Based on observations and knowledge of the areas involved, there is no evidence that cumulatively, the proposed wildlife-dependent uses will have an unacceptable effect on the wildlife resource. The landowners have allowed the public to engage in these wildlife-dependent uses for many years without discernable negative effects. Although a substantial increase in the cumulative impacts from public use is not expected in the near term, it will be important for Refuge staff to monitor use and respond, if necessary, to conserve the existing high quality wildlife resources.

The Refuge will close areas including campsites with active loon, bald eagle, and osprey nests to mitigate impact. Opening land to public use can often result in litter, vandalism, and other illegal activities on Refuge lands. Refuge staff will monitor and evaluate the effects of public use in collaboration with volunteers in an effort to discern and respond to unacceptable impacts to wildlife and habitats.

No additional effects from Wildlife Observation, Wildlife Photography, Environmental Education or Interpretation are anticipated. Therefore, allowing these uses on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP. These uses fully benefit Goal 4 “Provide high quality wildlife dependent activities” and Goal 5 “Develop high quality interpretative opportunities, and facilitate environmental education, to promote an understanding and appreciation for the conservation of fish and wildlife and their habitats, as well as the role of the refuge in the Northern Forest” as described in the CCP. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment:

As part of the CCP process for Lake Umbagog NWR this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EA. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility:

Public use areas will be monitored at various times of the year to assess wildlife disturbance. We would include information about proper etiquette and the effects of human impacts on habitat and wildlife resources in Refuge publications and flyers. Periodic law enforcement will ensure compliance with regulations and area closures, and would discourage vandalism.

To limit wildlife disturbance caused by human intrusion, we may limit access on some trails, coves and backwaters during the fall migration period to protect feeding and resting habitat for migratory birds. During nesting, we may offer only guided tours or we may close areas for certain periods of time. All other times of the year, the refuge would be open to visitors during normal Refuge hours.

We will ensure resource protection and visitor safety by providing full-time or seasonal law enforcement personnel to patrol areas and educate people about appropriate activities on Refuge lands.

Justification:

Wildlife Observation, Photography, Environmental Education and Interpretation are priority wildlife-dependent uses for the National Wildlife Refuge System through which the public can develop an appreciation for fish and wildlife (Executive Order 12996, March 25, 1996 and The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57)).

The Service's policy is to provide expanded opportunities for these uses when compatible and consistent with sound fish and wildlife management and ensure that they receive enhanced attention during planning and management. Allowing wildlife observation, photography, environmental education and interpretation on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP. In fact, allowing these uses supports those goals and objectives and the Service's Mission.

Signature: Refuge Manager: Paul F. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Legier 1-9-09
(Signature and Date)

Mandatory 15-year Reevaluation Date: January 9, 2024

COMPATIBILITY DETERMINATION

USE: Public hunting

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901 (b))
2. Migratory Bird Conservation Act (16 U.S.C. 715d)
3. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4))
4. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1))

PURPOSE(S) FOR WHICH ESTABLISHED:

1. ...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions... 16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)
2. ...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds... 16 U.S.C. 715d (Migratory Bird Conservation Act)
3. ...for the development, advancement, management, conservation, and protection of fish and wildlife resources... 16 U.S.C. 742f(a)(4) (Fish and Wildlife Act of 1956)
4. ...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

a. What is the use? Is the use a priority public use?

Primary Use: The use is public hunting. Hunting is a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16

U.S.C. 668dd-668ee), and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

Supporting Uses: Boating (motorized or non-motorized), camping

b. Where would the use be conducted?

Lake Umbagog National Wildlife Refuge has been open to public hunting of big game, upland game and migratory game birds, for all Service-owned lands within the Refuge boundary, since 2000 (U.S. Fish & Wildlife Service, Lake Umbagog National Wildlife Refuge Hunting Management Plan, 2000). This plan was amended through a separate NEPA process in 2007 (U.S. Fish and Wildlife Service, 2007a and U.S Fish and Wildlife Service, 2007b). Hunting occurs on all Refuge-owned land. Lands open to hunting include upland deciduous, coniferous, and mixed forests, as well as refuge wetlands and peatlands. These habitats support big game such as moose, deer, and black bear, as well as snowshoe hare, ruffed grouse, woodcock, and waterfowl, among others.

c. When would the use be conducted?

Hunting will be conducted during State (New Hampshire and Maine) big game, upland game, and waterfowl hunting seasons, and will be in accordance with Federal and State regulations. In cooperation with the States, hunt season dates and bag limits may be adjusted in the future as needed to achieve balanced wildlife population levels within carrying capacities.

d. How would the use be conducted?

The use will continue to be conducted according to State and Federal regulations. Federal regulations contained in 50 CFR pertaining to the National Wildlife Refuge System Administration Act, as well as existing Refuge-specific regulations will apply. No change from the existing hunt program is proposed. However, the Refuge Manager may, upon annual review of the hunting program, impose further restrictions on hunting activity, recommend that the Refuge be closed to hunting, or further liberalize hunting regulations within the limits of State law. Restrictions would occur if hunting becomes inconsistent with other higher priority Refuge programs or endangers Refuge resources or public safety.

Six permanent blinds are available to waterfowl hunters by reservation. Blinds are located in Leonard Pond, Sweat Meadows, and along nearby areas or backwaters of the Magalloway and Androscoggin Rivers. Waterfowl hunters will receive highest priority for blind reservations, during hunting season. Boat access for waterfowl and other types of hunting is available at a number of locations in the vicinity of Umbagog, both on and off refuge ownership. Waterfowl hunters will also be given preference for campsite reservations near blinds during hunting season, where possible. Hunting pressure appears to be moderate at the present time and visitor conflicts have not been significant. All areas of the refuge will therefore remain open to the public during hunting season. Should visitor conflicts increase significantly, then the refuge may have to consider zoning for different uses, or area closures.

Why is the use being proposed?

Hunting is one of the priority uses outlined by Congress in the Refuge Improvement Act of 1997. The Service supports and encourages priority uses on National Wildlife Refuge lands where appropriate and compatible. Hunting is used in some instances to manage wildlife populations. Hunting is also a

traditional form of wildlife-oriented recreation that can be accommodated on many National Wildlife Refuge System lands.

Availability of Resources:

Additional fiscal resources to conduct this activity would be minimal as the Refuge has been open to hunting since 2000 and since hunting will occur under State regulations and not as a Refuge regulated hunting program. Costs associated with administration of this use include:

<i>Preparation of Annual Hunt Plan:</i>	\$500	GS-12 Deputy Refuge Manager/ GS-12 Wildlife Biologist
<i>Preparation and Updating of Refuge Hunting Brochure:</i>	\$200	GS-12 Deputy Refuge Manager
<i>Managing Waterfowl Blind Reservation System/ Dispensing Information during year:</i>	\$500	GS-6 Administrative Assistant
<i>Law Enforcement/Outreach:</i>	\$3,000	GS-9 Refuge Officer
<i>Maintenance of Waterfowl Blinds:</i>	\$500	WG7 Maintenance Worker
<i>Total:</i>	\$4,700	

Anticipated Impacts of this use:

The following indented section is excerpted from the 2007 Amended Environmental Assessment on Public Hunting at Lake Umbagog National Wildlife Refuge (U.S. Fish and Wildlife Service, 2007a). For more specific impacts including a cumulative impacts analysis please refer to that document.

Hunting pressure on the refuge is presently considered moderate for northern New Hampshire and western Maine. Allowing hunting would not displace most hunters who have traditionally hunted in this area. Refuge-specific regulations might impact some bear, coyote, hare, fisher, bobcat and raccoon hunters, inducing them to hunt outside the refuge. However, hunting pressure on these refuge species is generally low, so it is anticipated that approximately the same number of hunters who have traditionally used the area would use the refuge under this alternative. It is possible that a slight increase in hunter numbers could occur, due to the publicity and expectations associated with the designation and posting of the area as a national wildlife refuge open to hunting. It is not anticipated that this increase will be significant enough to warrant restrictions on the numbers of hunters permitted to use the area, or substantially increase traffic congestion in the area.

Biological impacts would be minimal, since there would be no significant change from previous, long-standing hunting activities and use of the land.

The physical effects of hunting on refuge vegetation should be limited, due to refuge-specific regulations restricting use of ATV's, off-road travel, permanent stands and blinds, camping, and fires. Indirect effects of hunting on vegetation might be neutral or positive, if habitat quality was maintained at its present or an improved level.

Given Federal regulations restricting hunting over bait, harvest of bear on the refuge would possibly decrease. Coyote and raccoon harvest would probably decrease, as a result of refuge-specific regulations which prohibit hunting at night.

Bobcat hunting will decrease on the Maine portion of the refuge, due to refuge-specific regulations which prohibit bobcat hunting. Bobcat are currently protected under New Hampshire hunting regulations, but can still be legally hunted and trapped in Maine. With respect to big game (moose and white-tailed deer) and other upland game species, hunters would not be displaced from the area and would be allowed to continue hunting as they have in the past, in accordance with State and Federal regulations.

There is no anticipated impact on endangered or threatened species on the refuge. Hunting of all legally hunted species has occurred on and around the refuge for many years with no known adverse impact on any listed species. The hunting program at Lake Umbagog NWR is not expected to have an adverse impact on lynx or gray wolves. Since neither lynx nor gray wolves have been documented on the refuge in recent times, it is highly unlikely that the hunting program will affect these species. In addition, any lynx that do occur on the refuge will be protected by refuge-specific regulations prohibiting bobcat hunting and night hunting.

Waterfowl species known to breed on the Refuge include: American black duck, ring-necked duck, wood duck, common goldeneye, hooded merganser, common merganser, mallard, blue-winged teal, and Canada goose. The Umbagog area supports high concentrations of American black ducks. Many additional species such as scoter, scaup, American wigeon, northern pintail, bufflehead, green-winged teal, and snow goose frequent the Refuge during migration. The primary waterfowl species taken by hunters are mallard, American black duck, green-winged teal, wood duck, and hooded merganser. In addition to waterfowl, major game species sought on the Refuge include: white-tailed deer, moose, snowshoe hare, and upland game birds, including ruffed grouse and woodcock. Since the refuge has been open to hunting since 2000 and hunting occurred in the Umbagog area for many years prior to the creation of the refuge, no additional impacts are anticipated. Some wildlife disturbance of non-target species and impacts to vegetation may occur. However, these impacts should be minimal since hunting pressure is moderate, occurs outside the breeding season, and Refuge-specific regulations prohibit the use of ATVs and permanent tree stands, which are most likely to significantly damage vegetation. Hunting also helps to keep populations of browsing species such as deer and moose within the carrying capacity of the habitat, thus reducing excessive damage to vegetation caused by over-browsing, and maintaining understory habitat for other species.

Currently, all areas of the Refuge are open to hunters and other members of the public during hunting season. Although conflicts between user groups can occur, this does not appear to be a significant issue at present use levels. In the future, the Refuge may need to manage public use to minimize conflicts and insure public safety, should significant conflicts become evident. This may include public outreach and using zoning to separate user groups.

Additional discussion of hunting impacts may be found in the Refuge’s Final Environmental Assessment: Public Hunting (U.S. Fish and Wildlife Service, 2000a and 2007a). In summary, hunting on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP. Hunting fully supports and benefits Goal 4 “Provide high quality wildlife dependent activities” of the CCP by providing opportunities for this wildlife-dependent use. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment:

As part of the CCP process for Lake Umbagog NWR this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EA. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible With the Following Stipulations

Stipulations Necessary to Insure Compatibility:

The hunt program will be managed in accordance with Federal and State regulations. The program will be reviewed annually to ensure that wildlife and habitat management goals are achieved and that the program is providing a safe, high quality hunting experience for participants. Stipulations are based on the refuge’s Final Amended Environmental Assessment: Public Hunting (U.S. Fish and Wildlife Service, 2007a), and Hunting Management Plan (U.S. Fish and Wildlife Service, 2007b), and 2006-2007 Refuge-specific regulations submitted for publication in Title 50, Code of Federal Regulations (50CFR32.48 & 50CFR32.38) in 2006 and listed below:

New Hampshire

A. Hunting of Migratory Game Birds. We allow hunting of ducks, geese, snipe, coot, American crow, and woodcock in accordance with State of New Hampshire regulations, seasons, and bag limits subject to the following conditions:

1. Hunters must wear two articles of hunter-orange clothing or material. One article must be a solid-colored hunter orange hat; the other must cover a major portion of the torso, such as a jacket, vest, coat or poncho and must be a minimum of 50% hunter orange in color (ie. orange camouflage) except when hunting waterfowl.
2. We will provide permanent refuge blinds at various locations on the refuge that are available for public use by reservation. Hunters may make reservations for particular blinds up to 1 year in advance, for a maximum of 1 week, running Monday through Sunday during the hunting season. Hunters may make reservations for additional weeks up to 1 week in advance, on a space-available basis. We allow no other permanent blinds. Hunters must remove temporary blinds, boats, and decoys from the refuge following each day’s hunt.

3. You may use trained dogs to assist in hunting and retrieval of harvested birds. Hunting with pointing, flushing and retrieving dogs on the refuge will be subject to the following regulations:
 - i. We prohibit training during or outside of dog season.
 - ii. We allow a maximum of two dogs per hunter.
 - iii. Hunters must pick up all dogs the same day they release them.
4. We open the refuge to hunting during the hours stipulated under each State’s hunting regulations but no longer than from ½ hour before legal sunrise to ½ hour after legal sunset. We close the refuge to night hunting. Hunters will unload all firearms outside of legal hunting hours.
5. We prohibit the use of all-terrain vehicles (ATVs or OHRVs) on refuge land.

B. Upland Game Hunting. We allow hunting of coyote, fox, raccoon, woodchuck, red and eastern gray squirrel, porcupine, skunk, snowshoe hare, ring-necked pheasant, northern bobwhite and ruffed grouse in accordance with State of New Hampshire regulations, seasons, and bag limits subject to the following conditions:

1. We prohibit night hunting.
2. You may possess only approved nontoxic shot when hunting with a shotgun.
3. We open the refuge to hunting during the hours stipulated under each State’s hunting regulations, but no longer than from ½ hour before legal sunrise to ½ hour after legal sunset. We close the refuge to night hunting. Hunters must unload all firearms, and nock no arrows outside of legal hunting hours.
4. We prohibit the use of all-terrain vehicles (ATVs or OHRVs) on refuge land.
5. Each hunter must wear two articles of hunter-orange clothing or material. One article must be a solid-colored hunter orange hat; the other must cover a major portion of the torso, such as a jacket, vest, coat or poncho and must be a minimum of 50% hunter orange in color (ie. orange camouflage).
6. We allow hunting of snowshoe hare, ring-necked pheasant, ruffed grouse, and northern bobwhite with trained dogs during State hunting seasons. Hunting with pointing, flushing or trailing dogs on the refuge will be subject to the following regulations:
 - i. We prohibit training during or outside of dog season.
 - ii. We allow a maximum of two dogs per hunter.
 - iii. Hunters must pick up all dogs the same day they release them.

C. Big Game Hunting. We allow hunting of bear, coyote, white-tailed deer, and moose in accordance with State of New Hampshire regulations, seasons, and bag limits. The following conditions also apply:

1. We open the refuge to hunting during the hours stipulated under each State’s hunting regulations but no longer than from ½ hour before legal sunrise to ½ hour after legal sunset. We close the refuge to night hunting. Hunters will unload all firearms and nock no arrows outside of legal hunting hours.
2. We allow bear and coyote hunting with dogs during State hunting seasons. Hunting with trailing dogs on the refuge will be subject to the following regulations:
 - i. Hunters must equip all dogs used to hunt bear and coyote with working radio-telemetry collars and hunters must be in possession of a working radio-telemetry receiver that can detect and track the frequencies of all collars used.
 - ii. We prohibit training during or outside of dog season for bear and coyote.
 - iii. We allow a maximum of four dogs per hunter.
 - iv. Hunters must pick up all dogs the same day they release them.
3. We allow pre-hunt scouting of the refuge; however, we prohibit dogs and firearms during pre-hunt scouting.
4. Each hunter must wear two articles of hunter-orange clothing or material. One article must be a solid-colored hunter orange hat; the other must cover a major portion of the torso, such as a jacket, vest, coat or poncho and must be a minimum of 50% hunter orange in color (ie. orange camouflage).
5. We prohibit the use of all-terrain vehicles (ATVs or OHRVs) on refuge land.
6. We allow temporary tree stands and blinds, but hunters must remove them by the end of the season. We prohibit nails, screws, or screw-in climbing pegs to build or access a stand or blind.

Maine

A. Hunting of Migratory Game Birds. We allow hunting of ducks, geese, snipe, coot, rails, American crow, and woodcock in accordance with State of Maine regulations, seasons, and bag limits subject to the following conditions:

1. Hunters must wear two articles of hunter-orange clothing or material. One article must be a solid-colored hunter orange hat; the other must cover a major portion of the torso, such as a jacket, vest, coat or poncho and must be a minimum of 50% hunter orange in color (ie. orange camouflage) except when hunting waterfowl.
2. We will provide permanent refuge blinds at various locations on the refuge that are available for public use by reservation. Hunters may make reservations for particular blinds up to 1 year in advance, for a maximum of 1 week, running Monday through Sunday during the hunting season. Hunters may make reservations for additional weeks up to 1 week in advance, on a space-available basis. We allow no other permanent blinds. Hunters must remove temporary blinds, boats, and decoys from the refuge following each day’s hunt.

3. You may use trained dogs to assist in hunting and retrieval of harvested birds. Hunting with pointing, flushing and retrieving dogs on the refuge will be subject to the following regulations:
 - i. We prohibit training during or outside of dog season.
 - ii. We allow a maximum of two dogs per hunter.
 - iii. Hunters must pick up all dogs the same day they release them.
4. We open the refuge to hunting during the hours stipulated under each State’s hunting regulations but no longer than from ½ hour before legal sunrise to ½ hour after legal sunset. We close the refuge to night hunting. Hunters will unload all firearms outside of legal hunting hours.
5. We prohibit the use of all-terrain vehicles (ATVs or OHRVs) on refuge land.

B. Upland Game Hunting. We allow hunting of fox, raccoon, woodchuck, red and eastern gray squirrel, porcupine, skunk, snowshoe hare, ring-necked pheasant, ruffed grouse and northern bobwhite in accordance with State of Maine regulations, seasons, and bag limits subject to the following conditions:

1. We prohibit night hunting.
2. You may possess only approved nontoxic shot when hunting with a shotgun.
3. We open the refuge to hunting during the hours stipulated under each State’s hunting regulations, but no longer than from ½ hour before legal sunrise to ½ hour after legal sunset. We close the refuge to night hunting. Hunters must unload all firearms, and nock no arrows outside of legal hunting hours.
4. We prohibit the use of all-terrain vehicles (ATVs or OHRVs) on refuge land.
5. Each hunter must wear two articles of hunter-orange clothing or material in accordance with Maine law. One article must be a solid-colored hunter orange hat; the other must cover a major portion of the torso, such as a jacket, vest, coat or poncho and must be a minimum of 50% hunter orange in color (ie. orange camouflage).
6. We allow hunting of snowshoe hare, ring-necked pheasant, ruffed grouse, and northern bobwhite with trained dogs during State hunting seasons. Hunting with pointing, flushing or trailing dogs on the refuge will be subject to the following regulations:
 - i. We prohibit training during or outside of dog season.
 - ii. We allow a maximum of two dogs per hunter.
 - iii. Hunters must pick up all dogs the same day they release them.

C. Big Game Hunting. We allow hunting of bear, white-tailed deer, coyote and moose in accordance with State of Maine regulations, seasons, and bag limits. The following conditions also apply:

1. We open the refuge to hunting during the hours stipulated under each State’s hunting regulations but no longer than from ½ hour before legal sunrise to ½ hour after legal sunset. We close the refuge to night hunting. Hunters will unload all firearms and nock no arrows outside of legal hunting hours.
2. We allow bear and coyote hunting with dogs during State hunting seasons. Hunting with trailing dogs on the refuge will be subject to the following regulations:
 - i. Hunters must equip all dogs used to hunt bear or coyote with working radio-telemetry collars and hunters must be in possession of a working radio-telemetry receiver that can detect and track the frequencies of all collars used.
 - ii. We prohibit training during or outside of dog season for bear or coyote.
 - iii. We allow a maximum of four dogs per hunter.
 - iv. Hunters must pick up all dogs the same day they release them.
3. We allow prehunt scouting of the refuge; however, we prohibit dogs and firearms during prehunt scouting.
4. Each hunter must wear two articles of hunter-orange clothing or material. One article must be a solid-colored hunter orange hat; the other must cover a major portion of the torso, such as a jacket, vest, coat or poncho and must be a minimum of 50% hunter orange in color (ie. orange camouflage).
5. We prohibit the use of all-terrain vehicles (ATVs or OHRVs) on refuge land.
6. We allow temporary tree stands and blinds, but hunters must remove them by the end of the season. We prohibit nails, screws, or screw-in climbing pegs to build or access a stand or blind.

Justification:

Hunting is a wildlife-dependent priority public use with minimal impact on refuge resources. It is consistent with the purposes for which the Refuge was established, the Service policy on hunting, the National Wildlife Refuge system Improvement Act of 1997, and the broad management objectives of the National Wildlife Refuge System.

Hunting on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul J. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leger 1-9-09
(Signature and Date)

Mandatory 15-year Re-evaluation Date: January 9, 2024

References

U.S. Fish and Wildlife Service. 1997. National Wildlife Refuge Improvement Act 1997. Public Law 105-57-Oct. 9, 1997.

U.S. Fish and Wildlife Service. 2000a. Final environmental assessment: public hunting at Lake Umbagog National Wildlife Refuge, Coos Co., NH, Oxford Co., ME. U.S. Fish and Wildlife Service, Lake Umbagog National Wildlife Refuge, Errol, NH.

U.S. Fish and Wildlife Service. 2000b. Hunting management plan: Lake Umbagog National Wildlife Refuge. U.S. Fish and Wildlife Service, Lake Umbagog National Wildlife Refuge, Errol, NH.

U.S. Fish and Wildlife Service. 2007a. Final Amended Environmental Assessment: Public Hunting. Lake Umbagog National Wildlife Refuge, Errol, NH.

U.S. Fish and Wildlife Service. 2007b. Hunting Management Plan. Lake Umbagog National Wildlife Refuge, Errol, NH.

COMPATIBILITY DETERMINATION

USE: Public fishing

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITIES:

1. Emergency Wetlands Resources Act of 1986 [16 U.S.C. 3901 (b)]
2. Migratory Bird Conservation Act [16 U.S.C. 715d]
3. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)]
4. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(b)(1)]

PURPOSE(S) FOR WHICH ESTABLISHED:

1. “the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions.” 16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)
2. “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” 16 U.S.C. 715d (Migratory Bird Conservation Act)
3. “for the development, advancement, management, conservation, and protection of fish and wildlife resources...” 16 U.S.C. 742f(a)(4) (Fish and Wildlife Act of 1956)
4. “for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...” 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The use is public fishing, a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(b) Where would the use be conducted?

The use would be conducted at all Refuge bodies of water that are open to fishing including lakes, ponds, streams, and rivers.

(c) When would the use be conducted?

The use would be conducted during the hours and in the seasons specified in the fishing regulations of the States of New Hampshire and Maine.

(d) How would the use be conducted?

The use would be conducted under New Hampshire and Maine state fishing regulations for open water and ice-fishing, with some additional restrictions to protect fish, wildlife, and habitat, and to reduce potential public use conflicts. This compatibility determination applies primarily to shoreline fishing and fishing access from refuge lands. The open waters of great ponds (ponds > 10 ac.), Umbagog Lake, and associated major rivers, fall under state regulation, and for the most part, are accessible from State boat launches.

Boat access for fishing and other activities is available at a number of locations both on and off refuge ownership near Umbagog Lake (see Map C-1). Two State of New Hampshire public boat launches provide boat-trailer access to the upper Androscoggin River, Magalloway River, mouth of the Rapid River, and Umbagog Lake. One launch is located upstream of the Errol Dam, and the other is at the southern end of Umbagog Lake. We provide additional boat-trailer access is also provided on Refuge-owned land at the Steamer Diamond landing on the Androscoggin River and at Refuge headquarters on the Magalloway River. A car-top boat launch is located at Parson's landing on the Magalloway River, just south of the refuge headquarters.

The public occasionally fishes and launches canoes at other sites along Route 16, where it crosses or approaches the Magalloway and Androscoggin rivers. At some of those sites, inadequate parking or poor visibility for oncoming traffic present safety hazards. The Refuge is constructing an additional car-top boat launch in Wentworth Location on the Magalloway River, north of Refuge headquarters. The new site will provide parking, a dock, and restroom. After completing that new site, we will close all other boat access points along Route 16, excluding the access at the refuge headquarters and the Steamer Diamond Landing (see Map C-1).

We are also planning to improve and maintain the trail to Mountain Pond from the Mt. Pond Road, widening it enough to be ADA-compliant, if possible, and surfacing it with native materials and wood chips. Pedestrians will be able to use that 0.1 mile-long spur trail to access fishing at Mountain Pond, most readily by the Mt. Pond Trail, from a parking area 0.49 miles to the north. Neither the Mt. Pond Rd. Trail nor the Mt. Pond spur trail will be open to motorized vehicles outside of the snowmobile season. We will provide an 8 ft x 16 ft floating ADA-accessible fishing dock on the west shore of the pond. Fishing will not be permitted from any other locations along the Mt. Pond shoreline.

Fishing will be permitted according to state regulations at Mountain Pond and from the shore of Whaleback Ponds, Brown Owl Pond, the Swift and Dead Cambridge Rivers, and refuge streams. None of those has developed boat launches, and we are not proposing to add boat launches to any of them. Access will be by foot only. However, fishing from boats will be permitted at these locations, where practical.

Fishing from shore near residential areas will not be permitted, to minimize conflicts with adjacent private landowners and lessees. In addition, fishing from shore on islands will not be permitted, with the exception of state-run campsites. Due to the sensitive nature of island shoreline habitat and the

fact that a boat is necessary to access islands, the need to get out of a boat and fish from the shoreline of an island would not outweigh the habitat impact concerns. Fishing derbies and tournaments from refuge lands would be considered on a case-by-case basis under a special use permit.

Motorized boats may be launched from the Steamer Diamond Landing on the Androscoggin River and the refuge headquarters on the Magalloway River. All boats launching or landing on refuge lands must follow state boating regulations and be registered, if applicable, with the appropriate state.

The public must inspect motor boats and trailers and clean them of aquatic invasive species before launching at refuge sites. That cleaning should take place on dry ground well away from the water. Exotic, nuisance plants or animals on boats, trailers, diving equipment, or in bait buckets can disrupt aquatic ecosystems and negatively impact native fish and plant species. Umbagog Lake and its associated rivers appear to be relatively free of aquatic invasive plants, and cleaning of boats, trailers, and other equipment will help keep them that way. Signs, education, and periodic enforcement will remind the public of these regulations.

Unauthorized introductions of both non-native and native fish can also significantly disrupt aquatic ecosystems and destroy natural fisheries. No fish of any species may be introduced onto the refuge without appropriate state and refuge permits. This includes unused bait fish and eggs.

Loons, waterfowl, and other water birds may die of lead poisoning from swallowing lead fishing tackle. Many ducks and other water birds find food at the bottom of lakes. Most of these birds also swallow small stones and grit to aid in grinding their food. Some of the grit may contain lead from angling equipment. They may also ingest lead and other fishing tackle by consuming bait fish or escaped fish that still have fishing tackle attached. An investigation into causes of mortality in loons in New England found 52 percent of loon carcasses submitted to Tufts University Wildlife Clinic had died of lead poisoning from ingestion of lead sinkers (Pokras and Chafel. 1992). Although other studies have reported lower percentages, lead toxicity clearly poses a significant threat to wildlife. During the past few years, three loon carcasses have been recovered from Umbagog Lake that showed signs of poisoning from lead sinkers. Because of that threat, no lead fishing sinkers or jigs will be permitted on the refuge. Discarded tackle and line also pose a threat to fish-eating birds, including eagles, osprey, and loons.

At the discretion of the refuge manager, some areas may be seasonally, temporarily, or permanently closed to fishing, if wildlife or habitat impacts or user conflicts become an issue. In cooperation with state fisheries biologists, we may manipulate the fisheries and/ or habitat to promote or improve the fishery resource, if warranted. That may include changing fishing regulations (season dates, creel limits, methods of take), adjusting water levels (in cooperation with FPLE), introducing or removing fish barriers, manipulating instream or streambank habitat, designating riparian buffers, limiting timber harvest in the vicinity of streams, lakes, or ponds, etc.

(e) Why is the use being proposed?

The use is being proposed by the Refuge to accommodate one of the priority public uses of the Refuge System. We have the opportunity to provide public fishing opportunities in a manner and location that will offer high quality, wildlife-dependent recreation and maintain the level of current fish and wildlife values.

Availability of Resources:

Facilities or materials needed to support fishing include a new car-top boat launch off Route 16, north of the Refuge office. This launch has been paid for out of FY 2005 funds and no additional construction expenses. Existing launch sites that have been scheduled for closure may require the installation of closure signs, as well as some site restoration work. Additional resources and staff time will be required to maintain the new boat launch, put down gravel and maintain the Steamer Diamond launch, close off wildlife nesting sites to the public, provide interpretative materials and brochures on fishing, and monitor the fishery, public use, and impacts of fishing. A refuge officer and the States of New Hampshire and Maine will provide law enforcement.

We do not anticipate charging fees for fishing. We estimate these costs associated with this use.

<i>Routine maintenance:</i>	\$7,000	annually. This is the expected cost to maintain the three public boat launches (Magalloway River, refuge office, and Steamer Diamond landing) and includes putting down gravel; maintenance of parking areas, removal of garbage, and restroom maintenance at the Magalloway River launch.
<i>Supplies and materials:</i>	\$6,000.	This includes signage for closed launch sites, buoys and nesting site closure signs, interpretative brochures, fishing regulations brochures (produced in house)
<i>Monitoring:</i>	\$3,000	annually, to be carried out in cooperation with the States.
<i>Law Enforcement:</i>	\$3,000	annually for a Refuge Officer.
<i>Total:</i>	\$19,000	

Anticipated Impacts of the Use:

Although New Hampshire Fish and Game, Maine Department of Inland Fisheries and Wildlife, and the Service have carried out several limited surveys of Umbagog Lake, the Magalloway River, Rapid and Dead Cambridge rivers and C Pond, no comprehensive, refuge area-wide fishery or angler surveys have been carried out to date. The limited documentation available confirms more than 20 species of fish present in water bodies near the refuge. The species in table 1, below, have been reported from Umbagog Lake and associated rivers (Magalloway, Androscoggin, Rapid, Dead and Swift Cambridge Rivers):

Table 1. Fish species reported

Umbagog Lake and Androscoggin River	
Native species	Introduced species
Brook trout	Landlocked salmon
Brown bullhead (hornpout) (<u>possibly</u> introduced?)	Brown trout (confirmed in upper lakes, but not Umbagog)
Creek chub	Lake trout
Lake chub	Splake

<u>Umbagog Lake and Androscoggin River cont.</u>	
Native species	Introduced species
Fallfish	Rainbow trout (below Errol Dam only)
Pearl dace	Rainbow smelt
Finescale dace	Landlocked alewife
Northern redbelly dace	Yellow perch
Common shiner	Smallmouth bass
Golden shiner	Largemouth bass
Fathead minnow	Chain pickerel
Longnose sucker	Northern pike (probably extirpated)
White sucker	Lake whitefish (introduced early 1900's by Maine Fish Comm. in Mooselookmeguntic Lake and collected in Umbagog, but now extirpated)
Pumpkinseed sunfish	
Slimy sculpin	
American eel (confirmed in C Pond, but not Umbagog)	

<u>C Pond</u>	
Native species	Introduced species
Brook trout	Rainbow smelt
Brown bullhead (hornpout) (<u>possibly</u> introduced?)	Smallmouth bass
Blacknose shiner	
Creek chub	
Lake chub	
Fallfish	
Common shiner	
Golden shiner	
Fathead minnow	
White sucker	
Pumpkinseed sunfish	
Slimy sculpin	
American eel	

<u>Pond in the River</u>	
Native species	Introduced species
Brook trout	Landlocked salmon
Brown bullhead (hornpout) (<u>possibly</u> introduced?)	Brown trout (confirmed in upper lakes, but not PIR)
Creek chub	Lake trout
Lake chub	Rainbow smelt
Fallfish	Landlocked alewife
Blacknose dace	Yellow perch
Pearl dace	Smallmouth bass
Finescale dace	Chain pickerel
Northern redbelly dace	
Common shiner	
Golden shiner	
Fathead minnow	
White sucker	
Longnose sucker	
Pumpkinseed sunfish	
Slimy sculpin	
American eel (confirmed in C Pond, but not PIR)	

<u>Magalloway River (below Aziscohos Dam)</u>	
Native species	Introduced species
Brook trout	Landlocked salmon
Brown bullhead (hornpout) (<u>possibly</u> introduced?)	Brown trout (confirmed in upper lakes, but not Magalloway R)
Lake chub	Splake
Golden shiner	Rainbow smelt
White sucker	Yellow perch
Slimy sculpin	Smallmouth bass
American eel (confirmed in C Pond, but not Magalloway R)	Chain pickerel

<u>Rapid River</u>	
Native species	Introduced species
Brook trout	Landlocked salmon
Creek chub	Brown trout (confirmed in upper lakes, but not Rapid R)
Lake chub	Rainbow smelt
Fallfish	Yellow perch
Blacknose dace	Smallmouth bass
Northern redbelly dace	
Longnose dace	
Common shiner	
Golden shiner (<u>possibly</u> introduced?)	
White sucker	
Slimy sculpin	
American eel (confirmed in C Pond, but not Rapid River)	
<u>Dead Cambridge River</u>	
Native species	Introduced species
Brook trout	Smallmouth bass
Brown bullhead (hornpout) (<u>possibly</u> introduced?)	Yellow perch also likely present in lower reaches
Creek chub	
Fallfish	
Blacknose dace	
Longnose dace	
Common shiner	
White sucker	
American eel (confirmed in C Pond, but not Dead Cambridge)	

The changes in both the abundance and species composition of the Umbagog Lake fishery during the past 150 years have created a fishery today that bears very little resemblance to that which was present prior to the establishment of the first Errol Dam in 1853. During the 1800s, the lake supported a thriving brook trout population.

Prior to 1900, introductions of Atlantic salmon, chain pickerel, rainbow smelt, yellow perch, and several other species occurred in the Androscoggin River and/or in the Rangeley Lakes. Changes that are more recent include the introduction in the mid-1980s and subsequent population expansion of smallmouth bass in the lake. Northern pike have also been observed in the lake in recent years, but their present population status remains unclear (Bonney, 2002).

Umbagog Lake is primarily a warm-water fishery, with an average depth of 12 ft. A ‘deep hole’ located in the northeast section of the lake, near Sunday Cove, and extending to a depth of approximately 50 ft., supports a limited cold water salmonid fishery (landlocked salmon, brook trout). As an interstate body of water, the lake is governed by special state fishing regulations. A licensed New Hampshire or Maine angler may fish any part of the lake, which includes the waters of the Androscoggin River upstream of the Errol Dam, the waters of the Magalloway River within the State of New Hampshire and the waters of the Rapid River upstream to the marker at Cedar Stump in the State of Maine.

C Pond, the Rapid River, and parts of the Dead Cambridge River support wild brook trout fisheries. Wild brook trout also occur upstream of the refuge on the Magalloway and Diamond Rivers. The smallmouth bass originally introduced into Umbagog Lake have been expanding into all those water bodies, including C Pond and Pond in the River.

Bass may compete with and negatively impact brook trout and landlocked salmon fisheries. The Maine Department of Inland Fisheries and Wildlife has created a fish barrier on the Dead Cambridge River to prevent smallmouth bass expansion from impacting the C Pond brook trout fishery. Maine is also concerned about continued expansion of smallmouth bass from Umbagog into the Rapid River and Rangeley Lakes systems. Both Maine and New Hampshire are currently cooperating on brook trout and bass radio-telemetry studies on the Magalloway, Diamond, and Rapid Rivers, in order to gain a better understanding of movements, behavior, and interactions between these species. The Rapid River is of particular concern because of its high quality brook trout and salmon fishery and increasing popularity with anglers. Boucher (1995) reported over 31,000 angler-hours (8,000 fishing trips) of use on the Rapid River in 1995. Smallmouth bass fishing in Umbagog Lake has increased tremendously over the past few years, with the explosion of the bass population

Umbagog Lake and associated rivers are subject to atmospheric mercury deposition, which can cause mercury contamination of fish, and toxicity to wildlife that feed on them, such as loons and bald eagles. New Hampshire and Maine have both issued statewide health advisories about human consumption of freshwater fish with mercury contamination. Of particular concern is the consumption of warm water species, since they tend to have higher levels of mercury in their tissue.

Because Umbagog Lake and its rivers are accessible to fishing from the two New Hampshire state boat launches, we do not expect opening the rest of the refuge for fishing to result in a dramatic change from existing conditions.

Potential impacts of fishing follow:

- **Accidental or deliberate introductions of non-native fish** that may negatively impact native fish, wildlife, or vegetation: Illegal fish introductions have a long history in the Umbagog area. The refuge will continue to work with both states in providing educational outreach and signs on that subject and trying to contain introductions once they occur. Adding a refuge law enforcement officer will supplement state enforcement.
- **Accidental introduction of invasive plants, pathogens, or exotic invertebrates**, attached to fishing boats: With the exception of a few isolated occurrences of purple loosestrife, refuge waters appear to be relatively free of invasive aquatic plants and mollusks. However, we have not carried out extensive surveys of aquatic invasive plants. We can mitigate their impacts by continuing education, outreach, and initiating an intensive water monitoring program.
- **Negative effects on loons, eagles, osprey, waterfowl, and other wildlife from lost fishing gear** (i.e. from ingesting lead sinkers, hooks, lures, litter, or becoming entangled in fishing line or hooks): Lost fishing tackle may harm loons, waterfowl, eagles, and other birds externally by catching and tearing skin. Fishing line may also become wrapped around body parts and hinder movement (legs, wings), impair feeding (bill), or cause a constriction with subsequent reduction of blood flow and tissue damage. An object above or below the water surface may snag entangled animals, from which they are unable to escape. Nineteen percent of loon mortalities in Minnesota were attributed to entanglement in fishing line (Ensor et al. 1992). Entanglement in fishing line has also caused mortality in bald eagles.

Birds may also ingest sinkers, hooks, floats, lures, and fishing line. Ingested tackle may cause damage or penetration of the mouth or other parts of the digestive tract, resulting in impaired function or death. Lead tackle is particularly toxic to wildlife. An investigation into causes of mortality in loons in New England found 52 percent of loon carcasses submitted to Tufts University Wildlife Clinic had died of lead poisoning from ingestion of lead sinkers (Pokras and Chafel. 1992). Three Umbagog loon carcasses recovered and analyzed in the past few years showed signs of lead poisoning from lead sinkers or had ingested fishing hardware. Fishing hardware and line have also been found in and around osprey and bald eagle nests both on and off Refuge.

Maine prohibits the sale of lead sinkers, and in 2006, New Hampshire prohibited both the sale and use of lead sinkers of a certain size. The refuge will continue to provide education and outreach on the hazards of lead sinkers and discarded fishing tackle. The refuge officer will help in that public outreach.

- **Disturbance of wildlife** (particularly breeding and brood-rearing loons, waterfowl, eagles, osprey, wading birds): Fishing seasons in Maine and New Hampshire coincide in part with spring-early summer nesting and brood-rearing periods for many species of aquatic-dependent birds. Anglers and other boaters may disturb nesting birds by approaching too closely to nests, causing nesting birds to flush. Flushing may expose eggs to predation or cooling, resulting

in egg mortality. Both adult and flightless young birds may be injured or killed when run over by speeding boats. We will continue to close refuge areas seasonally to fishing, boating, and camping around sensitive nest sites, in conjunction with the states of Maine and New Hampshire. We will also continue our public outreach and the placement of warning signs. We monitor public use to help improve our management of public use, fisheries, and wildlife.

- **Reduction or alteration of prey base** important to fish-eating wildlife: Introductions of fish species over the years have undoubtedly altered the community composition of Umbagog Lake and associated rivers. Whether this has positively or negatively impacted fish-eating wildlife is unknown at this time.
- **Negative impacts on water quality** from motorboat and other pollutants, human waste, and litter: Extensive water quality testing on the Umbagog system has not been carried out. The levels of pollutants from boat fuel and impacts on local aquatic systems are unknown. Hydrocarbon contamination can be harmful to fish. We will initiate public outreach and education on littering, pollutants, proper waste disposal, and the advantages of 4-stroke engines, will be initiated to help mitigate water quality impacts. Water quality testing will be carried out as funding levels permit.
- **Bank and trail erosion** from human activity (boat landings, boat wakes, foot traffic, camping), which may increase aquatic sediment loads of streams and rivers, or alter riparian or lakeshore habitat/ vegetation in ways harmful to fish or other wildlife: Boat access will be restricted to designated areas only. Those areas will be ‘hardened’ to contain impacts to a small area. We will monitor the campsites and launch sites, and may modify, restore or close them if conditions warrant. Wetlands guard much of the refuge shoreline, making it extremely difficult to access for shore-based fishing. We do not intend to construct any new trails or boardwalks to provide shore-based fishing access, with the exception of the Mt. Pond area. All new trail and access construction will follow best management practices. Therefore, at current levels of use, we do not expect trail erosion to increase because of foot traffic related to fishing.
- **Negative impacts from fishing boats and foot traffic to sensitive wetlands** or peatlands and rare wetland plants. Boat access sites and trails will be located away from sensitive wetlands, peatlands, and rare plants. Habitat features, important to trout such as over-hanging banks, will be protected from disturbance.
- **Illegal fishing** resulting in over-harvest. By adding a refuge officer, the refuge will be able to supplement state enforcement to help reduce this type of activity.
- **Vegetation disturbance associated with installation of new boat launch and fishing access sites:** Although the new boat launch will be located within the floodplain of the Magalloway River, ground disturbance will be minimal. Because fishing will occur from non-motorized watercraft or a dock, no erosion is expected from bank fishing or trampling of vegetation. A trail already runs to Mt. Pond from Mt. Pond Rd., and improvements to that trail and its access site should not result in additional impacts on vegetation.

- **Conflicts between anglers and other user groups:** We know that some conflicts among motorized and non-motorized users have arisen on the refuge in the past. In addition, local cabin owners have expressed concerns about trespass and inappropriate human waste disposal by boaters, primarily canoeists and kayakers. The comfort station under construction at the Magalloway River launch site should help to reduce some of these conflicts. We intend to carry out public use surveys in 2006 that will help identify additional conflicts between user groups. Should any significant conflicts become evident, we may need to manage public use on the refuge to minimize conflicts. That may include providing additional education and outreach, providing additional sanitary facilities, or creating zones to separate groups of users.

Public fishing on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1 and 2 (“Manage open water and wetlands,” and “Manage floodplain and lakeshore habitats”) as written in the CCP. Monitoring will identify any actions needed to respond to new information and correct problems that may arise in the future. Public fishing benefits Goal 4 “Provide high quality wildlife dependent activities” of the CCP by providing for one of the listed uses. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment

As part of the comprehensive planning process for the Lake Umbagog refuge, this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EIS. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- We will review the fishing program annually to ensure that it contributes to refuge objectives in managing a quality fishery and protecting habitats. This may include surveys of angler, fish, and habitat.
- We will prohibit lead sinkers and other lead tackle to prevent ingestion by wildlife and possible lead poisoning.
- We will permit boat launching only in designated areas to prevent erosion and degradation of wetlands or water quality and ensure public safety.

- We will not permit fishing from near residential areas, to minimize conflicts with adjacent private landowners and lessees. In addition, we will not permit fishing from shore on the islands, with the exception of state-run campsites. On much of the Refuge, demand for shore-based fishing is relatively low, and we do not believe it significantly affects refuge resources. We will monitor its impacts and, if warranted, will take action to mitigate them, including seasonal or permanent closures.
- We will close wildlife nesting and brood-rearing areas seasonally to all public use, to prevent the disturbance of wildlife. This may include temporarily closing or relocating remote campsites or temporarily closing access sites.
- Access trails and launches will be constructed and situated in a way to provide for public safety and minimize disturbance of wildlife and habitat or the effects of siltation. We will use vegetation and other means of stabilizing soils around any culverts at road crossings. Protecting canopy trees from damage by humans or beavers will keep stream habitat shaded. We will monitor impacts and close, modify, restore, or even move an access if there are problems.
- We will cooperate with the fishery resource agencies of the states in implementing angling regulations and management actions.
- We will increase public outreach and education to minimize conflicts between user groups, help control aquatic invasive plants and lead in the environment, reduce the introduction of non-native fish, and minimize the disturbance of wildlife and habitat.
- A refuge officer will help to promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions.

Justification: Fishing is one of the six priority public uses of the National Wildlife Refuge System and has been determined to be a compatible activity on many refuges nationwide. The Refuge System Improvement Act of 1997 instructs refuge managers to seek ways to accommodate these six uses. Public fishing on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager:

Paul J. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief:

Anthony D. Legier 1-9-09
(Signature and Date)

Mandatory 15-year Re-evaluation Date:

January 9, 2024

Literature Cited:

Bonney, F. 2002. Personal communication. Maine Inland Fisheries and Wildlife.

Boucher, D. P. 1995. Rapid River salmonid management. Fishery Interim Summary Report Ser. No. 95-6. Maine Dept. of Inland Fisheries & Wildlife, Augusta, ME.

Ensor, K.L., D.D. Helwig, and L.C. Wemmer. 1992. The common loon in Minnesota: potential contaminant implications *in* L. Morse, S. Stockwell and M. Pokras, eds. Proc. from the 1992 conference on the loon and its ecosystem: status, management, and environmental concerns, Bar Harbor, ME.

Pokras, M.A. and R. Chafel. 1992. Lead toxicosis from ingested fishing sinkers in adult common loons (*Gavia immer*) in New England. *J. of Zoo and Wildl. Med.* 23(1):92-97.

Attachments: Map C-1, showing existing and planned boat access points.

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Commercial forest management

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul J. Casey

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use. If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence. If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Janet McKennedy

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Commercial forest management

Narrative

The primary objective of forest management will be to enhance and maintain habitat for our focal management species and associated communities over the long-term. Upland forest habitat on the refuge now lacks the optimal structure, composition, and patch size those species require. Forest management can improve and accelerate the development of appropriate structures and forest composition. Without active management, the development of appropriate habitat may take longer or fail to happen at all, depending on site characteristics, prior management history, and the frequency of natural disturbances. Forest management can also create and maintain the appropriate forest structure and age or size class distribution on the landscape into the future, so that adequate habitat is always available for species of concern. Because the refuge lacks the funding, personnel, or equipment to carry out forest management safely, commercial timber harvest and silvicultural treatments are the only reasonable alternative for accomplishing the work. Commercial timber harvest is an economic activity on the refuge and is regulated under 603 FW 2.6 (N) requiring both an Appropriateness Determination and a Compatibility Determination.

COMPATIBILITY DETERMINATION

USE: Commercial forest management

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITIES

1. Emergency Wetlands Resources Act of 1986 [16 U.S.C. 3901(b)]
2. Migratory Bird Conservation Act [16 U.S.C. 715d]
3. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)]
4. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(b)(1)]

PURPOSES FOR WHICH ESTABLISHED

1. “for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions...”[16 U.S.C. 3901(b); Emergency Wetlands Resources Act of 1986]
2. “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds....” [16 U.S.C. 715d; Migratory Bird Conservation Act]
3. “for the development, advancement, management, conservation, and protection of fish and wildlife resources...” [16 U.S.C. 742f(a)(4); Fish and Wildlife Act of 1956]
4. “for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...” [16 U.S.C. 742f(b)(1); Fish and Wildlife Act of 1956]

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM

“The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” — National Wildlife Refuge System Improvement Act of 1997 (Public Law 105–57; 111 Stat. 1282)

DESCRIPTION OF USE

(a) What is the use? Is it a priority public use?

The use is forest management, including commercial timber harvesting. It is not a priority public use of the National Wildlife Refuge System, under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

The purpose of the use would be to improve and maintain habitat for forest-dependent species over the long term. Before we acquired the lands for the refuge, companies in the forest industry had owned them, and had harvested most of the upland areas for more than a century and a half. Most refuge land now supports only regenerating or young forest. The timber harvesting practices of the past had also altered species composition, forest age class, and structure. Selective harvesting favored the conversion of many spruce-fir stands to mixed stands and mixed stands to hardwoods. Much of the forested land on the refuge lacks the structure, composition, or age distribution that species of conservation concern prefer.

The refuge lacks the equipment and personnel to carry out timber harvesting. Therefore, commercial timber harvesting is the most economical, safe method of achieving many of our proposed forest management objectives.

(b) Where would the use be conducted?

We have classified refuge lands into four types of management zones, depending on their degree of resource sensitivity. In all of the zones, as the level of resource sensitivity increases, the restrictions on forest management practices will increase, following the best forest and wildlife management practices recommended by the State of New Hampshire (New Hampshire Forest Sustainability Standards Work Team, 1997; Flatebo et al. 1999; Cullen, 2000; Calhoun and DeMaynadier, 2003).

We list the timber management zones below in order of their increasing level of restrictions on timber harvesting practices (see also map C-3).

Low Resource Sensitivity Zone: Stands in this zone allow the greatest flexibility in management over the long term to diversify forest age class and structure to benefit our focal species. A variety of commercial and non-commercial timber harvesting may occur as described below under each habitat type. All harvesting will follow best forestry and wildlife management practices (BMPs) recommended by New Hampshire and Maine. Where this zone surrounds or abuts moderate-to-high sensitivity or industry-inoperable zones, the stand prescriptions for this zone will reflect the need to protect or enhance the resource values on those more sensitive zones.

Moderate Resource Sensitivity Zone: Stands in this zone are subject to silvicultural prescriptions or timing of harvest more restricted than in the Low Resource Sensitivity Zone. Those restrictions may include seasonal closures of operations, the maintenance of closed canopy conditions, the retention of coarse woody debris or snags, etc.

High Resource Sensitivity Zone: Stands in this zone are subject to very few manipulations. We may fell, girdle, or otherwise treat individual trees or small groups of trees to benefit wildlife or for safety reasons; otherwise, tree harvest will be quite limited. Highly restrictive areas may include excessively steep slopes, hydric soils, or close proximity to such resources of concern as streams and wetlands. The forest products industry also considers most of these areas inoperable (see below). However, the high resource sensitivity zone on the refuge extends beyond what the industry would consider inoperable.

Forest Industry Inoperable Zone: This zone represents local forest industry standards for inoperability. The timber company that formerly owned the land mapped this zone. It includes stands that are non-forested wetlands or are too steep or wet to be harvested economically (Johnson, 2003).

We may fell, girdle, or otherwise treat individual trees or small groups of trees to benefit wildlife or for safety reasons. The tree harvest in this zone will be quite limited.

The refuge includes approximately 10,000 acres of upland forested habitat. About 20 percent of that acreage is softwood habitat (primarily red spruce and balsam fir), 45 percent hardwood habitat (sugar maple, yellow birch, beech, red maple), and 35 percent mixed woods habitat. Only about 4,000 of those acres lie outside the boundaries of the High Resource Sensitivity Zone, and are now in a mature size class. Over the next 15 years, most of the harvesting will take place on those 4,000 acres, located primarily in Management Units 1, 4, 5, and 6 (see map C-3). However, some forest management, such as pre-commercial thinning, may take place in other areas of the refuge to meet specific wildlife or habitat objectives.

(c) When would the use be conducted?

Forest management may occur at different times of the year at different locations, depending on individual site characteristics, stand conditions, and other resource concerns. All forest management will occur at times designed to minimize unwanted impacts on resources, e.g., erosion, soil compaction, or the disturbance of wildlife, while maximizing the desired silvicultural results, such as seed germination and natural tree regeneration. To achieve specific silvicultural goals, most of the harvesting will occur in summer or winter, as appropriate. A comprehensive forest inventory will evaluate forest habitat and wildlife species of concern and determine the best timing and method before harvesting. We will not harvest timber during the primary breeding season for bald eagles, if nests are within or directly adjacent to the harvest area.

(d) How would the use be conducted?

Although we began an inventory of timber stands on the refuge in 2005, we will need additional detail before harvesting. Another inventory will help design appropriate silvicultural prescriptions to meet the objectives of our Habitat Management Plan. We will send that data and all job specifications to local and regional timber harvesting companies for bidding, and issue a special use permit to the contractor we select. Commercial timber harvest on the refuge may yield products ranging from pulpwood or firewood to saw timber or veneer.

Table C.1, below, lists the forest migratory bird species we have identified as management priorities: species of regional conservation concern whose habitat needs represent, in large part, the habitat requirements of a larger suite of species of concern. Their ties to the mixed spruce-fir/northern hardwood forest matrix are close.

Table C.1. Priority forest birds (refuge focal species)

Species	Some Major Forest Structural Requirements
Blackburnian warbler	high conifer component, large conifers (>60 ft high), closed canopy
Black-throated green warbler	high conifer component, large forest patch size, large conifers, forest gaps
Canada warbler	well-developed understory, especially along streams, bogs, wet areas; canopy gaps; structurally diverse forest floor.
American woodcock	fields or forest openings, young aspen-birch, dense brushy areas, alder

Management for focal species such as blackburnian and black-throated green warblers will also help improve habitat for other species of conservation concern, such as bay-breasted and Cape May warblers, and wintering white-tailed deer. Both bay-breasted and Cape May warblers require closed canopy conifer habitat with large trees. Quality winter cover for deer includes large trees (softwood cover over 35 feet tall) and high (70-percent) crown closure (Reay et al., 1990).

Our approaches to silviculture will differ among different habitat types in the mixed spruce-fir/northern hardwood forest matrix, but will stay within the inherent capability of those sites to grow certain species (e.g., soil properties, moisture regimes, elevation, aspect, etc). We anticipate that our management will help make our forests generally more resilient to multiple stressors, including climate change. We plan to monitor our forest systems and the impacts of our forest management strategies, and modify our management practices appropriately, as necessary. We recognize that climate change may influence the trajectory of our forest systems in unpredictable ways and anticipate that we may have to adjust our objectives and management strategies accordingly. The use of accepted silvicultural practices will perpetuate habitat types. When feasible, our management strategies will favor or increase the conifer component of stands on appropriate sites. We describe some of those strategies below.

Strategies for Spruce-Fir Habitat Type

- Improve habitat structure through pre-commercial and commercial thinning and/or stand improvement operations for focal species. We will favor spruce during stand improvements, although it is not our intent to eliminate all other softwood species.
- Regenerate this habitat type through accepted silvicultural practices. Methods will include using
 - single tree or group selection, overstory removal, clearcut, or shelterwood techniques;
 - treatments timed to optimize the ability of the site to regenerate softwood;
 - rotation age for fir will range from 60 to 100 years
 - rotation age for spruce will range from 80 to 130 years, and,
 - the size of each management unit, its silvicultural prescription and rotation age will determine the size of each treatment and the cutting interval.
- Maintain a minimum of 50 percent of each critical deer wintering area as quality shelter at any point in time. Quality shelter includes softwood cover over 35 feet tall and 70-percent or higher crown closure (Reay et al., 1990).

Strategies for the Conifer-Hardwood Mixed Woods Habitat Type

- Improve habitat structure through pre-commercial and commercial thinning and/or stand improvement operations for focal species. We will favor spruce during stand improvements although it is not our intent to eliminate all other softwood species.
- Regenerate this habitat type by using accepted silvicultural practices. Favor softwoods on appropriate sites. Methods will include

On softwood-dominated sites

- single tree or group selection, overstory removal, clearcut, or shelterwood techniques;
- rotation age for fir will range from 60 to 100 years;
- rotation age for spruce will range from 80 to 130 years;
- the size of each management unit, its silvicultural prescription and rotation age will determine size of each treatment action and the cutting interval; and,
- emphasis on overstory removal techniques that protect softwood regeneration in areas of advanced softwood regeneration

On hardwood-dominated sites

- small group selection with group sizes up to ½ acre acre;
- age class goals of 100 to 200 years; and,
- cutting cycles of 10 to 20 years to maintain understory development.

Strategies for the Northern Hardwood Habitat Type

- Improve habitat structure through pre-commercial and commercial thinning and/or stand improvement operations for focal species.
- Regenerate those habitat types through accepted silvicultural practices. Methods will include
 - small group and single tree selection with up to 0.5-acre group sizes;
 - age class goals of 100 to 200 years; and,
 - cutting cycles of 10 to 20 years to maintain understory development.

Strategies for Woodcock Focus Area Management

- In woodcock focus areas (see map C-2), use accepted silvicultural practices to create openings, understory development and early successional habitat for woodcock and Canada warbler. We will use group selection, clearcuts or patch cuts of up to 5 acres in size. We may also maintain some larger, roosting fields. Cutting cycles will be approximately 8 to 10 years on a 40-year rotation. We may permanently maintain some 3- to 5-acre openings, primarily by mowing and brush clearing using mechanized equipment. We will perpetuate aspen-birch communities in woodcock management areas, when possible.

See additional details on forest management in appendix K of our comprehensive conservation plan.

(e) Why is the use being proposed?

The primary objective of forest management will be to enhance and maintain habitat for our focal management species and associated communities. Upland forest habitat on the refuge now lacks the optimal structure, composition, and patch size those species require. Forest management can improve and accelerate the development of appropriate structures and forest composition. Without active management, the development of appropriate habitat may take longer or fail to happen at all, depending on site characteristics, prior management history, and the frequency of natural

disturbances. Forest management can also create and maintain the appropriate forest structure and age or size class distribution on the landscape into the future, so that adequate habitat is always available for species of concern. Because the refuge lacks the funding, personnel, or equipment to carry out forest management safely, commercial timber harvest and silvicultural treatments are the only reasonable alternative for accomplishing the work.

Availability of Resources

The design and oversight of a timber management program on the refuge will require the addition of a forester position. That position has been approved, but has not yet been funded. In the absence of a refuge forester, the refuge may contract the services of a private consulting forester or use other Service personnel or our partners. The sales of timber will fund the fees for consultation.

A portion of the funds generated by the sale of timber on the refuge will go into the revenue sharing fund. We will use another portion to continue the forest management program and such activities as additional stand inventories, timber marking, pre-commercial thinning, and related roadwork. When appropriate and applicable, we may include tasks such as road rehabilitation in the contract as products and include them as part of the bid. That would alleviate any additional management costs associated with this specific activity. However, it would not eliminate most of the preliminary site preparation.

We expect all harvesting to be performed near, or from, existing roads. Because we would not construct any new facilities or improvements on refuge property for this use, we expect no significant construction costs associated with it. However, funding will be necessary for the maintenance of roads and water control structures. The refuge forester will assume the management of contract development and administration, monitoring, and resource database.

We expect the required costs in the following list for the refuge to administer the proposed commercial forest management practices each year. Assuming the funding of the refuge forester position, the timber sales revenue that returns to the refuge should cover any additional costs.

<i>Forest Inventories:</i>	\$6,000	(Refuge Forester)
<i>Wildlife Inventory & Monitoring:</i>	\$6,000	(Refuge Biologist)
<i>Marking Timber & skid road layout:</i>	\$20,000	(Refuge Forester)
<i>Contact Development and Administration:</i>	\$6,000	(Refuge Manager/Refuge Forester)
<i>Stand Inventory Data Entry and Analysis:</i>	\$1,000	(Refuge Forester)
<i>Wildlife Inventory Data Entry and Analysis:</i>	\$1,000	(Refuge Biologist)
<i>Road Maintenance:</i>	\$5,000	(Maintenance Worker)
<i>Total:</i>	\$45,000	

Anticipated Impacts of the Use

In case of the unregulated harvest of timber, the following impacts could occur.

Soils

The construction and maintenance of roads and landings and the operation of heavy equipment could compact soil, cause rutting, and result in increased erosion. To mitigate those potential impacts and minimize erosion, timber harvesting and road construction on the refuge will follow the best management practices recommended by the State of New Hampshire (Cullen, 2000). Timber harvesting will occur primarily outside the refuge High Resource Sensitivity Zone, at seasons appropriate for minimizing the effects of compaction and erosion. That zone includes areas of hydric, steep, shallow, erodible soils (see map C-3).

Aquatic Resources

Unregulated timber harvest and use of heavy equipment near streams, rivers, or ponds can result in increased run-off, sedimentation, and reduced shading of streams, with concomitant increases in aquatic temperatures. Downed wood in streams may initially increase and then decrease to levels below that of streams in unharvested areas. Those factors may have detrimental effects on stream organisms, including fish, invertebrates, and amphibians. Poorly planned timber harvests and road construction can alter surface and groundwater hydrology and water storage capability. The effects of multiple harvests in a watershed can accumulate over time.

Maintaining forested buffers around streams and other aquatic resources of concern will minimize impacts on water resources and water quality. Road construction, skid trail planning, harvest operation and stream crossings will follow best management practices advocated by the states of New Hampshire and Maine to minimize the alteration of hydrology and the impacts of siltation on water quality. Harvesting will use existing forest roads whenever possible. We will keep the construction of new roads to a minimum.

Wildlife and Vegetation

The construction of roads, creation of landings, and operation of heavy equipment can result in localized impacts and the damage or destruction of understory vegetation, including rare plants. Those practices may also damage the litter layer, coarse woody debris, snags, or cavity trees important for wildlife. They may alter the moisture regimes in soil and on the forest floor in ways that affect plants and animals such as forest floor amphibians and small mammals. Whole tree harvesting can result in a reduction of downed wood in the forest system. Skidding operations may cause residual damage to trees in the stand. Residual stand damage may result in the introduction of insects or disease into an otherwise healthy stand. Harvesting may also leave the remaining trees more susceptible to wind throw, alter plant and animal communities, facilitate the spread of invasive plants, disturb wildlife temporarily, or displace it over the long term.

We will mitigate most of those impacts by placing seasonal restrictions on harvesting to avoid disturbing wildlife or damaging trees or understory vegetation, the careful layout of skid trails, the use of mechanical harvesters and pre-harvest surveys of resources of concern. We will encourage timber contractors to leave tops, branches and other downed wood on site whenever possible.

Under refuge management, the average forest age/size class and canopy closure would increase over the long term, although different age classes would be present on the landscape. The softwood component of refuge matrix forest would also increase. Habitat connectivity would increase; the fragmentation of forest habitat would decrease.

Visitor Impacts

Logging may disturb refuge visitors, cause safety issues, or detract from visitors' esthetic experience. We will temporarily close areas of the refuge undergoing active logging. Because former owners harvested much of the refuge uplands just before we acquired them, and only a small proportion of the refuge will be closed at any one time, additional impacts on the public should be minimal.

Summary

Forest management on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, and 2 (“Manage open water and wetlands” and “Manage floodplain and lakeshore habitats”) and as written in the CCP. Monitoring will identify any actions needed to respond to new information and correct problems that may arise in the future.

Goal 3 as written in the CCP (“Manage upland forested habitats”) will benefit greatly from, and in fact depends on, forest management. This will potentially benefit Goal 4 “Provide high quality wildlife dependent activities” of the CCP from forest management activities and woodcock management activities providing varying habitat types suitable for wildlife observation and photography and for hunting. Opportunities also exist to interpret the management activities, benefitting Goal 5 of the CCP “Develop high quality interpretative opportunities...” Goal 7 of the CCP “Develop Umbagog National Wildlife Refuge as an outstanding center for research and development of applied management practices to sustain and enhance the natural resources in the Northern Forest in concert with the LMRD program” will benefit from this activity by providing a means to research and develop management techniques through forest management. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment

As part of the comprehensive conservation planning process for the Lake Umbagog refuge, this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EIS. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible, with the Following Stipulations

Stipulations Necessary to Ensure Compatibility

Our management philosophy is to create a forest management program that improves refuge wildlife habitat while simultaneously contributing to the forest industry and local economy of Coos and Oxford counties.

To protect refuge resources of concern, we will follow the best management practices for timber harvest and wildlife habitat recommended by the States of New Hampshire and Maine (New Hampshire Forest Sustainability Standards Work Team, 1997; Flatebo et al. 1999; Cullen, 2000; Calhoun and DeMaynadier, 2003; Smith and Whitney, 2001; Chase et al. 1997, Reay et al. 1990).

When the states recommend a range of best management strategies and buffer distances, we will implement the most conservative of those recommendations. The refuge may exceed state recommendations in some cases, for specific resource protection objectives.

We will plan roads, skid trails, water crossings, and landings in a way that minimizes damage to resources and stabilize roads and skid trails after harvesting.

Snags, live cavity trees, and large coarse woody debris will be retained, as appropriate, to meet refuge objectives. At the discretion of the refuge manager, the creation of snags, live cavity trees, or coarse woody debris, or the removal of individual trees or groups of trees may occur in any area of the refuge, including High Resource Sensitivity Zones, for specific wildlife management or safety purposes

We will review the forest management program annually in our Habitat Management Plan to ensure that the program contributes to refuge objectives for wildlife and habitat.

Before harvests, resource surveys will ensure that resources of concern have been identified and impacts minimized or eliminated.

Timber harvesting will occur at times that are seasonally appropriate for the site and silvicultural objectives and likely to minimize impacts on wildlife: e.g., outside raptor or heron nesting seasons.

We will discourage whole tree harvesting and encourage contractors to leave tops, branches, and other wood debris on site.

No commercial harvesting will occur on hydric soils or on slopes over 30 percent delineated on map C-3.

Except at the refuge manager's discretion to meet specific management objectives for wildlife or habitat, no harvesting will occur on forested wetlands, which include floodplain forest and northern white cedar, black spruce, and hardwood swamps.

We will use adaptive management in assessing and modifying silvicultural prescriptions to achieve wildlife habitat objectives.

Management actions will ensure the future growth of the forest and sustainable productivity consistent with ecological conditions.

Features in the implementation of the habitat management plan will ensure the application of new scientific, social, and economic information to improve silvicultural and management practices and enhance environmental and financial performance.

Justification

We have determined this use to be compatible, provided the stipulations necessary to ensure its compatibility are implemented. Forest management will contribute to the purposes for which the Lake Umbagog refuge was established and the mission of the Refuge System, and facilitate the ability of the refuge to meet its wildlife management objectives. The use will not pose significant adverse effects on refuge resources, interfere with the public use of the refuge, or cause an undue

administrative burden. We may adjust the habitat management program on the refuge annually to insure its continued compatibility. Forest management on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul J. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leger 1-9-09
(Signature and Date)

Mandatory 10 year Reevaluation Date: January 9, 2019

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Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads and antlersheds

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document? Establishing EA	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence. **(See Compatibility Determination for Justification).**

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul J Casey

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use. If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence. If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Justin Kennedy

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads and antlersheds

Narrative

The gathering of these materials is a long-standing and continuous use of the area and fosters a connection to, and appreciation for, the area's natural resources. We recognize that picking and gathering blueberries, raspberries, blackberries, mushrooms, fiddleheads and antler sheds has occurred on the refuge for many years. Current levels of this use are low and this use often occurs concurrently with other public uses including priority public

COMPATIBILITY DETERMINATION

USE: Recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds for personal use.

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901 (b))
2. Migratory Bird Conservation Act (16 U.S.C. 715d)
3. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4))
4. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1))

PURPOSE(S) FOR WHICH ESTABLISHED:

1. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions. 16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)
2. for use as an inviolate sanctuary, or for any other management purpose, for migratory birds 16 U.S.C. 715d (Migratory Bird Conservation Act)
3. for the development, advancement, management, conservation, and protection of fish and wildlife resources 16 U.S.C. 742f(a)(4) (Fish and Wildlife Act of 1956)
4. for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

1. What is the use? Is the use a priority public use?

Primary Use: The primary use is recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads and antler sheds. This is not a priority use of the National Wildlife Refuge System.

2. Where would the use be conducted?

The use would be conducted throughout the refuge.

3. When would the use be conducted?

These uses are seasonal in nature, as they naturally occur. Antlersheds are typically found during the late winter to early spring. Fiddleheads are typically gathered in early spring. Blueberries, blackberries, strawberries, and raspberries are typically gathered from July to September and mushroom may be available at varying times during the growing season.

4. How would the use be conducted?

We are proposing to open the Refuge to recreational gathering of natural materials for personal use. The gathering of these materials is a use of the area and fosters a connection to, and appreciation for, the area's natural resources. We recognize that picking and gathering blueberries, raspberries, blackberries, mushrooms, fiddleheads and antler sheds has occurred on the refuge for many years. Current levels of this use are low and this use often occurs concurrently with other public uses including priority public uses.

Natural materials gathered on the refuge are for private use only. Any sale of these materials would be considered a commercial use of these materials and is prohibited by federal law. This use specifically does not include recreational gathering of cranberries because they occur in our highest priority habitat, wetlands. Cranberries occur in bog systems that are especially sensitive to trampling. Since the refuge was established under the Emergency Wetland Resources Act and wetlands are our highest priority habitat, we do not feel that the risk of damage to these systems is warranted for recreational gathering of cranberries. Fields along Pond Brook Road in the Town of Magalloway Plantation are not open to the general public for berry picking. These fields include those formerly owned by Mr. Claude Linnell. Mr. Linnell retained life use of the rights to pick berries on those fields. These fields will be clearly marked with signs facing Pond Brook Road stating "Area Closed to Berry Picking, Rights Reserved by Previous Landowner."

At the discretion of the Refuge Manager, some areas may be seasonally, temporarily, or permanently closed to gathering of natural materials if wildlife or habitat impacts, or if user conflicts become an issue. Furthermore, the Refuge Manager may modify daily and yearly limits of natural materials to be collected. No plants may be introduced or transplanted on refuge lands to promote recreational gathering of berries and no plants are to be removed from the refuge.

5. Why is the use being proposed?

Gathering of these natural materials has occurred in the area for many years and this use was specifically requested during the public review phase of the draft EIS/CCP for Lake Umbagog NWR. Current use levels for this activity are very low and the use primarily occurs along roads and in disturbed areas like log landing and roadsides. This use is typically a family activity and provides an opportunity for family to connect with the natural environment. While people engage in this activity they often observe and gain an appreciation for wildlife.

6. Availability of Resources:

The resources necessary to provide and administer this use are available within current and anticipated refuge budgets. Staff time associated with the administration of this use is primarily related to answering general questions from the public and monitoring impacts of the use on refuge resources. This activity is administered by the refuge staff who assess interactions among user groups and any

related user impacts. Resource impacts will be monitored by refuge staff, under the supervision of the Refuge Manager. The use of refuge staff to monitor the impacts of public uses on refuge resources, and visitors is required for administering all refuge public uses. Therefore, these responsibilities and related equipment are accounted for in budget and staffing plans.

Costs associated with gathering natural materials are estimated below:

<i>Routine maintenance:</i>	\$100	annually. This is the expected cost to maintain the signs along Pond Brook Road.
<i>Supplies and materials:</i>	\$200	This includes signage for brochures (produced in house)
<i>Monitoring:</i>	\$1,000	annually.
<i>Law Enforcement:</i>	\$2,000	annually for a Refuge Officer.
<i>Total:</i>	\$3,300	

We do not anticipate charging fees.

Anticipated Impacts of the Use:

Gathering of natural materials has the potential to cause trampling of vegetation and disturb wildlife. However, we do not expect these disturbances to be significant, i.e. cause wildlife or habitats to be negatively impacted, since current and anticipated levels of use are low. Providing the opportunity for recreational gathering of natural materials on the refuge provides the public with an opportunity to observe wildlife and to view Service wildlife habitat management projects. There have been no indications that the current levels of limited harvesting of these natural materials causes problems for wildlife other than minimal and temporary disturbance caused by the mere presence of humans.

Therefore, the gathering of these natural materials on Lake Umbagog National Wildlife Refuge as described poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment:

As part of the comprehensive planning process for Lake Umbagog refuge, this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the draft CCP/EIS. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- A Refuge Officer will help to promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions.
- Recreational gathering of cranberries will not be allowed due to potential impacts to wetland vegetation.

Justification:

Recreational gathering of these materials on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul J. Casey 1-6-09
Signature and Date

Concurrence: Regional Chief: Anthony D. Leger 1-9-09
Signature and Date

Mandatory 10-year Re-evaluation Date: January 9, 2019

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Snowmobiling and recreational dogsledding on snowmobile trails

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document? Establishing EA	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul F. Carey

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence.
If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Janet M. Kennedy

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Snowmobiling and recreational dogsledding on snowmobile trails

Narrative

Snowmobiles and dogsleds provide a means of accessing the refuge in the winter months, and can provide an opportunity for visitors to engage in wildlife-dependent recreation. Snowmobile users and dogsled users have been observed engaging in wildlife-dependent recreation.

Before the establishment of the refuge, an extensive snowmobile trail system in northern New Hampshire and western Maine connected to trails in neighboring states and Canada. Estimates of snowmobile trails in Coos County alone exceed 1,000 miles. In 2001, the refuge acquired 4,375 acres of land west of Mountain Pond Road in Errol, N.H., from John Hancock Mutual Life Insurance Co. Those parcels came with a pre-existing agreement (1992) between the landowners at the time (James River Timber Corporation and Irving Pulp and Paper, Ltd.) and the State of New Hampshire. It states that New Hampshire can maintain a snowmobile trail near Mountain Pond and Eames roads, subject to a number of conditions. The Service is following through on earlier commitments and ensuring that it continues to work effectively with the affected States.

Snowmobile recreation is a critical part of the local economy during winter months and that of northern New Hampshire. Our “Final Environmental Assessment; Proposal to Protect Wildlife Habitat, Lake Umbagog, Coos Co., N.H., Oxford Co., Maine” (USFWS, 1991) states “The Mountain Pond [snowmobile] trail...would not be affected by this proposal.” Dogsledding is allowed in both states on snowmobile trails.

COMPATIBILITY DETERMINATION

USE: Snowmobiling and recreational dogsledding on snowmobile trails

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 [16 U.S.C. 3901 (b)]
2. Migratory Bird Conservation Act [16 U.S.C. 715d]
3. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4))
4. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1))

PURPOSE(S) FOR WHICH ESTABLISHED:

1. “the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions...” [16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)]
2. “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds...” [16 U.S.C. 715d; Migratory Bird Conservation Act]
3. “for the development, advancement, management, conservation, and protection of fish and wildlife resources...” [16 U.S.C. 742f(a)(4); Fish and Wildlife Act of 1956]
4. “for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...” [16 U.S.C. 742f(b)(1); Fish and Wildlife Act of 1956]

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The use is snowmobiling. It is not a priority public use of the National Wildlife Refuge System, under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Dogsledding is a supported use since it is allowable on the snowmobile trail systems in both New Hampshire and Maine.

(b) Where would the use be conducted?

We propose to permit snowmobile use on established snowmobile trails that pass through the refuge, (15.4 miles on current refuge lands), in their approximate, present locations (map C-4). We may occasionally close or reroute trails, depending on their biological impacts or refuge management activities. We will not allow the use of snowmobiles on spur trails or on any other trails not designated on map C-4.

Before the establishment of the refuge, an extensive snowmobile trail system in northern New Hampshire and western Maine connected to trails in neighboring states and Canada. Estimates of snowmobile trails in Coos County alone exceed 1000 miles. In 2001, the refuge acquired approximately 4375 acres of land located west of Mountain Pond Road, in Errol, NH, from John Hancock Mutual Life Insurance Co. These parcels came with a pre-existing snowmobile agreement (dated 1992) between the landowners of the time (James River Timber Corporation and Irving Pulp and Paper, Ltd) and the State of New Hampshire. It states that New Hampshire can maintain a snowmobile trail near Mountain Pond and Eames Roads, subject to a number of conditions.

New Hampshire Trail 18 is the only state-corridor snowmobile trail on refuge property (see trail 18, map C-4). A 5.4-mile-long segment of that trail crosses the refuge on Mountain Pond Road, a gravel road that runs north to south on the east side of Errol Hill. We re-routed a short segment of that trail, used only when there is enough snow cover, around our newly constructed maintenance shop. A 1.2-mile-long spur trail off trail 18 heads east along Potter Farm Road from the intersection of Mountain Pond Road and the Potter Farm road exiting refuge property onto state land and eventually Umbagog Lake. The Umbagog Snowmobile Association in Errol, NH maintains the combined 6.6 mile portion of trail through refuge property.

A short, 0.2-miles connector trail between the Bull Moose in Cambridge, NH and the Upton trail system in Maine crosses a corner of a 55-acre parcel of refuge land. The trail follows old Route 26 roadbed, and crosses a stream on the concrete bridge that served traffic on Route 26.

No Maine Interconnected Trail System (ITS) corridor trails cross refuge property. However, a number of long-standing trail segments cross refuge land in Maine. In Upton, a 0.25-miles segment crosses the refuge near Mill Street. That trail connects the southeast arm of Umbagog Lake to the Upton trail system by following an old skid trail.

On Tidswell Point, a 2.6-mile segment of snowmobile trail crosses refuge land on a gravel road. It originates at the south arm of Umbagog Lake, crosses state land, and connects to another gravel road just off refuge property that leads from Inlet Ridge to the Dead Cambridge River and, eventually, to East B Hill Road. That trail passes approximately 150 feet from a bald eagle nest and, therefore, may be subject to seasonal closure around February 15 to the end of the season to protect the nesting eagles.

An approximately 500-foot trail from a gravel road to Pebble Beach in Tyler Cove also crosses refuge land, and serves as a connector to Umbagog Lake. A similar, approximately 600 foot trail segment

connects the gravel road from B Brook Cove to the gravel road in a similar fashion. Those trails exist on existing skid roads. A third lake-access trail in Sturtevant Cove is 0.3 miles long. Approximately 500 feet of this trail is on a skid road; the remainder is on gravel road.

Near Pine Point, an approximately 0.4 mile trail segment crosses refuge property on the gravel road that provides access to private camps there.

In the area of Sunday Cove, approximately 3.6 miles of snowmobile trails cross refuge land. Those trails follow dirt and gravel roads and connect to Middle Dam on Lower Richardson Lake. One spur trail off of those trails leads to the Maine Warden's camp in Sunday Cove. The trails in the area of Sunday Cove will be the first we will assess, because overlay maps show that they may cross wetlands and cross through white-tailed deer winter yards. If we deem any changes necessary, we will work with Maine Department of Inland Fisheries and Wildlife, neighboring landowners and the Town of Magalloway Plantation in seeking alternate routes of travel.

In Magalloway Plantation, approximately 1.2 miles of trail crosses refuge lands south of Sturtevant Pond. This trail follows the Transfer Station road to a dirt road and out into open fields where it exits across from the Magalloway Church.

(c) When would the use be conducted?

We will open the trails identified above (map C-4) for snowmobiling when snow conditions are suitable, but no earlier than December 15 and no later than April 10.

(d) How would the use be conducted?

The operation of snowmobile on the refuge shall comply with all applicable state rules and regulations. We will not permit competitive snowmobiling events. The speed limit on the refuge will be 35 mph, unless otherwise posted. No parking areas will be provided on the refuge. No ATVs are permitted on refuge trails.

Refuge lease holders may request a special use permit to access their camps by snowmobile in winter, if no other access is practical. At the discretion of the refuge manager, that authorized use shall extend only to accessing the camp by the most direct route, which the special use permit will define, while minimizing impacts to refuge resources of concern. No new trails may be constructed.

The refuge will issue special use permits to the States of New Hampshire and Maine or other responsible parties (e.g. snowmobile clubs, volunteers) to maintain trails. Those permitted parties are responsible for accomplishing all trail maintenance, grooming, and infrastructure repair, including bridge and culvert repair and maintenance. Bridge and culvert construction must follow best management practices to avoid erosion or increasing siltation of sensitive streams. Culverts should be designed to handle the largest predicted stream flows. Any trail not on a road, shall not exceed 16 ft. in width at any point. All trail improvements must receive prior approval from the refuge.

The States of New Hampshire and Maine and other parties are also responsible for placing trail junction, trail number, safety, closure, and speed limit signs along the trail prior to December 1, maintaining them through the period of snowmobile use, and collecting signs and picking up any litter

at the end of the season. Trail maintenance may include cutting brush and removing fallen logs, but removal of brush or other vegetation should be kept to a minimum.

We do not currently monitor snowmobile use, but it is possible to estimate the current levels of use. Grey (2005) estimated that as many as 22,000+ snowmobiles may visit the Errol area annually. Since a major corridor trail is located on the refuge, it is likely that a high percentage of these snowmobiles also pass through the refuge.

Dogsled use of snowmobile trails is currently very light, but it appears from the number of inquiries and vehicles that interest in the refuge for dogsledding is increasing. Recreational dogsledding is only allowable on the above listed snowmobile trails. A permittee has the authority to use some other trails on the refuge, but these will not be available for public use in general.

We intend to monitor snowmobile trail use via winter surveys and/or traffic counters. We will also monitor the condition of trails, culverts, bridges, and streams in spring and summer, and identify and close undesignated trails on the refuge.

(d) Why is this use being proposed?

Snowmobile recreation is a critical part of the local economy during winter months for generations... and that of northern New Hampshire. Our “Final Environmental Assessment; Proposal to Protect Wildlife Habitat, Lake Umbagog, Coos Co., NH, Oxford Co., ME” (U.S. Fish and Wildlife Service, 1991) states “ The Mountain Pond [snowmobile] trail...would not be affected by this proposal. Snowmobiling would not be allowed on the central Refuge area, but no trails are currently identified in that area”.

Snowmobiles provide one means of accessing the refuge during the winter months, and can provide an opportunity for visitors to engage in wildlife-dependent recreation. Snowmobile users have been observed engaging in wildlife-dependent recreation on other national wildlife refuges (cf. Nulhegan Basin Division of the Silvio O. Conte National Fish and Wildlife Refuge, Compatibility Determination, Snowmobile Access, 1999) and national parks (Davenport and Borrie 2005).

Availability Of Resources:

With the hiring of a refuge officer, and a zone officer for Vermont and New Hampshire, the resources necessary to provide and administer this use, at its present levels, are available within current and anticipated refuge budgets. Staff time associated with administration of this use relates to overseeing trail maintenance, issuing special use permits and monitoring compliance with their conditions, enforcing laws, monitoring public use, and monitoring impacts on natural resources.

The refuge manager will administer the program. A wildlife biologist will monitor its effects on refuge resources. The refuge officer will monitor visitor use and conduct law enforcement for visitor safety and resource protection.

We estimate below the annual costs associated with the administration of snowmobiling on the refuge.

<i>Overall Oversight of Program;</i>		
<i>Coordinate with States of NH and Maine:</i>	\$2,000	GS-13 Refuge Manager
<i>Issue-administer SUPs/Coordinate with Snowmobile Clubs/Oversight of trail maintenance:</i>	\$2,000	GS-12 Deputy Refuge Manager
<i>Law enforcement–patrol/visitor-resource protection/public use monitoring/enforcement/outreach:</i>	\$3,000	GS-7 Refuge Officer
<i>Resource impacts/monitoring:</i>	\$3,000	GS-12 Wildlife Biologist
<i>Snowmobile gas/maintenance:</i>	\$1,000	
<i>Total:</i>	\$11,000	

All maintenance of snowmobile trails will be the responsibility of the States of New Hampshire and Maine and other responsibility parties (snowmobile clubs, volunteers, etc.). The refuge owns and operates snowmobiles for carrying out law enforcement, refuge operations, and monitoring public use. Officers from the New Hampshire Fish and Game and Maine Department of Inland Fisheries and Wildlife occasionally supplement law enforcement coverage on the refuge, at no cost to us.

ANTICIPATED IMPACTS OF THE USE:

Only New Hampshire Trail 18 has been evaluated in any detail, using refuge biological survey data and the refuge GIS (geographic information system). Where it passes through the refuge, Trail 18 is located both on a grassy track and on gravel roads. In several places, it crosses snowmobile bridges over small streams. The trail passes primarily through northern hardwood and mixed hardwood-conifer forest, as well as a small area of mixed pine-hemlock forest. The Potter Farm Rd. spur trail passes within less than 0.1 miles of a mature northern white cedar swamp located on State of New Hampshire property and inventoried by the New Hampshire Heritage Program. Some of the cedars in that swamp exceed 200 years in age.

We have recorded more than 50 species of birds in areas of the refuge Trail 18 traverses. Common species include red-eyed vireo, ovenbird, black-throated blue warbler, chestnut-sided warbler, hermit thrush, magnolia warbler, black-throated green warbler, American redstart, yellow-bellied sapsucker, black-capped chickadee, and ruffed grouse. Many of those species are migratory and, thus, are not present during the snowmobile season. Streams the trail crosses are known to support populations of northern two-lined and dusky salamanders. Vernal pools with populations of wood frogs and spotted salamanders occur in some areas. Although road, bridge and culvert conditions can affect their water quality, vernal pools generally dry up by fall and stream salamanders are usually inactive in the winter months. White-tailed deer, moose, and fisher are known to frequent the trail area. The trail does not cross through any known deer wintering areas and we know of no raptor (osprey, eagle) nests immediately adjacent to the trail. The nearest osprey nests are about 0.5 mi to the east of the trail. The trail approaches within <0.1 mi of Mountain Pond and its associated wetlands. A literature review of potential impacts of snowmobiling on wildlife and wildlife habitat follows:

Wildlife Impacts:

Winter is a particularly stressful time for many species of resident wildlife, because of the reduced availability and quality of food and the higher energetic costs of snow travel and thermoregulation. Late winter is a particularly vulnerable time for many species (especially ungulates), because snow depths are often greatest, the animals are in their poorest condition, and food resources have been exhausted.

Snowmobiles are capable of covering large areas and thus have the potential for disturbing wildlife and compacting snow over a large area, if they are not confined to designated trails (Hammitt and Cole 1998).

Some potential negative impacts of snowmobiling (and other forms of human disturbance) on wildlife include:

1. Increased energy expenditure. Disturbance may result in increased heart rate, activity, or actual flight, all of which have an energetic cost. During severe winters or for animals in poor or marginal condition, the additional stress of disturbance may result in exhaustion of an individual's food reserves, and lowered resistance to disease or predation. That may affect survival or reproduction. Animals may be in poorer condition going into the spring breeding season.
2. Displacement to suboptimal habitat. Animals may be forced into habitats where foraging or cover are of lower quality. This may increase energetic costs, increase vulnerability to predation, or increase crowding and disease transmission. It may alter the distribution of animals on the landscape.
3. Alteration of behavior. Disturbed animals may change their foraging times to periods when energy losses or exposure to predators is higher.
4. Changes in community composition and inter-species interactions.
5. Improved predator access to prey wintering areas (a benefit to predators, but a negative impact to prey).
6. Direct mortality from snowmobile-wildlife collisions.

Some potential, positive impacts of snowmobiling and other forms of human disturbance on wildlife follow.

1. Reduced energy expenditure. Snow compaction and trail creation by snowmobiles may reduce energy expenditure in deep snow, for animals that follow snowmobile trails.
2. Improved access to resources. Snow compaction and trail creation by snowmobiles may expand access to foraging areas, for animals using trails.

Although a moderately extensive body of literature treats the impacts of snowmobile activity on wildlife, particularly ungulates, the site-specific nature of much of the research and the complex

interactions among the factors affecting wildlife make interpreting results and extrapolating them for Lake Umbagog difficult. The differences in methodology among studies make it difficult to compare them, and have compounded the problem. As a result, different studies have found apparently contradictory results that seem to be applicable only locally.

A few of the variables that may affect the type and degree of wildlife response to snowmobiles include the

- severity of winter snow conditions,
- type of vegetation or habitat,
- topography,
- time of day and month of year,
- level of habituation to disturbance,
- animal age and condition,
- species type,
- animal density and group size,
- animal activity type (standing vs. bedded down),
- intensity of hunting,
- intensity of snowmobile activity,
- duration of disturbance, and
- behavior of snowmobile users.

Mammals may show less of an overt response to human disturbance when winter conditions are particularly severe and energy conservation is at its most critical (Knight and Cole, 1995). Impacts may be at the individual or population scale and may be either short- or long-term.

Despite the apparent contradictions in the literature, many studies seem to indicate that snowmobiling may affect wildlife under certain conditions. Although population level impacts may exist, only impacts at the individual and local level have been demonstrated. Appropriate management can mitigate many of the negative effects.

Ungulates (White-tailed deer; Moose):

White-tailed deer expend more energy in winter than at other times of the year. To compensate, deer usually conserve energy by restricting their movements, particularly in late winter, when they lack fat reserves and snow is deeper, rather than increasing their food intake by foraging more widely (Moen, 1976). Energy conservation measures include walking slowly; on level ground. Thus, they are particularly vulnerable to disturbances that counter that energy conservation strategy.

Most ungulates react more strongly (are more likely to flee, travel a greater distance) to a person on foot than a person on a snowmobile. Stopping or getting off a vehicle creates more disturbance than a person on a continuously moving snowmobile (Oliff et al. 1999). Response to snowmobiles is greater in areas open to hunting than in areas closed to hunting.

In Yellowstone National Park, heavy human activity was found to temporarily displace most wildlife from an area within about 190 feet of the trail (Oliff et al. 1999). However, at greater distances, responses of elk and bison to snowmobiles were generally infrequent and brief (White et al. 2004).

No active flight responses were seen at distances greater than 650 ft. Response intensity increased with increasing size of a snowmobile group. White et al. (2004) concluded that energetic costs to elk from snowmobile disturbance were low, and that there were no population-level impacts on elk. The disturbance of wildlife tends to be less when human activities are fairly predictable both in location and behavior. Animals may habituate to predictable disturbance, and show less of a behavioral or physiological response. Snowmobile activities on fixed designated trails create fewer disturbances than activity that occurs randomly across the landscape. (Oliff et al. 1999).

Wildlife seem to demonstrate a less intense response to disturbance when there is some sort of visual barrier between them and the source of disturbance created by vegetation and/or topography (Oliff et al. 1999).

Deer and moose are more likely to forage in the early morning or evening, therefore, these are the times they are most likely to encounter, and possibly, be disturbed by snowmobiles (Oliff et al. 1999).

Severinghaus and Tullar (1975) suggested that snowmobile disturbance might be energetically costly to deer. Although deer sometimes use snowmobile trails, those trails may not lead to the best foraging areas, or may help to concentrate foraging in a restricted area and contribute to over-browsing. They recommended keeping snowmobile trails at least 0.5 miles from deer wintering areas.

In a controlled experiment, Freddy et al. (1986) found that snowmobiles invoked flight responses in mule deer at distances < 440 ft. Distances traveled by fleeing deer averaged 330 ft. Deer demonstrated low levels of response (alerting) up to distances of about 1540 ft. Freddy et al. suggest that keeping snowmobile trails > 1500 ft from deer would minimize any disturbance. The study found no evidence of increased mortality or impairment of reproduction, but deer may not have been disturbed often enough to show an effect.

Eckstein et al. (1979) experimentally exposed white-tailed deer to snowmobile activity, and found no differences in home range size, habitat use, or activity by white-tailed deer in areas with snowmobile activity vs. areas without it. However, deer were displaced from an area within 200 ft. of snowmobile trails. The study found that deer were less disturbed by snowmobile activity at night than during the day. Deer were found to use snowmobile trails occasionally, but did not seem to use snowmobile trails in preference to their own trails, or follow snowmobile trails beyond their normal wintering area. They concluded that, although there might be some energy savings for the deer from using snowmobile trails, the effects of snowmobiles forcing deer off trails would counter balance those savings. They also recommended that snowmobile trails avoid deer wintering areas by rerouting through upland deciduous forest wherever possible.

Richens and Lavigne (1978) also found that white-tailed deer in Maine sometimes used snowmobile trails for short distances (< 660 ft), especially when they were near bedding areas. Deer were more likely to use snowmobile trails under more severe winter conditions, when snow depths were greater. Deer were less likely to use snowmobile trails on wide logging roads that were less sheltered. Unlike the Eckstein et al. (1979) study, Richens and Lavigne found that deer could be persuaded to follow snowmobile trails over a mile beyond their own trail system when improved forage was provided at the new location. The study suggests that snowmobile trails could be laid out in deer wintering areas in a way that could benefit deer, by improving their mobility, reducing energy costs, and providing

access to better foraging areas. Deer continued to use bedding areas close to snowmobile trails and did not appear to alter their activity patterns in response to snowmobiles, but snowmobile traffic in their study area was relatively light. The flight responses of deer to snowmobiles varied, depending on severity of winter, snow depth, type of cover, and time of day. Deer were more likely to flee from snowmobiles in early winter than in late winter. The poor condition of deer towards the end of winter may have contributed to this reduction in flight tendency. Richens and Lavigne also found deer were more likely to flee from snowmobiles traveling at high speeds than at low speeds (< 10 mph).

In contrast to some other studies, Dorrance et al. (1975) found increases in white-tailed deer home range size, movement, and distance to snowmobile trails with increased snowmobile activity for an area previously closed to snowmobile use (but open to hunting). Deer failed to show these changes in movement patterns with increased snowmobile activity at a second study site that was open to snowmobile traffic but closed to hunting. At the second site, deer were displaced from the immediate vicinity of active snowmobile trails, but usually returned shortly after snowmobile activity stopped. That effect was seen even at very low levels of snowmobile activity. The habituation of deer to snowmobile activity may have been facilitated at this second site, where hunting was not permitted. However, in this study, displacement of deer from snowmobile trails probably did not result in a significant impact on deer except during particularly severe winters and/or on poor winter ranges.

Huff and Savage (1972) found that white-tailed deer in Minnesota utilized conifer (jack pine) areas with dense canopy cover during the middle of the week when snowmobile traffic was light, but shifted to a more open canopy aspen-birch stand during weekend heavy-use periods. They reported that radiant heat loss was higher in the aspen-birch stand than in the jack pine.

Even animals that do not show an overt change in behavior, such as flight, in response to disturbance, may still undergo physiological changes indicative of stress. Creel et al. (2001) measured glucocorticoid of elk exposed to snowmobile activity in Yellowstone National Park. Elevated glucocorticoid secretion is indicative of stress, and if prolonged, can impair immune system and reproduction function. Elk were found to have higher glucocorticoid levels during snowmobile season than immediately post-season. In addition, glucocorticoid levels were found to increase with increasing daily snowmobile activity. Despite increased stress on elk during snowmobile season, Creel found no evidence that survival or reproduction of elk was being affected. Similarly, Moen (1982) found that heart rates of captive white-tailed deer increased when they were approached by snowmobiles, even when no change in their behavior was discernible. Deer also failed to habituate to snowmobiles (as measured by elevated heart-rates) over the course of the experiment. Moen (1982) suggested that there might be an energy cost to elevated heart-rate.

Although moose are considerably better adapted to deep snow and winter conditions than deer, severe winters can still stress them if food supplies are exhausted or if they are in poor condition. Like deer, moose tend to reduce their activity levels in winter as an energy conservation measure, and disturbances that cause them to increase their activity come at an energetic cost.

Collescott and Gillingham (1998) found that moose that bedded down within approximately 1000 ft. of an active snowmobile trail, or fed within 500 ft. of snowmobile traffic were likely to change their behavior in response to snowmobile disturbance. Moose within 1000 ft of snowmobile traffic were sometimes temporarily displaced into less favorable foraging habitat. However, they did not find

a significant impact on moose activity patterns within their study area associated with snowmobile traffic. Moose, in general, appear to habituate fairly readily to vehicle activity and will flee at shorter distances if they have become habituated.

Black Bears

Black bears will abandon den sites if humans on foot disturb them sufficiently, and may abandon cubs (Goodrich and Berger 1994). Bears that abandon or change dens may remain active longer and experience more weight loss than undisturbed animals. Bears are particularly vulnerable to disturbance just before denning (generally November- December), and just after they emerge from dens in the spring (March-April) (Olliff et al. 1999).

Other Carnivores (Fisher, marten, weasels, red fox, coyote)

Little research has been done on disturbance affects on any of these species. However, fishers do not appear to alter their activity significantly in response to moderate levels of human disturbance. When disturbed, females fishers may move their den sites (Olliff et al. 1999). Weasels and pine marten frequently tunnel under the snow when foraging. Snow compaction caused by snowmobile trails may affect their foraging ability locally, as well as negatively impact prey populations (small mammals).

Neumann and Merriam (1972) found that red foxes exhibited greater levels of activity near snowmobile trails and were using trails as travel corridors. Creel et al. (2001) also found that wolves used snowmobile trails in conditions of deep snow. Coyotes increase their use of snowmobile trails during severe winters as well (Crete and Lariviere, 2003).

Other Mammals (snowshoe hare, small mammals)

Neumann and Merriam (1972) found that hare activity was reduced within 250 ft. of snowmobile trails. They also found that a single passage of a snowmobile could significantly alter the insulating properties and temperature gradient of snow to a depth of two feet. Those changes in temperature regime were potentially great enough to increase energy costs to small mammals burrowing under the snow.

Jarvinen and Schmid (1971) found a significant increase in mortality of small mammals in an area where snow had been compacted experimentally by snowmobiles. Small mammals did not appear to migrate off-site in response to snowmobile activity. They suggested that causes of mortality might have been related to the reduced insulating capacity and increased thermal conductivity of the compacted snow which may have increased thermal stress on animals. Snow compaction may also have limited movement of animals and reduced the permeability of the snow to a point that inhibited gas exchange and increased levels of carbon dioxide above normal. If extensive, off-trail snowmobile activity compacts large areas of snow, the impacts on small mammal populations may be significant (Olliff et al. 1999).

Birds

Bald eagles appear to remain near Umbagog Lake throughout the winter. Eagles are particularly sensitive to disturbance early in the breeding season, including the period from nest site selection through incubation. Disturbed birds may abandon a nest site. As with other species, predictable traffic along designated routes appears to produce the least amount of disturbance. Random

movement by snowmobiles, together with high operator visibility, may make snowmobiles particularly disturbing to eagles (Oliff et al. 1999). Eagles foraging on the ground or on carcasses on ice are especially sensitive to disturbance (Oliff et al. 1999).

Migratory birds that breed in the refuge depart for their wintering habitats long before snowmobile use starts, and typically do not return before it ceases. Bald eagle nesting activity generally begins in the Umbagog area in late winter-early spring (February-March). The potential therefore exists that snowmobile activity could impact eagles. Winter eagle management guidelines for Yellowstone National Park (Oliff et al. 1999) recommend a buffer of up to 1300 feet around frequently used foraging and perching locations (depending on visual screening from topography and/or vegetation), and a quarter-mile to half-mile buffer around nest sites.

Anticipated impacts of snowmobile activity on refuge wildlife include displacement of wildlife immediately adjacent to trails and some potential for contamination of streams with sediment or exhaust. The current route of New Hampshire Trail 18 traverses mixed and hardwood forest, and does not pass through any known deer wintering areas, nor does it closely approach any known eagle or other raptor nest sites. Trails on the Maine side of the refuge may pass through deer wintering areas, near raptor nests, and/or through sensitive wetlands. We will assess these trails and may re-route or close some of them if significant resource impacts seem likely. Installation of well-constructed and maintained culverts or bridges over stream crossings should help to minimize the contamination of streams and impacts to stream amphibians. Much of the disturbances to wildlife are from snowmobiles that are not on a designated trail and are traveling all over the landscape in unpredictable ways. Restricting snowmobile traffic to designated trails helps to increase predictability. Most existing trails have been in place for decades and predate the establishment of the refuge.

Habitat Impacts

Vegetation

Several studies have found snowmobile damage vegetation. That may involve direct, mechanical damage as well as the alteration of soil and substrate conditions important for plant growth. The extent of impacts depends on the plant species, their sensitivity to cold and mechanical damage, snow depth, winter severity, and soil type and slope, among others.

Neumann and Merriam (1972) found that after a single passage by a snowmobile, over 25 percent of all tree saplings at or above the snow surface were damaged severely enough to cause mortality. Seventy-eight percent of saplings showed some signs of damage. Species with rigid woody stems were the most vulnerable. All vegetation above the snow surface was eliminated mechanically in heavily traveled areas.

Wanek (1974; 1971) found that soil temperatures were significantly colder and more variable under snowmobile trails than under un-compacted snow. That change occurred after the first snow compaction event. Soil froze sooner, deeper, and remained frozen for a longer time than under un-compacted snow. Soils under snowmobile tracks thawed out as much as 3 weeks later than under control areas. Temperature regimes varied, depending on the soil type. Sandy soils remained colder in the winter than did organic soils. Soil temperatures under hardwood forests remained colder

than under softwoods. The growth of microbial populations in litter under snowmobile trails was significant, but recovered. Some species of spring plants under snowmobile trails experienced up to 20 percent winter mortality, or no growth, delayed growth, or delayed or reduced flowering. Underground root structures were frozen and damaged in some instances. Species with large underground storage structures experienced the greatest damage due to freezing. Wanek (1974) also found that in an alfalfa field subjected to snow compaction by snowmobiles, productivity decreased by 24 - 33 percent. Weedy species also showed an accompanying increase. The decline in productivity was steeper during a more severe winter than during a milder winter. Wanek (1974; 1971) also found conifer sapling damage and mortality from snowmobile trails, particularly under low snow conditions. The damage to white spruce was highest. Some species, including trembling aspen and raspberry, increased in areas of snowmobile activity.

Bogs appear to be particularly sensitive to snowmobile activity. Wanek (1974) found a decline in some bog plants, with increasing snowmobile activity. Although sphagnum appeared to be unaffected, declines were observed in bog laurel, leather leaf, small cranberry, and pitcher plant. Impacts appeared to be due to mechanical damage, cold penetration, and desiccation.

Pesant et al. (1985) tested the effects of snowmobiling on agricultural fields. They found that in certain forage types, snowmobile trails resulted in reduced or delayed spring growth, changes in species composition, and reduced forage yield. Impacts were attributed to reduced soil temperatures under compacted snow, and deeper frost penetration into the soil, with accompanying damage to plants. Foresman et al. (1976) also found an early spring reduction in the growth of bluegrass under snowmobile trails, but found that vegetation had recovered by early summer. Matted vegetation under snowmobile tracks may have kept soil temperatures lower in the spring, and made it physically more difficult for new growth to penetrate the matted layer.

Keddy et al. (1979) found that snow compaction was greatest when snowmobiles traversed an area on several different days (increased frequency) than if they traversed the same area multiple times on the same day (increased intensity). Increased frequency of snowmobile use resulted in a decrease in standing crop on an old field, but no significant decrease occurred with greater intensity. Some shift in plant community structure also was noted. No significant impacts on vegetation were observed on an ice-covered marsh. Negative impacts of snowmobiling on vegetation may result from lower temperatures affecting buds and food storage structures, and longer snow retention in the spring may affect early germination and growth. Matting of vegetation may affect seed dispersal from previous year's seedpods.

Boucher and Tattar (1975) found that damage to vegetation and soils was greatest where snowmobile trails were located on steep (> 30 degrees) south-facing slopes. Damage primarily resulted from decreased snow depths (due to greater solar radiation), together with increased pressure of snowmobile treads on steeper slopes. On steep slopes, the surface organic layer, and in some instances the upper soil layer, were lost. Damage to plants included not only above-surface parts, but also damage to shallow root systems. Although vegetation recovered on flatter areas receiving moderate use, highly disturbed steep slopes did not.

Soil and Litter

The compaction of snow under snowmobile trails results in changes in thermal conduction and snow structure that cause snowmobile trails to melt more slowly in the spring and can create partially anaerobic conditions. The rates of litter decomposition may slow as a result. Neumann and Merriam (1972) found that the water holding capacity of snowmobile trails was significantly reduced. That could reduce the ability of the snow to hold water during spring run-off.

In contrast to this, Aasheim (1980) suggested that the delayed melting of compacted snowmobile trails might actually contribute to a reduction in peak run-off amounts.

Boucher and Tattar (1975) found that snowmobile activity on steep, south-facing slopes could disrupt or remove the surface layer of soil and increase erosion during spring rains. Some reports (Aasheim, 1980), indicate that soil erosion may be reduced on flatter areas under some circumstances because the compacted snow on snowmobile trails may protect against erosion from spring run-off.

There appears to be general agreement that snowmobile activity on steeper slopes can increase erosion, particularly with shallow snow depths and vegetation disturbance.

The impacts of snowmobiles on soils and vegetation under shallow snow conditions may be as significant as when snowmobiles travel on bare ground (Hammit and Cole, 1998).

Foresman et al. (1976) found no evidence of soil compaction under snowmobile trails.

The anticipated impacts from snowmobiling include damage to vegetation from snowmobile activity during the winter and from brush clearing during the fall, and some potential for soil erosion. There are no known rare plants or plant communities along the present route of trail 18. Because much of trail 18 is on a pre-existing road, where soils have already been compacted and vegetation has been removed, additional damage to vegetation and erosion should be minimal. Although the majority of trails on the Maine side of the refuge are also on roads, we will need to evaluate all Maine trails and may re-route or close them to minimize impacts. The maintenance of the Mountain Pond Rd. for snowmobile use encourages traffic by wheeled vehicles during the summer; they frequently drive on the road when the road is wet, thus increasing the potential for erosion. Installing gates at both ends of the road to prevent entry of vehicles outside of the snowmobile season will avoid that impact.

Dogsledding

Impacts to habitats and animals from dogsledding are similar to snowmobiling for all subject headings up to this point, except for the following. Wildlife exhibit a strong physiological response to dogs and dogs accompanied by humans (Miller et. al. 2001, Sime 1999). Deposition of canine feces provides a potential disease vector for wildlife (Sime 1999). While these potential disturbances would be contrary to the establishing purposes of the refuge, they are mitigated in large part by the low volume of dogsledding on the refuge and the location of trails along existing trails outside of deer wintering areas. Dogs used for dogsledding are not free roaming and will therefore keep to the trails.

Pollution

Water Quality

Adams (1975) found high levels of hydrocarbons after ice-out in the water of a small (2.5 ac), shallow pond that had been experimentally exposed to snowmobile exhaust. Brook trout exposed to the pond water were shown to have incorporated exhaust components (hydrocarbons). Hydrocarbons increased from undetectable levels in the water, pre-treatment to 10 ppm, post-treatment. Exposed fish exhibited hydrocarbon levels of up to 1 ppm. Petroleum hydrocarbons can have pathological effects on fish at very low levels (<10 ppb) and may negatively impact reproduction and foraging (Adams, 1975). Hydrocarbon concentrations were highest near the water surface after ice-out. Fish may be particularly vulnerable to hydrocarbon contamination in the early spring because they may be in poorer condition, and are more likely to be active near the water surface. The concentration of hydrocarbons in snow is likely to be particularly high on trails where regular grooming constantly packs exposed snow (Oliff et al. 1999). Spring snowmelt may release those hydrocarbons into streams and other bodies of water (Oliff et al. 1999). To what extent the bodies of water on the refuge are at risk of hydrocarbon pollution is unclear, given current levels of snowmobile use, recent improvements in snowmobile technologies, and large water volumes.

Air Quality

Bishop et al. (2001) found that snowmobiles accounted for 27 percent of the annual emissions of carbon monoxide in Yellowstone National Park, as well as 77 percent of the annual hydrocarbon emissions. Carbon monoxide production was reduced by 13 percent for vehicles using oxygenated fuels, but hydrocarbon emissions were unaffected. Fan-cooled snowmobiles had lower hydrocarbon emissions than liquid cooled machines.

Although automobiles substantially out-number snowmobiles 16:1 in Yellowstone during the winter, snowmobiles are responsible for up to 90 percent of hydrocarbon and up to 69 percent of carbon monoxide emissions in the park (US GAO, 2000). Additionally, 25 percent to 30 percent of snowmobile fuel is released unburned into the atmosphere (US GAO, 2000).

The anticipated impacts from snowmobiles include some exhaust emissions to the air and possibly refuge streams. The refuge currently has no data on stream or air quality. Only a few small streams are crossed by New Hampshire Trail 18 and with appropriately constructed bridges it is expected that water pollution impacts will not be significant. The refuge has surveyed for stream salamanders on some of the streams crossed by Trail 18, but has not detected any differences in salamander populations that could be reliably attributed to snowmobile-caused pollution. Trails on the Maine side of the Refuge will need to be assessed and evaluated for potential negative impacts. Some of these trails may be re-routed or closed, should conditions warrant.

Noise

Snowmobile noise is readily detectable by wildlife at distances up to several kilometers. The effects of disturbance on wildlife are quite variable, and many species seem to be capable of habituating to it (Bowles, 1995). There is no clear evidence for noise having an impact at the population level (Bowles, 1995). Noise may have an impact on the experience of other human users on the refuge.

We have not measured noise levels on the refuge, but they are probably significant near trails and on Umbagog Lake during busy winter weekends. Because of the ability of snowmobile noise to travel over great distances, much of the noise on the refuge probably comes from off-refuge snowmobile activity, over which the refuge has no control, as well as from on-refuge activity. We can minimize user conflicts among users by restricting snowmobile use to designated trails, thus leaving much of the remainder of the refuge open to other users.

Summary of Anticipated Impacts

Although the information available about the effects of snowmobiling on designated trails is incomplete, at its current and anticipated levels and patterns of use, we do not expect it to constitute significant short-term or long-term impacts separately or cumulatively. We will evaluate all trails every 5-years to ensure there are not site-specific impacts. We may re-route or close some trails if we determine that they have a significant, negative impact on wildlife or habitat.

Snowmobile trails are located almost entirely on existing gravel roads built to support commercial logging operations. The use of those roads as the location for the trails has effectively mitigated impacts of snowmobiling relating to soil and vegetation on those surfaces. The bridges and culverts crossing the water courses are designed to support trucks and other heavy equipment. Therefore, additional impacts from snowmobiling are unlikely. Snowmobile trails throughout the area have been established for many years and pre-date refuge ownership. Because the wildlife potentially affected are accustomed to that use, we consider impacts on wildlife minimal. Increases in emission regulations by the EPA, along with the increase in the number of 4-stroke and new cleaner 2-stroke engines in modern snowmobiles has and will continue to reduce the potential impacts on the environment described in the literature review. The increased presence of a law enforcement officer and zone officer will ensure stipulations that support the compatibility of this use. Therefore, snowmobiling and dogsledding on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP. Our continued monitoring of the effects of snowmobiling is necessary to understand better their impacts on refuge habitats, plant and wildlife communities, and human visitors. Monitoring will identify any actions needed to respond to new information and correct problems that may arise in the future.

Snowmobile trails on the refuge provide an important link in the state trail system, enhance opportunities for the public to experience the winter landscape, and facilitate priority public uses. This will potentially benefit Goal 4 “Provide high quality wildlife dependent activities” of the CCP by providing opportunities during winter months for wildlife observation and photography and access for hunting. Opportunities also exist to interpret the refuge along the snowmobile trail system. Goal 6 of the CCP “Enhance the conservation...through partnerships...” will also benefit from this activity by establishing the refuge as a partner with State and community economic and conservation groups. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment:

As part of the CCP process for LUNWR this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EA. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

DETERMINATION: THIS USE IS COMPATIBLE X
THIS USE IS NOT COMPATIBLE _____ (check one)

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY

1. Snowmobiles and dogsleds will only be permitted on designated trails (map C-4).
2. Snowmobile trails will only be open for use when all areas of the trail have generally contiguous snow cover.
3. All trails will be located on existing roadbeds, wherever possible, to minimize vegetation damage. Trails will also be kept away from streams to avoid erosion. Where stream crossings are unavoidable, siting and construction of bridges or culverts will follow best management practices, and crossing structures will be maintained in good repair.
4. Trails will be located away from areas of unique or sensitive vegetation, such as bogs or wetlands.
5. Snowmobile trails will be located so that they are away from deer wintering areas and do not run between deer bedding and feeding areas. Trails will also be located in upland deciduous forest, and will be kept out of drainage bottoms and coniferous riparian areas important for wildlife such as fisher, marten, and moose, wherever possible.
6. All trails will be surveyed for signs of wildlife activity, sensitive vegetation, or erosion potential, and trail locations will be entered into a geographic information system. We will use that information to guide routing, re-routing, or closure of trails. Biological inventories will continue to provide baseline information for measuring change. Should the monitoring and evaluation of the use indicate that the compatibility criteria have or will be exceeded, appropriate action will be taken to ensure continued compatibility, including modifying or discontinuing the use.
7. The refuge will institute a public outreach program (brochures, signs) to help educate the public about refuge regulations, safety, and how to minimize disturbance of wildlife.
8. Routine law enforcement patrols will be conducted throughout the year to promote compliance with refuge regulations and provide educational outreach, help monitor public use patterns, public safety, and document visitor interactions. Refuge officers may record visitor numbers, vehicle numbers, visitor activities, and locations of the activities to document current and future levels of refuge use. Conditions that are a risk to public safety will be identified, and appropriate action will be promptly taken to correct such conditions.

JUSTIFICATION: This use has been determined to be compatible provided the stipulations necessary to ensure compatibility are implemented, and the use does not exceed thresholds necessary for visitor safety and resource protection. Snowmobiling on Lake Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul J. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leger 1-9-09
(Signature and Date)

Mandatory 10-year re-evaluation date: January 9, 2019

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Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Bicycling

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed? First time use has been proposed.	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources? Public understanding and appreciation only.	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul L Casey

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence.

If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Janet M Kennedy

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Bicycling

Narrative

We are proposing to open the Refuge to bicycling to facilitate priority public uses. Current levels of this use are low and this use often occurs concurrently and without conflict with other public uses including priority public uses. This use would provide the public with an increased opportunity to participate in priority public uses. It is an alternate method of travel to view the refuge’s resources and participate in allowable public uses.

COMPATIBILITY DETERMINATION

USE: Bicycling

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 [16 U.S.C. 3901 (b)]
2. Migratory Bird Conservation Act [16 U.S.C. 715d]
3. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)]
4. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(b)(1)]

PURPOSE(S) FOR WHICH ESTABLISHED:

1. “the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions...” [16 U.S.C. 3901(b); Emergency Wetlands Resources Act of 1986]
2. “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds...” [6 U.S.C. 715d; Migratory Bird Conservation Act]
3. “for the development, advancement, management, conservation, and protection of fish and wildlife resources...” [16 U.S.C. 742f(a)(4); Fish and Wildlife Act of 1956]
4. “for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...” [16 U.S.C. 742f(b)(1); Fish and Wildlife Act of 1956]

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The use is bicycling. Bicycling when considered by itself is not a priority use of the National Wildlife Refuge System.

(b) Where would the use be conducted?

The use would be conducted on designated routes of travel open to public access throughout the refuge. Bicycles are considered vehicles and are therefore limited to the designated routes of travel

for motor vehicles and trails designated for bicycle use (currently, this includes the middle section of Mountain Pond Road). No other trail or off-road bicycling will be allowed. Please refer to Map C-1 for locations of designated routes of travel.

(c) When would the use be conducted?

This use will be conducted from the Wednesday before Memorial Day weekend through Fall.

(d) How would the use be conducted?

We are proposing to open the Refuge to bicycling to facilitate priority public uses. Current levels of this use are low and this use often occurs concurrently and without conflict with other public uses including priority public uses.

This use would provide the public with an increased opportunity to participate in priority public uses. It is an alternate method of travel to view the refuge’s resources and participate in allowable public uses.

At the discretion of the Refuge Manager, some areas may be seasonally, temporarily, or permanently closed to bicycling if wildlife or habitat impacts, or if user conflicts become an issue.

(e) Why is the use being proposed?

The use is being proposed by the refuge to facilitate access to the refuge for the public to participate in priority public uses.

(f) Availability of Resources:

The resources necessary to provide and administer this use are available within current and anticipated refuge budgets. Staff time associated with the administration of this use is primarily related to answering general questions from the public and monitoring impacts of the use on refuge resources. This activity is administered by the refuge staff, who assess the interactions among user groups and any related user impacts. Resource impacts will be monitored by refuge staff, under the supervision of the refuge manager. The use of refuge staff to monitor the impacts of public uses on refuge resources, and visitors is required for administering all refuge public uses. Therefore, these responsibilities and related equipment are accounted for in budget and staffing plans.

Costs associated with bicycling are estimated below:

<i>Routine maintenance:</i>	\$1,000	annually. This is the expected cost to maintain roads and signs due to impacts from bicycling.
<i>Supplies and materials:</i>	\$200	This includes signage for brochures (produced inhouse).
<i>Monitoring:</i>	\$500	annually.
<i>Law Enforcement:</i>	\$1,000	annually for a Refuge Officer.
<i>Total:</i>	\$2,700	

We do not anticipate charging fees.

Anticipated Impacts of the Use:

Access and use of the refuge for non-commercial bicycling on designated roads and trails poses a minimal threat of impact to the refuge achieving Goal 3 “Manage Upland Forest Habitats” as written in the CCP

Bicycle use can cause soil compaction and erosion, particularly when soils are wet, which can degrade plant communities. Soil compaction can diminish soil porosity, aeration, and nutrient availability. Bicycle tires could alter drainage features of roads and trails by increasing water channeling and erosion. These impacts will be minimized since bicycling will be allowed on designated routes of travel for motorized vehicles and multiple use trails. These designated routes of travel are along existing gravel roads which have been designed for heavier vehicle use. These roads will be monitored and maintained by refuge staff. Regular and corrective maintenance should address any impacts caused by bicycling.

Disturbance to wildlife from bicycle use is expected to be minimal and temporary from the mere presence of humans. Current levels of use are low and impacts of this disturbance are considered negligible. Refuge staff will monitor the levels of use over time.

No other refuge goals and objectives, as written in the CCP, will be affected by this use. No negative or cumulative long-term impacts are anticipated from allowing this use, however programs may be modified in the future to mitigate unforeseen impacts.

Public Review and Comment

As part of the CCP process for Lake Umbagog NWR this compatibility determination will undergo extensive public review, including a comment period of 30 days following the release of the Final Environmental Impact Statement.

Determination (check one below):

Use is Not Compatible

Use is Compatible With the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

- A refuge officer will help to promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions.
- Access to the refuge by bicycle is limited to the designated routes of travel. No other trails, logging roads, skid trails or firebreaks are permissible.
- Providing outfitting or guided bicycle trips on the refuge requires a special use permit, issued by the refuge manager and considered case by case for impacts to wildlife, habitat and other uses or management activities.
- Outreach and signage will be used to orient potential bicyclists to appropriate areas.

Justification: Bicycling has been determined to be compatible provided the above stipulations are implemented. The use of bicycles to facilitate priority public uses is a reasonable mode of access on designated routes of travel. Monitoring would be conducted to ensure that this use remains compatible. If significant impacts are found, corrective actions would be taken to protect refuge resources. Recreational bicycling on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul L. Cary 1-6-09
Signature and Date

Concurrence: Regional Chief: Anthony D. Legis 1-9-09
Signature and Date

Mandatory 10-year Re-evaluation Date: January 9, 2019

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Horseback riding

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed? First time use has been proposed.	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources? Public understanding and appreciation only.	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul F Casey

Date: 1-6-07

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence.

If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Janet McKenna

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Horseback riding

Narrative

Horseback riding on designated trails on the refuge provides increased opportunity for public participation in priority public uses. It is an alternative method of travel to view the refuge’s diverse natural resources. It is anticipated that horseback riding would facilitate wildlife observation, wildlife photography and interpretation.

COMPATIBILITY DETERMINATION

USE: Horseback riding.

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 [16 U.S.C.3901 (b)]
2. Migratory Bird Conservation Act [16 U.S.C. 715d]
3. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)]
4. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(b)(1)]

PURPOSE(S) FOR WHICH ESTABLISHED:

1. “the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions...” [16 U.S.C. 3901(b); Emergency Wetlands Resources Act of 1986]
2. “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds...” [16 U.S.C. 715d; Migratory Bird Conservation Act]
3. “for the development, advancement, management, conservation, and protection of fish and wildlife resources...” [16 U.S.C. 742f(a)(4); Fish and Wildlife Act of 1956]
4. “for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude...” [16 U.S.C. 742f(b)(1); Fish and Wildlife Act of 1956]

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The use is horseback riding to facilitate priority public uses on the Umbagog National Wildlife Refuge. Hunting, fishing, wildlife observation, photography, environmental education and interpretation are priority public uses of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57). Horseback riding on designated trails on the refuge provides increased opportunity for public participation in priority

public uses. It is an alternative method of travel to view the refuge's diverse natural resources. It is anticipated that horseback riding would facilitate wildlife observation, wildlife photography and interpretation.

(b) Where would the use be conducted?

The refuge will allow travel on Mountain Pond Rd. and the snowmobile trail that connects the south end of Mountain Pond Rd. to Rt. 26 (see map C-1).

(c) When would the use be conducted?

The horseback riding trail would be open to horseback travel from May 15 through November 30.

(d) How would the use be conducted?

Horseback riding to facilitate priority public uses commonly involves observing natural features and animals from horseback. Riders stop frequently to observe associated plant communities and animals during their ride. Horseback riding for such purposes is done at a walking gait. Riding typically occurs either individually or in a small group of two to four riders. Horseback riding will be limited to the designated trail which has a packed gravel surface and the road can accommodate the safe passage of other users. The designated trail also has sufficient viewing distance for horseback riders to detect, in a timely fashion, other users and maneuver appropriately per rules of right-of-way.

Two gates will be installed: one on Mountain Pond Road south of Eames Road and the other on Mountain Pond Road north of the Potter Farm Road. The purpose of these gates is to only allow non-motorized use of the middle section of Mountain Pond Road except during the winter months when the gates will be opened for snowmobile trail use. These gates will be passable by horseback riders but not ATVs or other motor vehicles. No parking areas will be provided for horse trailers on the refuge.

Safety and information signs will be installed at refuge entry points and at appropriate sites where the designated trail intersects other roads and trails. Brochures depicting the trail will be available from the refuge office.

The trail designated for horseback riding will be, like all designated routes of travel, monitored at least annually to determine if they remain compatible with the allowable uses. Designated routes will be maintained in such a manner as is practical to minimize environmental impacts such as erosion and sedimentation and provide safe conditions for allowable travel.

A refuge law enforcement officer will routinely patrol the area and monitor the types and levels of use seen during patrols and make recommendations to avoid negative user interactions or correct potential safety concerns.

(e) Why is this use being proposed?

Horseback riding on the refuge provides an increased opportunity for the public to connect with nature and participate in priority public uses. Wildlife observation, wildlife photography, and environmental interpretation are Priority Public Uses as defined by The National

Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57), and if compatible, are to receive enhanced consideration over other general public uses.

Availability of Resources:

With the hiring of a refuge law enforcement officer, and a zone officer, the resources necessary to provide and administer this use, at current use levels, is available within current and anticipated refuge budgets. Staff time associated with administration of this use is related to general oversight of trail maintenance activities, issuing special use permits and monitoring compliance with permit conditions, law enforcement, monitoring public use, and monitoring resource impacts.

The refuge manager will administer the program. A wildlife biologist will monitor effects on refuge resources. Visitor use will be monitored by the refuge law enforcement officer. A refuge law enforcement officer will conduct law enforcement activities to provide for visitor safety and resource protection.

Annual costs associated with the administration of horseback riding on the refuge are estimated below:

<i>Overall Oversight of Program; Coordinate with States of NH and Maine:</i>	\$500	GS-13 Refuge Manager
<i>Law enforcement–patrol/visitor-resource protection/ public use monitoring/enforcement/outreach:</i>	\$1,000	GS-7 Refuge Officer
<i>Resource impacts/monitoring:</i>	\$1,000	GS-12 Wildlife Biologist, Deputy Refuge Manager
<i>Trail Maintenance:</i>	\$1,000	
<i>Signs:</i>	\$1,000	first year only
<i>Total:</i>	\$4,500	in the first year
	<u>\$3,500</u>	<i>thereafter</i>

Maintenance of the trails will be a combined effort between the refuge and snowmobile trail clubs (since the trails occur on snowmobile trails). Annual funding for maintenance listed above is for refuge maintenance only. See the snowmobiling compatibility determination for Umbagog NWR for snowmobile club responsibility. Law enforcement coverage on the refuge is occasionally supplemented by officers from New Hampshire Fish and Game and Maine Department of Inland Fisheries and Wildlife, at no cost to the refuge.

Anticipated Impacts of the Use:

Potential impacts of horseback travel include: soil compaction and erosion, downstream sedimentation, trampling and mortality of fragile plant communities, habitat loss/deterioration, wildlife disturbance, hydrologic changes, human health effects and a shift in plant communities along

trails. These potential impacts as reported in the literature and through in-field investigation and observation are listed below:

Impacts to plants: Horse travel can impact plants on trails by directly crushing them. Indirectly, horses can impact plants by compacting soils, which diminish soil porosity, aeration and nutrient availability (Kuss 1986). Hammitt and Cole (1998) noted that compaction limits the ability of plants to re-vegetate affected areas. Plants growing in wet or moist soils are the most sensitive to disturbance from trampling effects (Kuss 1986). Moist and wet soil conditions are common during spring and early summer and can occur on upland trails that have been incised and are channeling water.

Horse use may cause local impacts to plants and soils when confined (i.e. tied or tethered to a tree) since the horse could eat the bark, which could result in girdling of a tree or allow for insect invasion and subsequent damage. Localized soil compaction and subsequent soil erosion can also damage trees especially where roots are exposed.

It is anticipated that allowing this use will cause some vegetation loss on designated routes. Plant communities that occur on these routes are not rare or highly sensitive to disturbance based on available information. Erosion from horse hooves may increase root exposure, however it is anticipated that under current levels of use the incidence of this problem will be minor. Trails that have been found compatible for horse use are pre-existing routes that have been modified by vehicles or are still being used for vehicle access to the refuge.

Soil Impacts: Horses cause soil compaction, particularly when soils are wet which can directly affect plant growth and survival (Kuss 1986). Horseback riding has been found to cause braided trails in excessively muddy trail sections (Summer 1986). Weaver and Dale (1978) found horse use caused a greater loss of vegetation cover, wider and deeper trails, and greater soil compaction when compared to hiker use on meadow and forest trail conditions. Horses may cause trail erosion by loosening the soil and increasing soil particle detachment under both wet and dry trail conditions (Deluca et al 1998).

Kuss (1986) found that increasing moisture content of soils reduces the ability of the soil to support traffic. Summer (1986) recommended that horse trails be established on dry, well-drained sites.

It is anticipated that some soil erosion will occur as a result of horse hooves on soil surfaces. Soil compaction is likely to occur, however this is anticipated to be insignificant relative to the current soil conditions. Routes that have been found compatible for horse use include pre-existing roads open for vehicle use on the refuge and routes modified through grading and proper drainage located predominately on upland soils. Current levels of horse use of the designated routes are not expected to cause significant impacts to soils through compaction or erosion.

Invasive Species: Exposed soil and an abundance of sunlight along roads and trails provide ideal conditions for the establishment of invasive plant species. Invasive plant species may be transported into the refuge through the presence of exotic plant seeds in feed hay or horse manure.

The current known incidence of invasive plant species is relatively low on the refuge, however refuge staff are constantly monitoring for invasive plants. Japanese knotweed (*Polygonum cuspidatum*) and common reed (*Phragmites australis*) have been observed by refuge staff.

Based on current levels of use it is anticipated that no significant increases in invasive plant species will occur as a result of this use. The route proposed for horseback use is old logging roads that were planted with exotic grasses by logging companies. Therefore, increases resulting from horse use are anticipated to be relatively low.

Hydrologic Impacts: Roads and trails used for horseback travel can affect the hydrology of an area, primarily through alteration of drainage patterns. Bartgis and Berdine (1991) noted that roads and trails can divert water from their original drainage patterns in the Canaan Valley of West Virginia. This results in some drainages becoming dry while others accelerate erosion by being forced to carrying more water. Zeedyk (2002) documented many instances in the Canaan Valley of West Virginia where existing trails were channeling water away from historic wetlands and in some cases causing erosion and sedimentation of bog and other wetland communities.

It is anticipated that horse use could alter drainage features of trails through erosion and compaction. These changes are likely to be insignificant based on current levels of use and condition of proposed routes. The routes proposed for horse use are pre-existing gravel roads and snowmobile trails. No new routes will be created to accommodate this use. Routes found compatible for horseback riding do not appear to be significantly affecting the hydrology of refuge habitats.

Wildlife Impacts: Horseback travel can cause disturbances to wildlife using the refuge. Disturbances vary with the wildlife species involved and the type, level, frequency, duration and the time of year such activities occur. Whittaker and Knight (1998) noted that wildlife response can include attraction, habituation and avoidance.

Trails can disturb wildlife outside the immediate trail corridor (Trails and Wildlife Task Force 1998, Miller et al. 2001). Miller et al. (1998) found bird abundance and nesting activities (including nest success) increased as distance from a recreational trail increased in both grassland and forested habitats. Bird communities in this study were apparently affected by the presence of recreational trails, where “generalists” (American robins) were found near trails and “specialist” species (i.e. grasshopper sparrows) were found farther from trails. Nest predation was also found to be greater near trails (Miller et. al 1998).

Disturbance can cause shifts in habitat use, abandonment of habitat and increase energy demands on affected wildlife (Knight and Cole 1991). Flight in response to disturbance can lower nesting productivity and cause disease and death. Knight and Cole (1991) suggest recreational activities occurring simultaneously may have a combined negative impact on wildlife. Hammitt and Cole (1998) conclude that the frequent presence of humans in “wildland areas” can dramatically change the normal behavior of wildlife mostly through “unintentional harassment.”

Seasonal sensitivities can compound the effect of disturbance on wildlife. Examples include regularly flushing birds during nesting or causing mammals to flee during winter months, thereby consuming large amounts of stored fat reserves. Some uses, such as bird observation, are directly focused on

viewing certain wildlife species and can cause more significant impacts during breeding season and winter months.

The designated trail where horseback riding will be allowed has been consistently used for public access for a long period of time, possibly as long as 100 years. A biological assessment of the trail location revealed one osprey nest in close proximity to the proposed trail. Any affects of horseback riding on the trail will be evaluated over a 3-year period for potential negative impacts. A section of this trail may be re-routed if it is determined that they have a significant negative impact on wildlife and/ or habitat.

Impacts to wildlife may be indirectly caused through erosion and subsequent sedimentation of streams and vernal pools. Increased sediment loads can reduce aquatic vegetation and dissolved oxygen concentrations (Sadoway 1986). Sedimentation can directly kill aquatic invertebrates in which impacts the success of amphibian larvae and adults (Sadoway 1986). Observations by refuge staff in 2002 document numerous occurrences of amphibian egg masses that failed after becoming coated in sediment from eroding trails and roads nearby.

Anticipated impacts of horseback riding on wildlife include temporal disturbances to species using habitat on the trail or directly adjacent to the trail. These disturbances are likely to be short term and infrequent based on current levels of use. Use of some trails may cause direct impacts such as mortality (crushing amphibians foraging on grassy trails) to nest abandonment of bird species nesting on trails. Long-term impacts may include certain wildlife species avoiding trail corridors as a result of this use over time. Routes found compatible for horse use are located primarily in continuous tracts northern hardwood forest on the refuge. Smaller more sensitive wildlife habitat such as riparian, wetland and grassland areas were avoided. Based on existing levels of use horseback riding is not anticipated to significantly increase wildlife habitat fragmentation or cause significant impacts through disturbance.

User Conflicts

Conflicts between trail users are commonly reported in the literature (Knight and Gutzwiller 1995, Ramthun 1995, Watson et. al 1994, Chavez et al. 1993). Conflicts range from concerns over personal safety to certain user groups feeling that they should be given priority over other groups based on a past history or other reasons. Based on interviews with individuals and user groups, conflicts between groups are not significant in this area. This is likely due to the relatively low number of users in the area, as compared with heavy use and conflict sites reported in the literature. Providing safe routes for wildlife-oriented activities is an important consideration for wildlife observation trails on the refuge. Safety considerations include ability of multiple modes of access to use a trail without creating dangerous conditions, ability to maintain a trail to allow safe use, and timing of various uses such as wildlife observation and hunting activities. Horseback travel on the subject routes are considered safe under current conditions and levels of use.

Summary:

Any effects of horseback travel on the roads designated, are not, based on our current levels of knowledge, and at current and anticipated levels and patterns of use, considered separately or cumulatively, to constitute significant short-term or long-term impacts. The use is viewed as an effective and justifiable method of access that better enables the public to discover, experience, and

enjoy priority public uses on the refuge. Continued monitoring of the effects of horseback travel and associated human activities is necessary to better understand the influence of the use on refuge habitats, plant and wildlife communities, and visitors. Monitoring will identify any actions needed to respond to new information (adaptive management) and correct problems that may arise in the future. Therefore, horseback riding on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP.

Horseback riding to facilitate wildlife observation and photography and environmental interpretation can produce positive impacts to the wildlife resource. A positive effect of public involvement in these priority public uses will be a better appreciation and more complete understanding of the wildlife and habitats associated with northern New England ecosystems. This can translate into more widespread and stronger support for the refuge, the National Wildlife Refuge System and the Service. This will benefit Goal 4 “Provide high quality wildlife dependent activities” of the CCP by providing opportunities for wildlife observation and photography and access for hunting. Opportunities also exist to interpret the refuge (Goal 5 of the CCP) along the trail. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment:

As part of the CCP process for Lake Umbagog NWR this compatibility determination will undergo extensive public review, including a comment period of 30 days following the release of the Final Environmental Impact Statement.

Determination (check one below):

Use is Not Compatible

Use is Compatible with the following stipulations

Stipulations Necessary to Ensure Compatibility:

- Horseback travel to facilitate priority public use is only compatible on the designated trail and described in this compatibility determination and shown in Figures 1.
- Signs necessary for visitor information, safety, and traffic control will be installed.
- The refuge will conduct an outreach program to promote public awareness and compliance with refuge public use regulations.
- Horseback travel is allowed between sunrise and sunset.
- Camping and overnight parking are prohibited.
- Horses will not be tied to trees or confined on the refuge and must be accompanied by riders at all times.

- All routes designated for public access will be inspected at least annually for maintenance needs. Road and trail conditions that require immediate maintenance will be identified and appropriate action will be taken to correct such conditions. Prompt action will be taken to correct any conditions that risk public safety.
- Routine law enforcement patrols will be conducted throughout the year. The patrols will promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions. Conditions that have the potential to risk public safety will be identified and appropriate action will be promptly taken to correct such conditions.

JUSTIFICATION:

This use has been determined to be compatible provided the stipulations necessary to ensure compatibility are implemented, and the use does not exceed thresholds necessary for visitor safety and resource protection.

Public use areas would be monitored at various times of the year to assess wildlife disturbance. We would include information about proper etiquette and the effects of human impacts on habitat and wildlife resources in refuge publications and flyers. Periodic law enforcement would ensure compliance with regulations and area closures, and would discourage vandalism.

Horseback riding on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul F. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony J. Legé 1-9-09
(Signature and Date)

Mandatory 10-year Reevaluation Date: January 9, 2019

ATTACHMENTS:

Map C-1: Map showing the designated horseback riding trail.

CITATIONS

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Deluca, T.H., Patterson, W.A., Freimund, W.A. and Cole, D.N. 1998. Influence of llamas, horses and hikers on soil erosion from established recreation trails in western Montana, USA. *Environmental Management*. V22, No.2:255-262.

Hammitt, William E. and Cole, David N. 1998. *Wildland Recreation*. John Wiley & Sons, New York, 361pp.

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Summer, Rebecca. 1986. Geomorphic impacts of horse traffic on montane landforms. *Journal of Soil and Water Conservation*, 41:126-128.

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Weaver, T. and Dale, D. 1978. Trampling effects of hikers, motorcycles and horses in meadows and forests. *Journal of Applied Ecology*, 15:451-457.

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Zeedyk, Bill. 2002. Summary Report of Road Related Wetlands Impacts of the Canaan Valley NWR. 5 pp.

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Camping

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document? Establishing EA	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence. **(See Compatibility Determination for Justification).**

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul T Casey

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use. If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence. If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: James Kennedy

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Camping

Narrative

Before the creation of the Refuge in 1992, more than 20 campsites were located around Umbagog Lake. Most of these were leased year-to-year from private timber companies by Jim and Carolyn Willard, who managed them as part of a campground business (the Umbagog Lake Campground). Over the years, the industrial timberland around the lake changed hands. The new timber owners, including James River Co., Crown Vantage, Mead Paper Co. and Boise Cascade, generally renewed the lease agreements. The campground business included remote sites on the lakeshore and islands accessible only by boat, as well as a larger, multi-site base campground, accessible by car, on the south end of Umbagog Lake.

Starting in 1995, we began to acquire parcels on which some of those remote campsites were located. First, we acquired two islands with campsites in Leonard Pond, and a third in Thurston Cove from James River Co. We agreed to allow camping to continue at those sites, under the conditions specified in a special use permit issued to the Willards. In 1999, the State of New Hampshire bought the campground at the south end of Umbagog Lake and incorporated it into Umbagog State Park. The state continues to manage the facility as a state campground. In the spirit of the original Umbagog conservation partnership between the Service and both states, we agreed to maintain the existing level of camping on Umbagog Lake, by allowing camping to continue at remote sites on refuge lands.

Camping on the Refuge is a long-standing, popular use that pre-dates the creation of the refuge. Camping increases opportunities for the public to participate in priority public uses in a remote setting. Because many species of wildlife are most active at dawn and dusk, camping particularly facilitates wildlife observation, photography, hunting, and fishing. Visitors camping at remote sites enjoy the unique experience of hearing loon calls throughout the night during the breeding season.

COMPATIBILITY DETERMINATION

USE: Camping

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 (16 U.S.C 3901 (b))
2. Migratory Bird Conservation Act (16 U.S.C. 715d)
3. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4))
4. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1))

PURPOSE(S) FOR WHICH ESTABLISHED:

1. ...the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions... 16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)
2. ...for use as an inviolate sanctuary, or for any other management purpose, for migratory birds... 16 U.S.C. 715d (Migratory Bird Conservation Act)
3. ...for the development, advancement, management, conservation, and protection of fish and wildlife resources... 16 U.S.C. 742f(a)(4) (Fish and Wildlife Act of 1956)
4. ...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude... 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The use is overnight camping on refuge lands. Camping is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

Camping is a secondary use that facilitates and supports wildlife-dependent priority public uses including fishing, hunting, wildlife observation, and photography. Thirteen designated public campsites lie entirely on refuge-owned property. One additional campsite is located on the New

Hampshire-Maine border and is partially on refuge-owned land and partially on State of New Hampshire-owned land. The total is 14 campsites.

History of Camping on Umbagog Lake

Before the creation of the Refuge in 1992, more than 20 campsites were located around Umbagog Lake. Most of these were leased year-to-year from private timber companies by Jim and Carolyn Willard, who managed them as part of a campground business (the Umbagog Lake Campground). Over the years, the industrial timberland around the lake changed hands.

The new timber owners, including James River Co., Crown Vantage, Mead Paper Co. and Boise Cascade, generally renewed the lease agreements. The campground business included remote sites on the lakeshore and islands accessible only by boat, as well as a larger, multi-site base campground, accessible by car, on the south end of Umbagog Lake.

The Willards eventually purchased the 9.6 acre multi-site base facility on the south end of the lake from Crown Vantage, but continued to lease the remote campsites. The Willards also held an agreement with the Society for the Protection of New Hampshire Forests to maintain several remote campsites on Big Island, which the Society owned. The majority of the campsites were located on the New Hampshire side of Umbagog Lake, but a number were located on the Maine side, as well. The Umbagog Lake Campground is generally opened for the season on the first Friday of the Memorial Day weekend, and closes on or around September 15.

Starting in 1995, we began to acquire parcels on which some of those remote campsites were located. First, we acquired two islands with campsites in Leonard Pond, and a third in Thurston Cove from James River Co. We agreed to allow camping to continue at those sites, under the conditions specified in a special use permit issued to the Willards. In 1999, the State of New Hampshire bought the campground at the south end of Umbagog Lake and incorporated it into Umbagog State Park. The state continues to manage the facility as a state campground. In the spirit of the original Umbagog conservation partnership between the Service and both states, we agreed to maintain the existing level of camping on Umbagog Lake, by allowing camping to continue at remote sites on refuge lands.

In addition to those campsites that are part of Umbagog State Park, Mollidgewock State Park manages several additional campsites along the Magalloway and Androscoggin Rivers. In 2001, the Service acquired lands that included two of those campsites. Both are drive-in campsites, easily accessible from Route 16. One, (North 2) is located next to the Magalloway River; the other, (North 1), is on the Androscoggin River. The base facility of Mollidgewock State Park Campground is located on the Androscoggin River, 3 miles south of Errol, New Hampshire. Both campsites on Refuge land are now designated as group campsites. An additional Mollidgewock campsite, (North 3), is located off-refuge on private land, near North 2. To summarize, Umbagog State Park manages 12 of the 14 campsites on refuge lands, and Mollidgewock State Park manages two campsites (see map C-1).

Umbagog State Park currently manages 34 remote campsites around the lake, in addition to providing electrical and water hook-ups at 35 sites and 3 cabins at the base facility at the southern end of the lake (see Appendix 1). In addition to the 12 remote sites wholly or partly on refuge land, six sites are located on Big Island, owned by Society for the Protection of New Hampshire Forests, and 16 sites are located on land owned by the State of New Hampshire (see map C-1). The park at the south

end of the lake provides motorized and non-motorized boat rentals, boat fuel, a boat launch, and transportation to the remote campsites.

(b) Where would the use be conducted?

We will continue to conduct the use at the 12 remote campsites managed by Umbagog State Park: R3, R13, R14, R15, R16, R18, R21, R22, R23, R28, R29, and R35. We may close or relocate those sites seasonally or permanently, at the discretion of the refuge manager, to protect refuge resources. We will close all campsites accessible by car, including campsites North 1 and North 2, now managed by Mollidgewock State Park (see map C-1).

(c) When would the use be conducted?

The refuge will be open to camping during the period set annually by the State of New Hampshire, but no earlier than May 20, and no later than October 15th. At other times of the year, the refuge will be closed for camping. The periods when we close coincide with state closure periods. In some years, we may close certain campsites seasonally to protect such nesting birds as loons, osprey, bald eagles, and waterfowl, as well as for the purpose of research or for other reasons to protect resources. Closures to protect nesting birds generally occur between late May and early July, but may occur outside that period for birds attempting to re-establish nests.

(d) How would the use be conducted?

The State of New Hampshire and the refuge will cooperatively manage campsites. The State of New Hampshire Division of Parks and Recreation will be responsible for campsite reservations and routine site maintenance, and will assist with providing camping information and law enforcement, where appropriate. The refuge will cooperate with the state in improving campsites, where appropriate.

A number of boat launches both on and off Refuge lands provide boat access to the lake and remote campsites. Our compatibility determination for fishing describes boat access points. Map C-1 shows their locations. Camping will be permitted only at State designated sites. Although we may close or move campsites to protect refuge resources, we will maintain a level of camping on the lake consistent with current levels.

The state provides each remote campsite with a fireplace, picnic table, and pit toilet. When a pit toilets is full, the state fills in the pit and moves the toilet to a new pit. Drinking water is not provided. No trash pick-up is provided and campers must carry out all trash. Existing State campsite regulations follow:

- The maximum number of tents allowed per site is two, with the exception of group campsites.
- The maximum number of tents at group campsites is eight.
- The maximum length of stay of 14 nights.
- The maximum number of people per campsite is 6, except at designated group sites.
- The maximum number of people at group campsites is 16.

- Sites R2, R6, R15, R18, R23, R27, and R31 are designated as group campsites.
- Quiet hours are from 10:00 pm to 7:00 am.
- Pets are permitted, but must be supervised.
- Fires are permitted but must be kept within the fire ring provided. Wood should be under 16 inches in length and less than 5 inches in diameter. Unattended fires are not permitted.
- Firewood must be brought in to island campsites. Elsewhere, firewood gathering is currently permitted.
- R15, R18, and R31 are the group campsites on refuge land.

In cooperation with the State of New Hampshire, we intend to modify some of the regulations as follows:

- Pets are allowed at the main camp base only, no pets are allowed on remote campsites.
- No firewood gathering will be permitted on refuge lands. Campers must bring in all firewood.

We list additional refuge-specific regulations below under the section “Stipulations Necessary to Ensure Compatibility”.

(e) Why is this use being proposed?

Camping on the Refuge is a long-standing, popular use that pre-dates the creation of the refuge. Camping increases opportunities for the public to participate in priority public uses in a remote setting. Because many species of wildlife are most active at dawn and dusk, camping particularly facilitates wildlife observation, photography, hunting, and fishing. Visitors camping at remote sites enjoy the unique experience of hearing loon calls throughout the night during the breeding season.

Availability Of Resources:

Although camping is an ongoing use, we anticipate no expansion. Additional costs to administer the program should be minimal, because the State of New Hampshire now manages all campsite reservations and most campground maintenance. The resources for hiring a refuge officer to administer this use are available within current budget levels. FY2005 funds paid for a new car-top boat launch now under construction on the Magalloway River to help provide access to campsites. Staff time associated with administration of this use primarily relates to coordinating management of the program with the State of New Hampshire, assisting with some campsite restoration activities (usually accomplished through our annual Youth Conservation Corps program), providing law enforcement and outreach, and posting area closures near campsites to protect nesting wildlife

Costs associated with administering the program include:

<i>Administration and coordination with State of New Hampshire:</i>	\$1,000	
<i>Maintenance and campsite restoration (includes closure of illegal campsites, posting signs, vegetation restoration, closure of nesting areas, boat operation):</i>	\$5,000	(includes \$4000 one time expenditure for signs; ongoing maintenance costs for signs: \$500–\$1000/yr)
<i>Law Enforcement and Outreach:</i>	\$3,000	
<i>Campsite Monitoring:</i>	\$1,000	
<i>Total Cost of Program:</i>	\$10,000	year one
	<u>\$6,000</u>	<i>subsequent years</i>

Anticipated Impacts Of The Use:

Of the 12 campsites that we intend to keep open, five are located in lakeshore pine-hemlock habitat, five are in mixed conifer-hardwoods, and two are in balsam fir-floodplain forest. Four sites are on islands; the rest are on the mainland. All sites are accessible only by boat.

Illegal camping at non-designated sites also occurs regularly along the Magalloway River, Harper’s Meadow, in the Leonard Pond area, and elsewhere.

Sites 28 and 29 are both located on islands in Leonard Pond. Site 29 is approximately 400 meters from a traditional bald eagle nest tree and site 28 is approximately 500 meters from the nest tree. Two loon territories are also near these campsites, and nests are sometimes within 400 meters of one or both of the sites. Refuge sites 3, 14, and 15 are also within loon territories, and nest sites have been found within 250 meters of campsites. The State designates R15 as a group site.

The Refuge currently cordons off an area around the Leonard Pond eagle’s nest with ropes and signs to prevent visitors from approaching within 200 meters from May to September. Although the pair of eagles that nested at the site for many years was habituated to human disturbance, a new pair that replaced it appears to be more sensitive. We will continue to monitor the impacts of human activity on the new eagle pair will continue to be monitored. If necessary, we may adjust the size of the eagle closure area and/or seasonally close or move campsites 29 and 28.

In cooperation with the State of New Hampshire, we also close areas seasonally around vulnerable loon nests on the lake to the public, as the refuge manager deems appropriate. Those closures help ensure that visitors remain far enough away from nests to avoid disturbance. Occasionally, visitors do ignore closure signs, either inadvertently or deliberately, resulting in disturbance to nesting birds. Adding a refuge officer will provide greater opportunity for enforcement and public outreach on this issue.

The refuge also coordinates with the State of New Hampshire in closing campsites seasonally near loon nests with a history of disturbance, both on and off refuge-owned lands. Refuge campsites we have closed in the past include: 14 and 15 (Sunday Cove). State campsites include: 4 (Big Island), 8 (Tidswell Pt.), 30 (Black Island Cove), and 38 (Sargent Cove Point). Seasonal closures generally last

until the eggs hatch or the nest fails, generally from mid-May- early July.

We describe below the potential impacts of camping, as reported in the literature. Impacts may be locally quite severe, but are usually restricted to a relatively small area: i.e. the campsite itself (Marion and Cole, 1996). Significant impacts on vegetation and soil generally occur quickly, even with light use (Cole, 1981). Much of the impact occurs when the campsite is first opened and during the first year of use. Recovery of closed campsites is generally a much slower process. Even on fertile soils, full recovery may take over 6 years in some areas (Cole and Marion, 1988; Marion and Cole, 1996). For that reason, Cole (1981) recommends against dispersed camping and rotational closure of campgrounds.

Soil: Camping results in soil compaction and reduction in soil moisture content. It may reduce or remove the organic litter and soil layer, and run-off and soil erosion may increase. Those changes affect soil invertebrates and microbial processes, as well as inhibit plant growth. Fine-textured soils are particularly susceptible to compaction. Campsites with vegetated shorelines that are accessed by boat may also undergo shoreline erosion from the effects of repeated boat landings compacting soil and removing vegetation. Visitor use of the shoreline for swimming, dish washing, and collecting water may also trample vegetation, compact soil, and accelerate erosion. That erosion may expose tree roots, resulting in increased tree mortality due to wind throw. Existing picnic tables and fire rings tend to concentrate the use of campsites and limit campsite expansion. The refuge will work with the State to evaluate the condition of the campsites. If necessary, we will harden campsites and the shoreline, provide signage, and educate visitors about low-impact camping techniques.

Vegetation: The impacts of camping on vegetation are usually locally severe even, with low to moderate use; they include loss of ground vegetation cover, reduced vegetation height and vigor, loss of rare or fragile species, and changes in plant community composition (Leung and Marion, 2000). Vegetation may be removed or trampled. Shrubs and trees are commonly lost from the site or damaged. Axes or fire may scar tree trunk, branches may be broken, bark removed or damaged, or nails placed in trees. Tree regeneration (seedlings and saplings) is generally lost, thus facilitating conversion to a non-forested site. Marion and Cole (1996) found on campsites they studied in Delaware that an average of 19 percent of trees had been felled and 77% of the standing trees had been damaged (primarily branches cut for firewood or trunks scarred by axes and nails). Trampling resistant vegetation (often grasses or exotics) tend to replace existing understory vegetation (forbs) (Marion and Cole, 1996).

The indirect effects of vegetation disturbance include microclimate changes and increased erosion. The extent of camping impacts on vegetation is generally related to the frequency sites are used, their durability, and group size (Cole, 1995). Larger groups are usually responsible for enlarging campsites more than small groups (Cole, 1992; Marion, 2003). Campsite enlargement is particularly a problem when campsites are located on flat, open sites. Campers may also enlarge the affected area by developing multiple, uncontrolled “social trails” between tents, to water sources, to view points or favored fishing locations. Some visitors have a much greater impact on vegetation than others, because they are more likely to cut down vegetation, dig trenches around tents, and otherwise modify the sites.

Cole (1981) suggests that lakeshore areas are not necessarily more fragile than areas at some distance from the shore. Although vegetation on moist and steep lakeshore soils may be more vulnerable to

damage, some lakeshore areas may actually be rocky or gravelly and flat, and thus fairly resistant to disturbance. Many of the campsites on Umbagog Lake have rocky shorelines and fall into this category. Over-used, poorly maintained campsites can have an esthetic impact that may impair visitor experience.

Camping is permitted only at designated campsites, so the disturbance of vegetation is limited to a relatively small area of the refuge. We are also planning to close permanently two car-camping sites along the Magalloway and Androscoggin Rivers, thus reducing the total number of campsites available. Drive-in sites are probably particularly vulnerable to campsite expansion. The State of New Hampshire regularly maintains remote campsites, and provides them with a picnic table and fire ring that tends to concentrate use and inhibit expansion. In cooperation with the state, we will evaluate all campsites and, if necessary, take additional measures to reduce social trails, identify designated tent sites, and provide outreach on low impact camping. Because wood gathering often damages vegetation, visitors will be required to provide their own wood at all refuge campsites. Digging or trenching will not be permitted at refuge campsites.

Campfires: The impacts of camping generally are much greater where campfires are permitted. Campfires can have severe effects on soils in a localized area. Campfires destroy organic matter in soil, and can change soil chemistry to a point that effectively “sterilizes” the site. Those effects can persist over a long period and make regrowth of vegetation difficult. In some cases, recovery may take over 10 years (Hammitt and Cole, 1998). Fire may directly damage trees and shrubs. Although forest fires in this area are unlikely, they are also a possibility. In addition, wood-gathering may result in tree damage from broken or cut limbs, axe scars, or felling. The collection of downed wood may increase the trampling of surrounding vegetation and reduce the amount of downed wood. This may affect communities of small mammal and terrestrial amphibian. Campers may develop multiple fire sites, which tend to contribute to campsite expansion. Fire pits often become receptacles for trash. Build-up of trash and charcoal may negatively affect the experience of subsequent campers. Illegal campsites and fires exacerbate those impacts.

All campsites are provided with a fire ring that helps to limit campfire impacts to a small area. Firewood has been depleted at all refuge campsites. The collection of firewood at refuge island sites is already banned. Because of the depletion of firewood, visitors will be required to bring their own wood supply, to further reduce damage to existing vegetation. That requirement applies to all refuge campsites. In cooperation with the State of New Hampshire, the refuge will provide increased outreach on low-impact camping and how to minimize campfire impacts and litter.

Water Quality: Improperly disposed human waste and pet waste at campsites may compromise water quality by introducing pathogens, and affect campsite esthetics. Human waste, food disposal, and dishwashing may increase aquatic nutrient loads. That may result in limited, localized increases in algal growth, facilitating oxygen depletion, and altering the composition of aquatic vegetation and invertebrate communities. Run-off from eroded campsites can increase turbidity and sedimentation, which may affect fish and invertebrates (Marion, 2003; Leung and Marion, 2000). Improperly cleaned motor boats may introduce invasive aquatic plant species from other water bodies. Soap from improper dishwashing, trash, and fish-cleaning waste, may all pollute water and have an esthetic impact. Pit toilets located near water on shallow, permeable soils can sometimes introduce coliform bacteria into the water (Hammitt and Cole, 1998). However, camping generally does not affect water quality to the

extent of creating a public health concern, even in areas that receive heavy use (Cole, 1981). The New Hampshire Division of Parks and Recreation will be responsible for maintaining campsites and campsite toilets. The refuge will cooperate with the state in providing educational outreach on invasive plants and proper waste disposal.

Wildlife: Camping can alter or destroy wildlife habitat, or displace wildlife from preferred habitat or resources (food, water, nest sites). Camping may also modify or disrupt wildlife behavior. Larger groups are generally more likely to disturb wildlife (Marion, 2003). Nesting birds such as eagles or loons may leave the nest in response to disturbance, exposing eggs to cooling or predators.

Human visitors or their pets may “harass” wildlife. Even leashed pets may disturb wildlife. Pets may also transmit diseases to wildlife (Hammit and Cole, 1998). The disturbance of camping may also affect wildlife health, fitness, reproduction, and mortality rates (Leung and Marion, 2000).

Indirect effects may include a change in vertebrate species composition near the campsite. Changes in vertebrate communities at campgrounds (as compared to control sites) have been reported for birds (Blakesley and Reese, 1988; Garton et al. 1977; Foin et al. 1977; Knight and Gutzwiller, 1995) and small mammals (Clevenger and Workman, 1977). In the case of songbirds, changes in species composition were due primarily to a reduction in ground cover vegetation (for nesting, feeding) at campsites and different levels of sensitivity to human disturbance. Rarer species are generally absent from campgrounds.

The presence of humans attracts some species, while others avoid it. The availability of food generally differs between campgrounds and undisturbed areas. Natural foods may decrease in availability while foods supplied by humans may increase. Human may intentionally supply foods to wildlife, or unintentionally, because of littering, accidental spillage, or improper food storage (Garton et al. 1977). Human foods may be unhealthy for wildlife or promote scavenging behavior, which may increase vulnerability of animals to predation. Rodent populations often increase at campsites, in response to increased availability of human food, and may negatively affect nesting songbirds. Populations may crash when campsites are closed for the season (Marion, 2003). Bears and other scavengers may be attracted to improperly stored food and may damage property or threaten visitor safety. In at least one instance, a bear looking for food damaged a kayak at an Umbagog campsite.

We intend to continue to evaluate campsites annually and, in cooperation with the State of New Hampshire, seasonally close some campsites and nesting areas, if warranted. At the discretion of the refuge manager, we may close or relocate campsites permanently, should wildlife disturbance become a major concern. We expect seasonal closures to minimize any camping disturbance of nesting birds. No pets will be permitted at Refuge campsites. The refuge will work with the State of New Hampshire on managing campsites and providing outreach to the public on how to avoid disturbing wildlife and the importance of not feeding wildlife and storing food properly.

Visitor Conflicts: Conflicts may arise between visitors as a result of noise and over-crowding. Conflicts may also develop between small and large groups and different user groups (fishermen, hunters, wildlife photographers, etc.). Litter, noise, large group sizes, and crowding may impair the

refuge experience for some visitors. Campsites are currently well spaced and group size is limited, so that conflicts do not appear to be significant at this time. Public outreach may help reduce potential conflicts by reducing littering and promoting considerate camping. The refuge will work with the State of New Hampshire to adjust camping policies, should this issue become significant.

Summary of Impacts: Camping on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP since the overall area impacted by the campsites is confined to a fairly small area, seasonal closures limit disturbance to nesting wildlife, and the sites have been used for many years.

Camping benefits Goal 4 “Provide high quality wildlife dependent activities” of the CCP by providing enhanced opportunities for hunting, fishing, wildlife observation and photography. Opportunities also exist to interpret the refuge at camp sites and through the reservation system benefitting Goal 5 of the CCP. Goal 6 of the CCP “Enhance the conservation...through partnerships...” will also benefit from this activity by continuing our partnership with the State of New Hampshire Department of Parks. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment:

As part of the comprehensive conservation planning process for the Lake Umbagog refuge, this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EIS. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible with the following stipulations

STIPULATIONS NECESSARY TO ENSURE COMPATIBILITY:

- Camping will be at state-designated campsites only.
- The refuge will be open to camping during the period set annually by the State of New Hampshire, but no earlier than May 20th or later than October 15th
- Pets are not permitted on refuge campsites.
- Hunting dogs will be allowed on refuge campsites during the refuge hunting seasons only. All hunting dogs will be under the immediate and direct control of the hunter at all times while camping.
- No wood gathering or vegetation removal is permitted on the refuge.

- Campfires must be confined to the designated fire pit.
- No digging or trenching will be permitted.
- Feeding of wildlife is not permitted.
- All trash must be carried out.
- In cooperation with the state, we will implement best management practices for preventing campsite expansion.
- We will place signs at all Refuge campsites explaining refuge regulations and minimal impact camping techniques. The refuge will work with the state to provide additional outreach on “leave no trace” camping.
- We will monitor the impacts of camping, the condition of the shoreline and campsites, and the potential for wildlife disturbance yearly, and work with the state to minimize impacts or restore sites. We will prioritize for initial monitoring the sites with the highest potential for wildlife disturbance. Based on the outcome of those surveys, we may adjust our management of those sites.
- We will develop a cooperative camping management plan in conjunction with the state.

Justification:

Camping on the refuge is a popular use that pre-dates the creation of the refuge. Camping provides an increased opportunity for the public to participate in priority public uses in a remote setting. Because many species of wildlife are most active at dawn and dusk, and concentrate in areas accessible only by boat, camping facilitates wildlife observation, hunting, photography and fishing, in a safe manner. Providing the public with an opportunity to experience the refuge wildlife and natural resources through camping, along with a public educational outreach program, will help motivate visitors to understand and develop a commitment to protecting healthy ecosystems. Experiencing the refuge through camping and education are tools that can help build a land ethic, develop political support, and lessen vandalism, littering and poaching. We expect the impacts of camping on vegetation and wildlife to be minor and localized. With the stipulations noted above, camping will be compatible with refuge purposes.

Based on the limited detrimental impacts of this use, the stipulations above, and a long history of use, and current levels of use, camping on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul J. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Lega 1-9-09
(Signature and Date)

Mandatory 10- year Re-evaluation Date: January 9, 2019

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APPENDIX 1.

Remote Campsites in the Umbagog Lake Area Managed by the State of New Hampshire.

Site Number	Ownership	Management	Comments
R 1	SPNHF	Umbagog State Park	
R 2	SPNHF	Umbagog State Park	
R 3	USFWS	Umbagog State Park	
R 4	SPNHF	Umbagog State Park	
R 5	SPNHF	Umbagog State Park	
R 6	NH	Umbagog State Park	
R 7	NH	Umbagog State Park	
R 8	NH	Umbagog State Park	
R 9	SPNHF	Umbagog State Park	
R 10	SPNHF	Umbagog State Park	
R 11	NH	Umbagog State Park	
R 12	NH	Umbagog State Park	
R 13	USFWS	Umbagog State Park	
R 14	USFWS	Umbagog State Park	
R 15	USFWS	Umbagog State Park	
R 16	USFWS	Umbagog State Park	
R 18	USFWS	Umbagog State Park	
R 21	USFWS	Umbagog State Park	
R 22	USFWS	Umbagog State Park	
R 23	USFWS	Umbagog State Park	
R 24	NH	Umbagog State Park	
R 25	NH	Umbagog State Park	
R 26	NH	Umbagog State Park	
R 27	NH	Umbagog State Park	
R 28	USFWS	Umbagog State Park	
R 29	USFWS	Umbagog State Park	
R 30	NH	Umbagog State Park	
R 31	NH	Umbagog State Park	

Compatibility Determination – Camping

Site Number	Ownership	Management	Comments
R 33	NH	Umbagog State Park	
R 34	NH	Umbagog State Park	
R 35	NH, USFWS	Umbagog State Park	
R 36	NH	Umbagog State Park	
R 37	NH	Umbagog State Park	
R 38	NH	Umbagog State Park	
North 1	USFWS	Mollidgewock State Park	Closure planned
North 2	USFWS	Mollidgewock State Park	Closure planned
North 3	Private	Mollidgewock State Park	

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Research conducted by non-refuge personnel

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul T. Casey Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use.
If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence.
If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: James M. Kennedy Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Research by conducted by non-refuge personnel

Narrative

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen decisions on managing natural resources. The refuge manager encourages and seeks research that clearly relates to approved refuge objectives, improves habitat management, and promotes adaptive management. Priority research addresses information on better managing the Nation’s biological resources that generally are important to agencies of the Department of Interior, the National Wildlife Refuge System, and State Fish and Game Agencies, that address important management issues, or demonstrate techniques for managing species or habitats.

Researchers will submit a final report to the refuge on completing their work. For long-term studies, we may also require interim progress reports. We expect researchers to publish in peer-reviewed publications. All reports, presentations, posters, articles or other publications will acknowledge the Refuge System and the Lake Umbagog refuge as partners in the research. All posters will adhere to Service graphics standards. We will insert this requirement to ensure that the research community, partners, and the public understand that the research could not have been conducted without the refuge having been established, its operational support, and that of the Refuge System.

USE: Research conducted by non-refuge personnel

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITY:

1. Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901 (b))
2. Migratory Bird Conservation Act (16 U.S.C. 715d)
3. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(a)(4))
4. Fish and Wildlife Act of 1956 (16 U.S.C. 742f(b)(1))

PURPOSE(S) FOR WHICH ESTABLISHED:

1. the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions. 16 U.S.C. 3901(b) (Emergency Wetlands Resources Act of 1986)
2. for use as an inviolate sanctuary, or for any other management purpose, for migratory birds. 16 U.S.C. 715d (Migratory Bird Conservation Act)
3. for the development, advancement, management, conservation, and protection of fish and wildlife resources 16 U.S.C. 742f(a)(4) (Fish and Wildlife Act of 1956)
4. for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude 16 U.S.C. 742f(b)(1) (Fish and Wildlife Act of 1956)

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM:

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

DESCRIPTION OF USE:

(a) What is the use? Is the use a priority public use?

The use is research conducted by non-Service personnel. Research conducted by non-Service personnel is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), and the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57).

(b) Where would the use be conducted?

The location of the research will vary depending on the individual research project that is being conducted. The entire refuge is open and available for scientific research. An individual research project is usually limited to a particular habitat type, plant or wildlife species. On occasion research

projects will encompass an assemblage of habitat types, plants or wildlife. The research location will be limited to those areas of the refuge that are absolutely necessary to conduct of the research project.

(c) When would the use be conducted?

The timing of the research will depend entirely on the individual research project that is being conducted. Scientific research will be allowed to occur on the refuge throughout the year. An individual research project could be short term in design, requiring one or two visits over the course of a few days. Other research projects could be multiple year studies that require daily visits to the study site. The timing of each individual research project will be limited to the minimum required to complete the project. If a research project occurs during the refuge hunting season, special precautions will be required and enforced to ensure public health and safety.

(d) How would the use be conducted?

The mechanics of the research will depend entirely on the individual research project that is conducted. The objectives, methods, and approach of each research project will be carefully scrutinized before it will be allowed to occur on the refuge. No research project will be allowed to occur if it does not have an approved study plan and protocol or if it compromises public health and safety.

(e) Why is this use being proposed?

Research by non-Service personnel is conducted by colleges, universities, Federal, State, and local agencies, non-governmental organizations, and qualified members of the general public to further the understanding of the natural environment and to improve the management of the refuge's natural resources. Much of the information generated by the research is applicable to management on and near the refuge. Past projects on the refuge have studied loons, contaminants, peatland systems, birds, forest structure, and fish. A multi-year study was begun on the refuge in 2005, in cooperation with the Audubon Society of New Hampshire, to look at 1) levels of public use on Umbagog Lake and it's affects on wildlife 2) a systems analysis of the lake system and its associated wetlands and 3) a contaminants study.

The Service encourages and supports research and management studies on refuge lands that will improve and strengthen natural resource management decisions. The refuge manager encourages and seeks research relative to approved refuge objectives that clearly improves habitat management and promotes adaptive management. Priority research addresses information that will better manage the Nation's biological resources and are generally considered important to: Agencies of the Department of Interior; the U.S. Fish and Wildlife Service; the National Wildlife Refuge System; and State Fish and Game Agencies, and that address important management issues or demonstrate techniques for management of species and/or habitats.

The refuge also considers research for other purposes which may not be directly related to refuge-specific objectives, but contribute to the broader enhancement, protection, use, preservation and management of native populations of fish, wildlife and plants, and their natural diversity within the region or flyway. These proposals must comply with the Service's compatibility policy.

Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as housing or use of other facilities, vehicles, boats, or equipment, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

Availability of Resources:

The bulk of the cost for research is incurred in staff time to review research proposals, coordinate with researchers and write Special Use Permits. In some cases, a research project may only require one day of staff time to write a Special Use Permit. In other cases, a research project may take many weeks, as the refuge staff must coordinate with students and advisors and accompany researchers on site visits.

Annual costs associated with the administration of outside research on the refuge are estimated below:

<i>Refuge biologist (GS12) (review proposals, coordinate with researchers):</i>	\$6,800	4 weeks/yr
<i>Deputy Refuge Manager (GS12) (review proposals, special use permits, housing and vehicle coordination):</i>	\$3,500	2 weeks/yr
<i>Refuge Manager (GS13) (coordination; budgeting):</i>	\$2,100	1 weeks/yr
<i>Administrative Assistant (GS6) (office administration):</i>	\$2,700	3 weeks/yr
<i>Maintenance Worker (WG5) (vehicle, boat, housing maintenance):</i>	\$950	1 weeks/yr
<i>Total:</i>	\$16,050	

Anticipated Impacts of the Use:

The Service encourages approved research to further the understanding of the natural resources. Research by other than Service personnel adds greatly to the information base for Refuge Managers to make proper decisions. Disturbance to wildlife and vegetation by researchers could occur through observation, banding, collecting blood, and accessing the study area by foot, boat, or vehicle. These impacts could be exacerbated by multiple concurrent research projects. It is possible that direct mortality could result as a by-product of research activities. Overall, however, allowing research to be conducted by non-Service personnel should have little impact on Service interests. If the research project is conducted with professionalism and integrity, the knowledge gained far outweighs potential adverse impacts.

Research conducted by non- Service personnel on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP. These threats are mitigated by the stipulations required under this compatibility determination.

This will potentially benefit Goal 5 of the CCP “Develop high quality interpretative opportunities...” when research presents the opportunity and information to interpret the refuge. Goal 7 of the CCP

“Develop Umbagog National Wildlife Refuge as an outstanding center for research...” will benefit greatly from this activity as it is an essential activity for this goal. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment:

As part of the CCP process for Lake Umbagog NWR this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EIS. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

All researchers will be required to submit a detailed research proposal following Lake Umbagog National Wildlife Refuge’s study proposal guidelines (Appendix 1) and Service Policy (FWS Refuge Manual Chapter 4 Section 6). The refuge must be given at least 45 days to review proposals before initiation of research. If collection of wildlife is involved, the refuge must be given 60 days to review the proposal. All necessary scientific collecting or other permits must be obtained prior to the commencement of the research. Proposals will be prioritized and approved based on need, benefit, compatibility, and funding required.

Researchers will be expected to submit a final report to the Refuge, on completion of their work. For long-term studies, interim progress reports may also be required. The Refuge also expects that research will be published in peer-reviewed publications. The contribution of the Refuge and the Service should be acknowledged in any publications.

Special Use Permits (SUP) will be required for all research conducted by non-Service personnel. The SUP will list all conditions that are necessary to ensure compatibility. The Special Use Permits will also identify a schedule for annual progress reports and the submittal of a final report or scientific paper.

The Regional refuge biologists, other Service Divisions, State agencies, academic experts, may be asked to review and comment on proposals.

All researchers will be required to obtain appropriate State and Federal permits.

Researchers will be required to take steps to insure that invasive species and pathogens (particularly aquatic invasives and pathogens) are not inadvertently introduced or transferred to the Umbagog system.

Justification: The Service encourages approved research to further understanding of refuge natural resources and management. Research by non- Service personnel adds greatly to the information base for Refuge Managers to make proper decisions. Research conducted by non- Service personnel on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul L Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leger 1-9-09
(Signature and Date)

Mandatory 10-year Re-evaluation Date: January 9, 2019

Literature Cited:

U.S. Fish and Wildlife Service. 1985. Refuge Manual. Washington, D.C.: U.S. Government Printing Office.

APPENDIX 1. Lake Umbagog National Wildlife Refuge Study Proposal Guidelines

A study proposal is a justification and description of the work to be done, and includes cost and time requirements. Proposals must be specific enough to serve as “blueprints” for the investigative efforts. Step-by-step plans for the actual investigations must be spelled out in advance, with the level of detail being commensurate with the cost and scope of the project and the needs of management. Please submit proposals electronically as an MS Word document or hardcopy to the refuge manager.

The following list provides a general outline of first order headings/sections for study proposals.

- Cover Page
- Table of Contents (for longer proposals)
- Abstract
- Statement of Issue
- Literature Summary
- Objectives/Hypotheses
- Study Area
- Methods and Procedures
- Quality Assurance/Quality Control
- Specimen Collections
- Deliverables
- Special Requirements, Concerns, Necessary Permits
- Literature Cited
- Peer Review
- Budget
- Personnel and Qualifications

Cover Page

The cover page must contain the following information:

- Title of Proposal
- Current Date
- Investigator’s(s’)—name, title, organizational affiliation, address, telephone and fax numbers and e-mail address of all investigators or cooperators.
- Proposed Starting Date
- Estimated Completion Date
- Total Funding Support Requested from the US Fish and Wildlife Service
- Signatures of Principal Investigator(s) and other appropriate institutional officials

Abstract

The abstract should contain a short summary description of the proposed study, including reference to major points in the Statement of Issue, Objectives, and Methods and Procedures sections.

Statement of Issue

Provide a clear precise summary of the problem to be addressed and the need for its solution. This section should include statements of the importance, justification, relevance, timeliness, generality,

and contribution of the study. Describe how any products will be used, including any anticipated commercial use. What is the estimated probability of success of accomplishing the objective(s) within the proposed timeframe?

Literature Summary

This section should include a thorough but concise literature review of current and past research that pertains to the proposed research, especially any pertinent research conducted at the Lake Umbagog National Wildlife Refuge. A discussion of relevant legislation, policies, and refuge planning and management history, goals, and objectives should also be included.

Objectives/Hypotheses

A very specific indication of the proposed outcomes of the project should be stated as objectives or hypotheses to be tested. Project objectives should be measurable. Provide a brief summary of what information will be provided at the end of the study and how it will be used in relation to the problem. These statements should flow logically from the statement of issue and directly address the management problem.

Establish data quality objectives in terms of precision, accuracy, representativeness, completeness, and comparability as a means of describing how good the data need to be to meet the project's objectives.

Study Area

Provide a detailed description of the geographic area(s) to be studied and include a clear map delineating the proposed study area(s) and showing specific locations where work will occur.

Methods and Procedures

This section should describe as precisely as possible how the objectives will be met or how the hypotheses will be tested. Include detailed descriptions and justifications of the field and laboratory methodology, protocols, and instrumentation. Explain how each variable to be measured directly addresses the research objective/ hypothesis. Describe the experimental design, population, sample size, and sampling approach (including procedures for sub-sampling). Summarize the statistical and other data analysis procedures to be used. List the response variables and tentative independent variables or covariates. Describe the experimental unit(s) for statistical analysis. Also include a detailed project time schedule that includes start, fieldwork, analysis, reporting, and completion dates.

Quality Assurance/Quality Control

Adequate quality assurance/quality control (QA/QC) procedures help insure that data and results are: credible and not an artifact of sampling or recording errors; of known quality; able to stand up to external scientific scrutiny; and accompanied by detailed method documentation. Describe the procedures to be used to insure that data meet defined standards of quality and program requirements, errors are controlled in the field, laboratory, and office, and data are properly handled, documented, and archived. Describe the various steps (e.g. personnel training, calibration of equipment, data verification and validation) that will be used to identify and eliminate errors introduced during data collection (including observer bias), handling, and computer entry. Identify the percentage of data that will be checked at each step.

Specimen Collections

Clearly describe the kind (species), numbers, sizes, and locations of animals, plants, rocks, minerals, or other natural objects to be sampled, captured, or collected. Identify the reasons for collecting, the intended use of all the specimens to be collected, and the proposed disposition of collected specimens. For those specimens to be permanently retained as voucher specimens, identify the parties responsible for cataloging, preservation, and storage and the proposed repository.

Deliverables

The proposal must indicate the number and specific format of hard and/or electronic media copies to be submitted for each deliverable. The number and format will reflect the needs of the refuge and the Refuge manager. Indicate how many months after the project is initiated (or the actual anticipated date) that each deliverable will be submitted. Deliverables are to be submitted or presented to the refuge manager.

Deliverables that are required are as follows:

Reports and Publications

Describe what reports will be prepared and the timing of reports. Types of reports required in fulfillment of natural and social science study contracts or agreements include:

- (1) Progress report(s) (usually quarterly, semiannually, or annually): (may be required)
- (2) Draft final and final report(s): (always required).

A final report must be submitted in addition to a thesis or dissertation (if applicable) and all other identified deliverables. Final and draft final reports should follow refuge guidelines (Appendix I).

In addition, investigators are encouraged to publish the findings of their investigations in refereed professional, scientific publications and present findings at conferences and symposia. The Refuge manager appreciates opportunities to review manuscripts in advance of publication.

Data Files

Provide descriptions of any spatial (GIS) and non-spatial data files that will be generated and submitted as part of the research. Non-spatial data must be entered onto Windows CD ROMs in Access or Excel. Spatial data, which includes GPS generated files, must be in a format compatible with the refuge's GIS system (ArcGIS 8 or 9, Arcview 3.3, or e00 format) . All GIS data must be in UTM 19, NAD 83.

Metadata

For all non-spatial and spatial data sets or information products, documentation of information (metadata) describing the extent of data coverage and scale, the history of where, when, and why the data were collected, who collected the data, the methods used to collect, process, or modify/transform the data, and a complete data dictionary must also be provided as final deliverables. Spatial metadata must conform to US Fish & Wildlife Service (FGDC) metadata standards.

Oral Presentations

Three types of oral briefings should be included: pre-study, annual, and closeout.

These briefings will be presented to refuge staff and other appropriate individuals and cooperators. In addition, investigators should conduct periodic informal briefings with refuge staff throughout the study whenever an opportunity arises. During each refuge visit, researchers should provide verbal updates on project progress. Frequent dialogue between researchers and refuge staff is an essential element of a successful research project.

Specimens and Associated Project Documentation

A report on collection activities, specimen disposition, and the data derived from collections, must be submitted to the refuge following refuge guidelines.

Other:

Researchers must provide the Refuge manager with all of the following:

1. Copies of field notes/ notebooks/ datasheets
2. Copies of raw data (in digital format), including GIS data, as well as analyzed data
3. Copies of all photos, slides (digital photos preferred), videos, films
4. Copies of any reports, theses, dissertations, publications or other material (such as news articles) resulting from studies conducted on refuge.
5. Detailed protocols used in study
6. Aerial photographs
7. Maps
8. Interpretive brochures and exhibits
9. Training sessions (where appropriate)
10. Survey forms
11. Value-added software, software developed, models

Additional deliverables may be required of specific studies.

Special Requirements, Permits, and Concerns

Provide information on the following topics where applicable. Attach copies of any supporting documentation that will facilitate processing of your application.

Refuge Assistance

Describe any refuge assistance needed to complete the proposed study, such as use of equipment or facilities or assistance from refuge staff. It is important that all equipment, facilities, services, and logistical assistance expected to be provided by the Fish and Wildlife Service be specifically identified in this section so all parties are in clear agreement before the study begins.

Ground Disturbance

Describe the type, location, area, depth, number, and distribution of expected ground- disturbing activities, such as soil pits, cores, or stakes. Describe plans for site restoration of significantly affected areas.

Proposals that entail ground disturbance may require an archeological survey and special clearance prior to approval of the study. You can help reduce the extra time that may be required to process such a proposal by including identification of each ground disturbance area on a USGS 7.5-minute topographic map.

Site Marking and/or Animal Marking

Identify the type, amount, color, size, and placement of any flagging, tags, or other markers needed for site or individual resource (e.g. trees) identification and location. Identify the length of time it is needed and who will be responsible for removing it. Identify the type, color, placement of any tags placed on animals (see special use permit for stipulations on marking and handling of animals)

Access to Study Sites

Describe the proposed method and frequency of travel to and within the study site(s). Explain any need to enter restricted areas. Describe duration, location, and number of participants, and approximate dates of site visits.

Use of Mechanized and Other Equipment

Describe any vehicles, boats, field equipment, markers, or supply caches by type, number, and location. You should explain the need to use these materials and if or how long they are to be left in the field.

Safety

Describe any known potentially hazardous activities, such as electro-fishing, scuba diving, whitewater boating, aircraft use, wilderness travel, wildlife capture or handling, wildlife or immobilization.

Chemical Use

Identify chemicals and hazardous materials that you propose using within the refuge. Indicate the purpose, method of application, and amount to be used. Describe plans for storage, transfer, and disposal of these materials and describe steps to remediate accidental releases into the environment. Attach copies of Material Safety Data Sheets.

Animal Welfare

If the study involves vertebrate animals, describe your protocol for any capture, holding, marking, tagging, tissue sampling, or other handling of these animals (including the training and qualifications of personnel relevant to animal handling and care). If your institutional animal welfare committee has reviewed your proposal, please include a photocopy of their recommendations. Describe alternatives considered, and outline procedures to be used to alleviate pain or distress. Include contingency plans to be implemented in the event of accidental injury to or death of the animal. Include state and federal permits. Where appropriate, coordinate with and inform state natural resource agencies.

Literature Cited

List all reports and publications cited in the proposal.

Peer Review

Provide the names, titles, addresses, and telephone numbers of individuals with subject-area expertise who have reviewed the research proposal. If the reviewers are associated with the investigator's research institution or if the proposal was not reviewed, please provide the names, titles, addresses, and telephone numbers of 3-5 potential subject-area reviewers who are not associated with the investigator's institution. These individuals will be asked to provide reviews of the proposal, progress reports, and the draft final report.

Budget

If Service funding or assistance (i.e. in-kind contributions) is involved in the research project, a budget must accompany the proposal detailing both funding and assistance that will be requested from the Fish and Wildlife Service and the cooperator's contributions on an identified periodic (usually annual) basis.

Personnel Costs

Identify salary charges for principal investigator(s), research assistant(s), technician(s), clerical support, and others. Indicate period of involvement (hours or months) and pay rate charged for services. Be sure to include adequate time for data analysis and report writing and editing.

Fringe Benefits

Itemize fringe benefit rates and costs.

Travel

Provide separate estimates for fieldwork and meetings. Indicate number of trips, destinations, estimated miles of travel, mileage rate, air fares, days on travel, and daily lodging and meals charges. Vehicle mileage rate cannot exceed standard government mileage rates. Charges for lodging and meals are not to exceed the maximum daily rates set for the locality by the Federal Government (contact Lake Umbagog NWR for appropriate rates).

Equipment

Itemize all equipment to be purchased or rented and provide a brief justification for each item costing more than \$1,000. Be sure to include any computer-related costs. For proposals funded under US Fish and Wildlife Service agreement or contract, the refuge reserves the right to transfer the title of purchased equipment with unit cost of \$1,000 or more to the Federal Government following completion of the study. These items should be included as deliverables.

Supplies and Materials

Purchases and rentals under \$1,000 should be itemized as much as is reasonable.

Subcontract or Consultant Charges

All such work must be supported by a subcontractor's proposal also in accordance with these guidelines.

Specimen Collections

Identify funding requirements for the cataloging, preservation, storage, and analyses of any collected specimens that will be permanently retained.

Printing and Copying

Include costs for preparing and printing the required number of copies of progress reports, the draft final report, and the final report. In general, a minimum of two (2) copies of progress reports (usually due quarterly, semiannually, or as specified in agreement), the draft final report, and the final report are required.

Indirect Charges

Identify the indirect cost (overhead) rate and charges and the budget items to which the rate is applicable.

Cooperator's Contributions

Show any contributing share of direct or indirect costs, facilities, and equipment by the cooperating research institution.

Outside Funding

List any outside funding sources and amounts.

Personnel and Qualifications

List the personnel who will work on the project and indicate their qualifications, experience, and pertinent publications. Identify the responsibilities of each individual and the amount of time each will devote. A full vita or resume for each principal investigator and any consultants should be included here.

APPENDIX 1. INTERIM FINAL REPORT GUIDELINES

Draft final and final reports should follow Journal of Wildlife Management format or other refuge pre-approved format and typically includes the following sections:

- Title Page
- Abstract
- Introduction/ Problem statement
- Study Area
- Methods (including statistical analyses)
- Results
- Discussion
- Management Implications
- Management Recommendations
- Literature Cited

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Privately owned recreational cabins (camps)

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document? Establishing EA	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public's understanding and appreciation of the refuge's natural or cultural resources, or is the use beneficial to the refuge's natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use ("no" to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe ("no" to (b), (c), or (d)) may not be found appropriate. If the answer is "no" to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor's concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul J. Casey

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use. If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence. If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Janet M. Kennedy

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Privately owned recreational cabins (camps)

Narrative

The environmental assessment (EA) establishing the refuge states that when the Service acquires land in fee with a pre-existing cabin lease, camp owners may either sell the building, or “continue to lease the land from the Service instead of the timber company on a yearly basis” (USFWS, 1991). Although we established the refuge in 1992, we acquired no tracts with cabin leases until 1995. By 1996, the refuge owned tracts containing 24 pre-existing cabin lease agreements.

This use existed before refuge ownership. Timber companies who transferred lands to the Service insisted that leases be carried forward as part of the purchase agreement. At the time the Service established the refuge, we felt that trade-off was worthwhile, because it would result ultimately in enhanced protection for the shoreline by precluding additional development. The original conservation proposal for Umbagog Lake involved a partnership between the Service and the State of New Hampshire, among others. Both the Service and the state acquired cabin leases as part of that proposal. Both agencies have developed a coordinated, consistent approach to the use and eventual phase-out of cabin leases. By managing this cabin lease program, the Service is following through on earlier commitments and ensuring that our approach is consistent with that of the State of New Hampshire.

COMPATIBILITY DETERMINATION

USE: Occupancy and use of privately owned recreational cabins (camps)

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITIES

1. Emergency Wetlands Resources Act of 1986 [16 U.S.C. 3901(b)]
2. Migratory Bird Conservation Act [16 U.S.C. 715d]
3. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)]
4. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(b)(1)]

PURPOSES FOR WHICH ESTABLISHED

1. “the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions....” [16 U.S.C. 3901(b); Emergency Wetlands Resources Act of 1986]
2. “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” [16 U.S.C. 715d; Migratory Bird Conservation Act]
3. “for the development, advancement, management, conservation, and protection of fish and wildlife resources....” [16 U.S.C. 742f(a)(4); Fish and Wildlife Act of 1956]
4. “for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude....” [16 U.S.C. 742f(b)(1); Fish and Wildlife Act of 1956]

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM

“The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” — National Wildlife Refuge System Improvement Act of 1997 (Public Law 105–57; 111 Stat. 1282)

DESCRIPTION OF USE

(a) What is the use? Is it a priority public use?

The use is the occupancy and use of privately owned recreational cabins (camps). It is not a priority public use of the National Wildlife Refuge System, under the National Wildlife Refuge System

Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

Some recreational cabins, or camps, existed on the shores of the Magalloway River and Umbagog Lake as early as the late 1800s. William Brewster, a well-known regional ornithologist, built a summer cabin on Pine Point in 1893 (Heywood, 1973). Private timber companies originally owned most of the land around the lake and rivers, and built early cabins to provide lodging for company employees. By the 1960s, an increasing number of private individuals owned and maintained seasonal cabins for fishing and other recreation. Most timber companies developed recreational leases that, for an annual fee, allowed private individuals to build and use cabins on company land. The leases required annual renewal or, in some cases, every 2 to 5 years. Families often passed down the ownership and use of those cabins from generation to generation. As industrial timberlands changed hands among companies, so did the lease agreements; the new company often took over the management of any pre-existing leases.

The environmental assessment (EA) establishing the refuge states “In general, camps will remain; however, no new camps will be constructed. The Service will remain an interested buyer of camps within the proposal area” (USFWS, 1991). In addition, the EA state that when the Service acquires land in fee with a pre-existing cabin lease, camp owners may either sell the building, or “continue to lease the land from the Service instead of the timber company on a yearly basis” (USFWS, 1991). Although we established the refuge in 1992, we acquired no tracts with cabin leases until 1995. By 1996, the refuge owned tracts containing 24 pre-existing cabin lease agreements.

The majority of the cabin leases were on lands we purchased from James River Corp (currently, 17). We acquired additional lands with lease agreements in place from Boise Cascade Co. (currently, 6), Mead-Oxford Paper Co. (currently, 5), and Yankee Forest LLC (currently, 1). The timber companies that initially transferred lands with pre-existing leases to the Service insisted that their leaseholders be treated fairly, and that leases not be quickly terminated. When the State of New Hampshire purchased land along the western shore of Umbagog Lake and on Tidswell Point, it also acquired a number of pre-existing cabin leases. The state established conditions that included a maximum lease period of 50 years for leased land.

Most current lessees reside in surrounding communities (e.g., Errol, Berlin, Milan, and Gorham) or elsewhere in New Hampshire, but about a third maintain permanent residences outside New Hampshire. At least 10 camps on refuge property have changed ownership one or more times since 1995. The majority of the camps are of one-story, wood or log construction, and typically are small (<600 square feet).

(b) Where would the use be conducted?

The majority of the camps is located along the Magalloway River, north of the refuge office, and around Umbagog Lake, with most concentrated around Thurston Cove and along the northeast shoreline of the lake. Most cabins are accessible by road, but some are accessible only by boat during the summer. Lot sizes are small (generally, half an acre). The construction of new cabins will not be permitted.

Cabins are located in the wooded floodplain along the Magalloway River and lakeshore pine-hemlock, northern hardwood, and mixed conifer/hardwood habitats along Umbagog Lake. Some cabins are located near loon territories.

(c) When would the use be conducted?

Most cabins are occupied during the summer months; heaviest use is on weekends and holidays. However, camps are also used for hunting in the fall and snowmobiling in the winter. The duration of use is commonly short-term. Only seasonal use is permitted. The camps cannot be used as permanent, year-round residences.

(d) How would the use be conducted?

When the refuge first acquired refuge lands with pre-existing recreational leases, the Service agreed to permit their occupancy and use up to a 50-year maximum from the date of acquisition, as long as the use was determined to be compatible. The ownership of leases can be transferred outside the immediate family only during a pre-determined period.

Under Service land ownership, the use and occupancy of these camps will be administered through a system of special use permits (SUPs), the conditions of which are analogous to the former lease. We review the leases at least once every 5 years, and renew permits annually. We assess annual fees based on the appraised value of the property, and may adjust the fees periodically to reflect market rates.

The conditions of the SUPs require that cabins must be maintained in a manner compatible with the purposes of the refuge and produce the least amount of environmental disturbance. Cabins may only be used for non-commercial recreational purposes, and cannot be used as a principal place of residence. Modifications of existing structures require prior approval by the refuge manager. All structures must be >250 ft. from water, and no permanent docks may be constructed. Cutting live vegetation is restricted. We do not post the camp lots, but expect the public to reasonably respect the privacy of camp owners. A complete description of permit conditions for each cabin may be viewed on file at the refuge headquarters.

(e) Why is this use being proposed?

This use existed before refuge ownership. Timber companies who transferred lands to the Service insisted that leases be carried forward as part of the purchase agreement. At the time the Service established the refuge, we felt that trade-off was worthwhile, because it would result ultimately in enhanced protection for the shoreline by precluding additional development. The original conservation proposal for Umbagog Lake involved a partnership between the Service and the State of New Hampshire, among others. Both the Service and the state acquired cabin leases as part of that proposal. Both agencies have developed a coordinated, consistent approach to the use and eventual phase-out of cabin leases. By managing this cabin lease program, the Service is following through on earlier commitments and ensuring that our approach is consistent with that of the State of New Hampshire.

Availability of Resources

The refuge staff time associated with administering this use primarily relates to processing annual permit fees, answering the questions of lessees concerning conditions of the permits, monitoring

compliance with those conditions, and monitoring potential impacts of the use on refuge resources and visitors. The refuge manager and deputy refuge manager will administer the lease program. The refuge wildlife biologist will monitor the impacts of the use on refuge resources. No special equipment, facilities, or resources are needed to administer this use. We do not direct refuge resources for law enforcement toward providing safety for permit holders or security for their property, beyond that which is expected for the general visiting public. The maintenance of the camps and associated lots are the responsibility of the permit holders. We submit permit fees to the refuge revenue sharing account.

We estimate below the annual costs associated with the administration of the cabin lease program on the refuge.

<i>Program Oversight:</i>	\$3,000	(Refuge Manager/ Deputy Manager)
<i>Processing Annual Permit Fees:</i>	\$1,000	(Administrative Assistant)
<i>Resource Impact Monitoring:</i>	\$1,000	(Wildlife Biologist)
<i>Total Annual Cost of Program:</i>	\$5,000	

Anticipated Impacts of the Use

The possible impacts of this use include the direct loss of habitat, possible wildlife disturbances caused by camp occupancy or camp users traveling along roads, slight additional hunting pressure on upland species, and impacts on sensitive wetland areas because of the location of some camps. This is a short-term use and, as permits expire or owners sell camps to the Service, most if not all of the camps will be moved or destroyed. Therefore, the program will cause no long-term loss of habitat.

We do not consider the disturbance of wildlife by permit holders traveling to or occupying the camps significant, for the following reasons. The number of camps is low; they generally are not located close to any known, major concentrations of waterfowl, shorebirds, or other wildlife; and, travel or other activities by camp owners do not differ substantially in type or intensity from those of the general public in allowed, daily uses.

We allow hunting, whether by camp occupants or the public, according to state regulations, and set harvest levels so as not to affect populations. We performed an Environmental Site Assessment Level 1 Survey on refuge lands prior to purchase, and identified no contaminant problems around the camps. We also performed Level 1 surveys on all the camps we purchased. Again, we observed no problems. The results of subsequent, more detailed environmental surveys and plant and wildlife inventories could affect future compatibility determinations for individual camps. If so, we could then consider remedial measures, including relocation.

The original Final Environmental Assessment (USFWS, 1991) determined that the locations and numbers of the cabins on Umbagog Lake were compatible with wildlife and water quality up to that time. However, the expansion of lakeshore cabins or home development was determined to be incompatible.

The occupancy and use of privately owned camps on the refuge will not extend beyond 50 years. Meanwhile, we designed the conditions for the permits to help maintain the compatibility of this use, reduce negative impacts on refuge resources, and minimize conflicts among refuge management activities and other uses of the refuge.

Therefore, the occupancy and use of privately owned recreational camps on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP. This is a short-term use and, as permits expire or owners sell camps to the Service, most if not all of the camps will be moved or destroyed. Therefore, the program will cause no long-term loss of habitat.

No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment

As part of the comprehensive conservation planning process for the Lake Umbagog refuge, this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EIS. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one)

This Use Is Not Compatible

This Use Is Compatible, with the following stipulations

Stipulations Necessary to Ensure Compatibility

Cabin leases will be reviewed at least once every 5 years to ensure their continued compatibility. The stipulations necessary to ensure compatibility are on file at refuge headquarters.

Justification

This use has been determined to be compatible, provided the conditions of the Special Use Permits are implemented. The use will not pose significant adverse effects on trust species or other refuge resources, will not interfere with public use of the refuge, or cause an undue administrative burden. The refuge manager will re-evaluate the compatibility of this use every 10 years.

The occupancy and use of privately owned recreational camps on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul F. Gray 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leger 1-9-09
(Signature and Date)

Re-evaluation date: Jan 9, 2014

Literature Cited

Heywood, C. E. 1973. History of Upton, Maine. Oxford Hills Press, Norway, ME, 104 p.

U.S. Fish and Wildlife Service. 1991. Final environmental assessment: proposal to protect wildlife habitat, Lake Umbagog, Coos Co., NH, Oxford Co., ME. USFWS, Region 5.

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Motorized and non-motorized boating

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use? Open waters within refuge	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?	X	
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate Appropriate X

Refuge Manager: Paul F. Casey Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use. If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence. If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Janet M. Kennedy Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Motorized and Non-motorized Boating

Narrative

Hunting, fishing wildlife observation and photography, and environmental education and interpretation are the six priority public uses of the Refuge System, and have been determined to be compatible activities on many refuges nationwide. The Refuge System Improvement Act of 1997 instructs refuge managers to seek ways to accommodate those six uses. Motorized and non-motorized boating is an appropriate means of facilitating these priority public uses on Lake Umbagog Refuge. By allowing this use, we are providing opportunities and facilitating refuge programs in a manner and location that offer high quality, wildlife-dependent recreation and maintain the level of current fish and wildlife values.

COMPATIBILITY DETERMINATION

USE: Motorized and non-motorized boating

REFUGE NAME: Lake Umbagog National Wildlife Refuge

DATE ESTABLISHED: November 12, 1992

ESTABLISHING AUTHORITIES

1. Emergency Wetlands Resources Act of 1986 [16 U.S.C. 3901(b)]
2. Migratory Bird Conservation Act [16 U.S.C. 715d]
3. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(a)(4)]
4. Fish and Wildlife Act of 1956 [16 U.S.C. 742f(b)(1)]

PURPOSES FOR WHICH ESTABLISHED

1. “the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions.” [16 U.S.C. 3901(b); Emergency Wetlands Resources Act of 1986]
2. “for use as an inviolate sanctuary, or for any other management purpose, for migratory birds.” [16 U.S.C. 715d; Migratory Bird Conservation Act]
3. “for the development, advancement, management, conservation, and protection of fish and wildlife resources....” [16 U.S.C. 742f(a)(4); Fish and Wildlife Act of 1956]
4. “for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude.... [16 U.S.C. 742f(b)(1); Fish and Wildlife Act of 1956]

MISSION OF THE NATIONAL WILDLIFE REFUGE SYSTEM

“The mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.” — National Wildlife Refuge System Improvement Act of 1997 (Public Law 105–57; 111 Stat. 1282)

DESCRIPTION OF USE

(a) What is the use? Is it a priority public use?

The use is motorized and non-motorized boating. Motorized and non-motorized boating is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee), as amended by the National Wildlife Refuge System Improvement Act of 1997.

(b) Where would the use be conducted?

Motorized and non-motorized boating would be conducted on all open waters within the refuge open to compatible public use programs.

(c) When would the use be conducted?

Motorized and non-motorized boating will be allowed during the hours and in the seasons identified for refuge public use programs, including hours specified in the respective state regulations.

(d) How would the use be conducted?

Motorized and non-motorized boating would be allowed as a means to facilitate refuge public use programs, namely the priority public use programs of hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The use would be conducted consistent with refuge and New Hampshire and Maine regulations, with some additional restrictions to protect fish, wildlife and habitat, and reduce potential conflicts among public uses.

Boat access is available at a number of locations both on and off refuge ownership near Umbagog Lake. Two State of New Hampshire public boat launches provide boat trailer access to the upper Androscoggin River, Magalloway River, the mouth of the Rapid River, and Umbagog Lake. One launch is located upstream of the Errol Dam, the other at the southern end of Umbagog Lake. We provide additional boat-trailer access on refuge-owned land at the Steamer Diamond landing on the Androscoggin River and at refuge headquarters on the Magalloway River. A car-top boat launch is located at Parson's landing on the Magalloway River, just south of refuge headquarters.

The public occasionally launches canoes at other sites along Route 16, where it crosses or approaches the Magalloway and Androscoggin rivers. At some of those sites, inadequate parking or poor visibility of oncoming traffic present safety hazards. The refuge is constructing an additional car-top boat launch on the Magalloway River, north of refuge headquarters. The new site will provide parking, a dock, and a restroom. After completing that new site, we will close all refuge-owned boat access points along Route 16, except the present access at refuge headquarters and the Steamer Diamond Landing. All boats launching or landings on refuge lands must follow state boating regulations and, if applicable, show registration with the appropriate state.

The public must inspect all boats and boat trailers and clean them of aquatic invasive species before launching at refuge sites. That cleaning should take place on dry ground well away from the water. Exotic, nuisance plants or animals on boats, trailers, diving equipment, or in bait buckets can disrupt aquatic ecosystems and negatively affect native fish and plant species. Umbagog Lake and its associated rivers appear to be relatively free of aquatic invasive plants, and cleaning boats, trailers, and other equipment will help to keep them that way. Signs, education, and periodic enforcement will remind the public of these regulations.

(e) Why is the use being proposed?

Hunting, fishing, wildlife observation and photography, and environmental education and interpretation are the six priority public uses of the Refuge System. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses.

Motorized and non-motorized boating is allowed as a means to facilitate these priority public uses. By allowing this use, we are providing opportunities and facilitating refuge programs in a manner and

location that offer high quality, wildlife-dependent recreation and maintain the level of current fish and wildlife values.

Availability of Resources

Facilities or materials needed to support motorized and non-motorized boating include a new car-top boat launch off Route 16, north of the refuge office. FY 2005 funds paid for that launch, and we expect no additional construction expenses. Existing launch sites that we have scheduled for closure may require the installation of closure signs, as well as some site restoration work. Additional resources and staff time will be required to maintain the new boat launch, put down gravel and maintain the Steamer Diamond launch and the Mt. Pond fishing access and spur trail, close off wildlife nesting sites to the public, and provide interpretive materials and brochures. A Refuge Officer and the States of New Hampshire and Maine will provide law enforcement.

We do not anticipate charging fees for motorized and non-motorized boating. We estimate these costs associated with this use.

<i>Routine maintenance:</i>	\$7,000	annually. This is the expected cost to maintain the two public boat launches (Magalloway River (north) and Steamer Diamond landing), and includes putting down gravel or wood chips; maintaining parking areas, removing garbage, and maintaining the restroom at the Magalloway River launch.
<i>Supplies and materials:</i>	\$6,000.	This includes signs for closed launch sites, buoys and nesting site closure signs, interpretative brochures, regulation brochures (produced in-house)
<i>Monitoring:</i>	\$3,000	annually, to be carried out in cooperation with the states.
<i>Law Enforcement:</i>	\$3,000	annually for a refuge officer.
<i>Total:</i>	\$19,000	

Anticipated Impacts of the Use

Because Umbagog Lake and its rivers are accessible to motorized and non-motorized boats from the two New Hampshire state boat launches, we do not expect a dramatic change from existing conditions.

Potential impacts of motorized and non-motorized boating follow.

- **Accidental introduction of invasive plants, pathogens, or exotic invertebrates**, attached to boats: With the exception of a few isolated occurrences of purple loosestrife, refuge waters appear to be relatively free of invasive aquatic plants and mollusks. However, we have not carried out extensive surveys of aquatic invasive plants. We can limit their impacts by continuing education, outreach, and initiating an intensive monitoring program.

- **Disturbance of wildlife** (particularly breeding and brood-rearing loons, waterfowl, eagles, ospreys, and wading birds): Popular public use boating seasons in Maine and New Hampshire, coincide in part, with spring-early summer nesting and brood-rearing periods for many species of aquatic-dependent birds. Boaters may disturb nesting birds by approaching too closely to nests, causing nesting birds to flush. Flushing may expose eggs to predation or cooling, resulting in egg mortality. Boat wakes from watercraft may also flood or wash eggs out of nests. Both adult and flightless young birds may be injured or killed if run over by speeding boats. We will continue to close refuge areas seasonally to boating around sensitive nest sites, in conjunction with the States of Maine and New Hampshire. We will also continue our public outreach and the placement of warning signs. We will start monitoring public use in 2006, to help improve our management of public use, fisheries, and wildlife.
- **Negative impacts on water quality** from motorboat and other pollutants, human waste, and litter: Extensive water quality testing on the Umbagog system has not been carried out. The levels of pollutants from boat fuel and impacts on local aquatic systems are unknown. Hydrocarbon contamination can be harmful to fish. We will initiate public outreach and education on littering, pollutants, proper waste disposal, and the advantages of 4-stroke and other low emissions engines to help mitigate water quality impacts. Water quality testing will be carried out as funding levels permit
- **Bank and trail erosion** from human activity (boat landings, boat wakes, foot traffic), which may increase aquatic sediment loads of streams and rivers or alter riparian or lakeshore habitat or vegetation in ways harmful to fish or other wildlife: Boat access will be restricted to designated areas only. Those areas will be ‘hardened’ to contain impacts in a small area. We will monitor launch sites, and may modify, restore, or close them if conditions warrant. All new boat access construction will follow best management practices. Therefore, at current levels of use, we do not expect increased erosion because of boating activities.
- **Negative impacts from boats on sensitive wetlands** or peatlands and rare wetland plants: Boat access sites will be located away from sensitive wetlands, peatlands, and rare plants. Habitat features important for trout, such as overhanging banks, will be protected from disturbance.
- **Vegetation disturbance associated with installation of new boat launch and fishing access sites:** Although the new boat launch on Route 16 will be located in the floodplain of the Magalloway River, ground disturbance will be minimal. Because fishing will occur from non-motorized watercraft or a dock, we expect no erosion from bank fishing or trampling of vegetation.
- **Conflicts between boaters and other user groups:** We know that some conflicts among motorized and non-motorized boat users have arisen on the refuge in the past. In addition, local cabin owners have expressed concerns about trespass and inappropriate disposal of human waste by boaters, primarily canoeists and kayakers. The comfort station under construction at the Magalloway River launch site should help reduce some of those conflicts. We intend to carry out public use surveys in 2006 that will help identify any additional

conflicts between user groups. Should any significant conflicts become evident, we may need to manage public use on the refuge to minimize conflicts. That may include providing additional education and outreach, providing additional sanitary facilities, or creating zones to separate groups of users.

To summarize, boating on Lake Umbagog National Wildlife Refuge poses only a minimal threat to Goals 1, 2, and 3 (“Manage open water and wetlands,” “Manage floodplain and lakeshore habitats,” and “Manage upland forested habitats”) as written in the CCP. Our continued monitoring of invasive species and outreach at launching sites is necessary to prevent impacts on refuge habitats, plant and wildlife communities. Monitoring will identify any actions needed to respond to new information and correct problems that may arise in the future.

Boating will benefit Goal 4 “Provide high quality wildlife dependent activities” of the CCP by providing opportunities for wildlife observation and photography and access for hunting and fishing. Opportunities also exist to interpret the refuge at boat launches and on a canoe trail. No other refuge goals and objectives, as written in the CCP, will be affected by this use.

Public Review and Comment

As part of the comprehensive conservation planning process for the Lake Umbagog refuge, this compatibility determination underwent extensive public review, including a comment period of 77 days following the release of the Draft CCP/EIS. It will also undergo an additional 30 days of public review during the public review period of the FEIS.

Determination (check one below):

Use is Not Compatible

Use is Compatible, with the following stipulations

Stipulations Necessary to Ensure Compatibility

On refuge lands:

- We will permit boat launching only in designated areas to prevent the erosion and degradation of wetlands or water quality and ensure public safety.
- We will close wildlife nesting and brood-rearing areas seasonally to all boating activities, to prevent the disturbance of wildlife. That may include temporarily closing or relocating boating activities and/or access sites.
- Boat launches will be constructed and situated in such a way as to provide for public safety and minimize the disturbance of wildlife and habitat or the effects of siltation. We will use vegetation and other means of stabilizing soils around any culverts at road crossings. Protecting canopy trees from damage by humans will keep stream habitat shaded. We will monitor impacts and close, modify, restore, or move an access area if problems arise.

- We will increase public outreach and education to minimize conflicts among user groups, help control aquatic invasive plants and lead in the environment, reduce the introduction of non-native fish species, and minimize the disturbance of wildlife and habitat.
- A refuge officer will help to promote compliance with refuge regulations, monitor public use patterns and public safety, and document visitor interactions.

Justification: Hunting, fishing wildlife observation and photography, and environmental education and interpretation are the six priority public uses of the Refuge System, and have been determined to be compatible activities on many refuges nationwide. The Refuge System Improvement Act of 1997 instructs refuge managers to seek ways to accommodate those six uses. Motorized and non-motorized boating is allowed as a means to facilitate these priority public uses on Lake Umbagog Refuge. Boating on Umbagog National Wildlife Refuge will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established as evidenced by the impact analysis that shows this use will not compromise our ability to achieve the goals and objectives set forth under the Lake Umbagog NWR CCP.

Signature: Refuge Manager: Paul J. Casey 1-6-09
(Signature and Date)

Concurrence: Regional Chief: Anthony D. Leges 1-9-09
(Signature and Date)

Mandatory 10-year Re-evaluation Date: January 9, 2019

Literature Cited

Bonney, F. 2002. Personal communication. Maine Inland Fisheries and Wildlife.

Boucher, D. P. 1995. Rapid River salmonid management. Fishery Interim Summary Report Ser. No. 95–6. Maine Dept. of Inland Fisheries and Wildlife, Augusta, ME.

Ensor, K.L., D.D. Helwig, and L.C. Wemmer. 1992. The common loon in Minnesota: potential contaminant implications *in* L. Morse, S. Stockwell and M. Pokras, eds. Proc. from the 1992 conference on the loon and its ecosystem: status, management, and environmental concerns, Bar Harbor, ME.

Pokras, M.A. and R. Chafel. 1992. Lead toxicosis from ingested fishing sinkers in adult common loons (*Gavia immer*) in New England. *J. of Zoo and Wildl. Med.* 23(1):92-97.

Attachment: Map C-1, showing existing and planned boat access points.

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: ATV, ORV, or Motorbike Use

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)?	X	
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources? Public understanding and appreciation only.	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate X Appropriate

Refuge Manager: Paul F Casey Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence.

If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Janet Kennedy Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: ATV, ORV and motorbike use

Narrative: This use has the potential to cause erosion and habitat (vegetation) damage. The use also may detract from the quality of other wildlife-dependent uses. The noise and speed of these machines has potential to disturb wildlife especially during the breeding season. Use of all-terrain vehicles is not consistent with two executive orders, E.O. 11644 and E.O. 11989 which require that refuges promote safety, minimize conflicts among users, monitor effects of ATV use if allowed, and to close areas to ATV use if they will cause adverse effects on soil, vegetation, wildlife, habitat or cultural or historic resources. This use is not consistent with any approved refuge management plan and would divert existing and future resources from accomplishing priority tasks.

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Geocaching

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)? Abandonment of Property 50CFR Ch. 1 27.93		X
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?	X	

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate X Appropriate

Refuge Manager: Paul T. Casey

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence.

If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: Justin McKeune

Date: 1-9-2009

A compatibility determination is required before the use may be allowed.

Justification for a Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Geocaching

Narrative Geocaching is not appropriate since it encourages the unauthorized abandonment of property on the refuge. It also encourages participants to go “off trail” and may impact wildlife during the breeding season.

Finding of Appropriateness of a Refuge Use

Refuge Name: Lake Umbagog National Wildlife Refuge

Use: Field trials for dogs

This exhibit is not required for wildlife-dependent recreational uses, forms of take regulated by the State, or uses already described in a refuge CCP or step-down management plan approved after October 9, 1997.

Decision criteria:	YES	NO
(a) Do we have jurisdiction over the use?	X	
(b) Does the use comply with applicable laws and regulations (Federal, State, tribal, and local)? Field Trials prohibited by 50 CFR 27.91		X
(c) Is the use consistent with applicable Executive orders and Department and Service policies?	X	
(d) Is the use consistent with public safety?	X	
(e) Is the use consistent with goals and objectives in an approved management plan or other document?		X
(f) Has an earlier documented analysis not denied the use or is this the first time the use has been proposed?	X	
(g) Is the use manageable within available budget and staff?	X	
(h) Will this be manageable in the future within existing resources?	X	
(i) Does the use contribute to the public’s understanding and appreciation of the refuge’s natural or cultural resources, or is the use beneficial to the refuge’s natural or cultural resources?	X	
(j) Can the use be accommodated without impairing existing wildlife-dependent recreational uses or reducing the potential to provide quality (see section 1.6D. for description), compatible, wildlife-dependent recreation into the future?		X

Where we do not have jurisdiction over the use (“no” to (a)), there is no need to evaluate it further as we cannot control the use. Uses that are illegal, inconsistent with existing policy, or unsafe (“no” to (b), (c), or (d)) may not be found appropriate. If the answer is “no” to any of the other questions above, we will generally not allow the use.

If indicated, the refuge manager has consulted with State fish and wildlife agencies. Yes X No

When the refuge manager finds the use appropriate based on sound professional judgment, the refuge manager must justify the use in writing on an attached sheet and obtain the refuge supervisor’s concurrence.

Based on an overall assessment of these factors, my summary conclusion is that the proposed use is:

Not Appropriate X Appropriate

Refuge Manager: *Paul J. Casey*

Date: 1-6-09

If found to be Not Appropriate, the refuge supervisor does not need to sign concurrence if the use is a new use.

If an existing use is found Not Appropriate outside the CCP process, the refuge supervisor must sign concurrence.

If found to be Appropriate, the refuge supervisor must sign concurrence:

Refuge Supervisor: *Janet M. Quinn*

Date: 1-9-2009

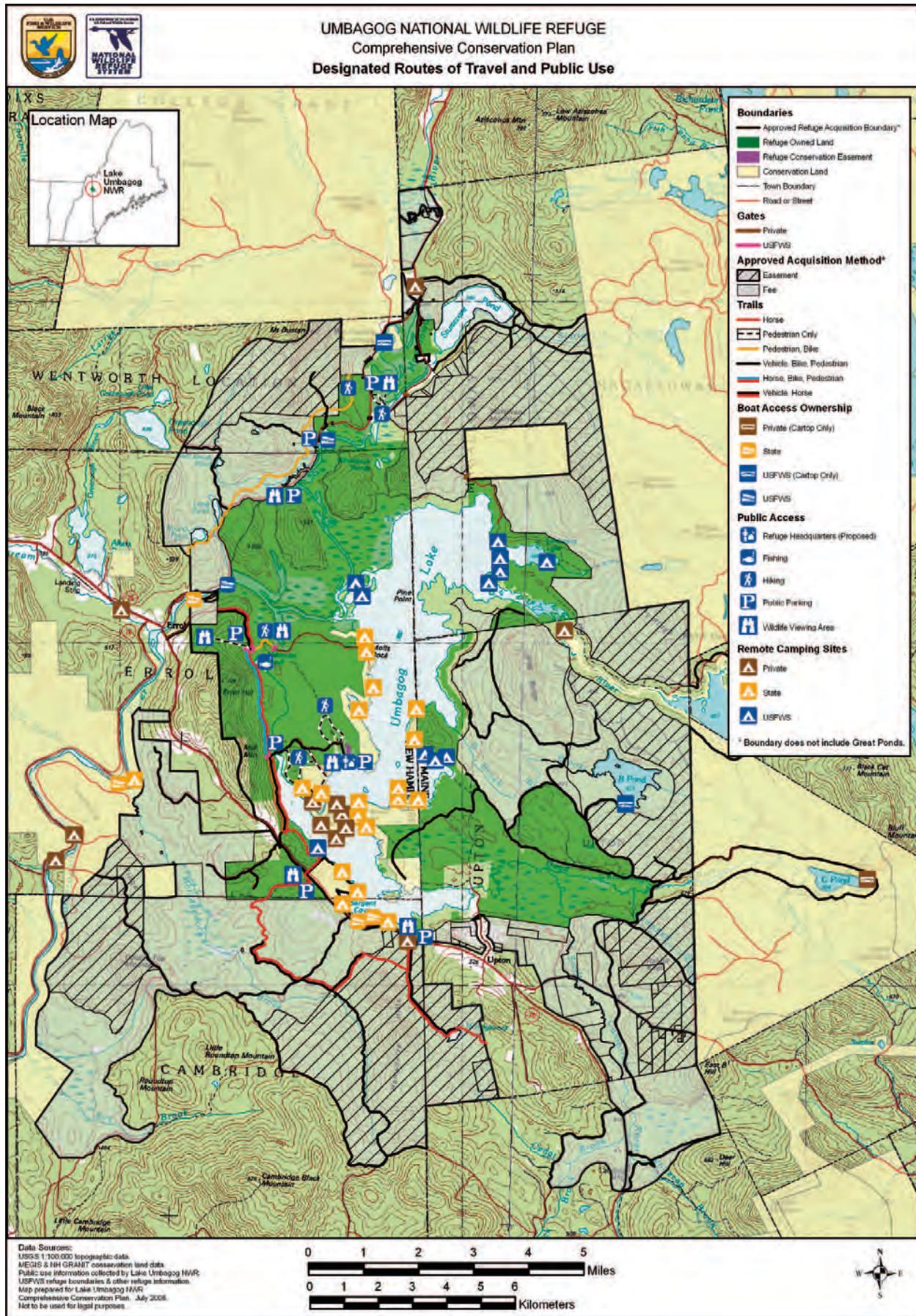
A compatibility determination is required before the use may be allowed.

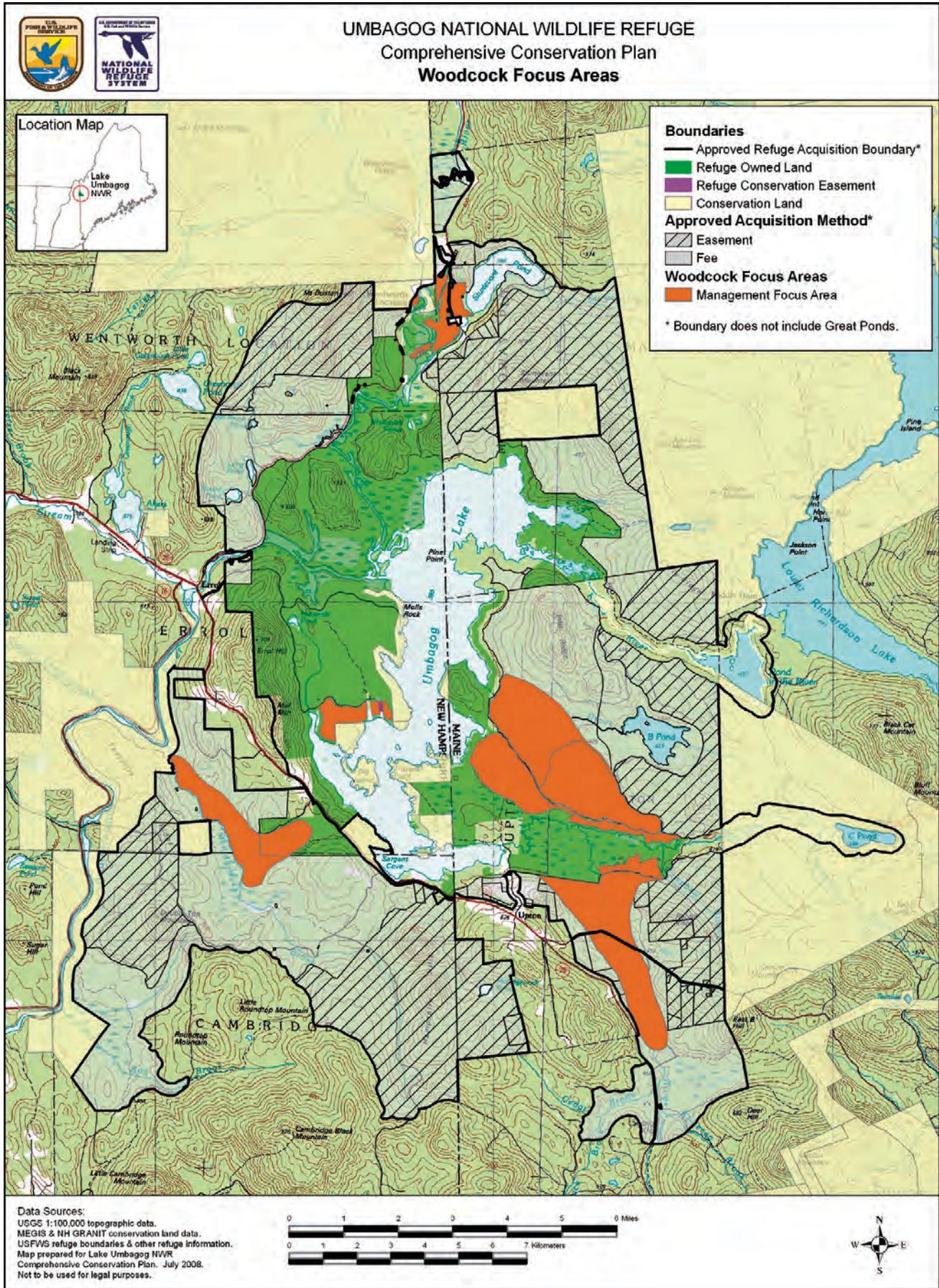
Justification for a Finding of Appropriateness of a Refuge Use

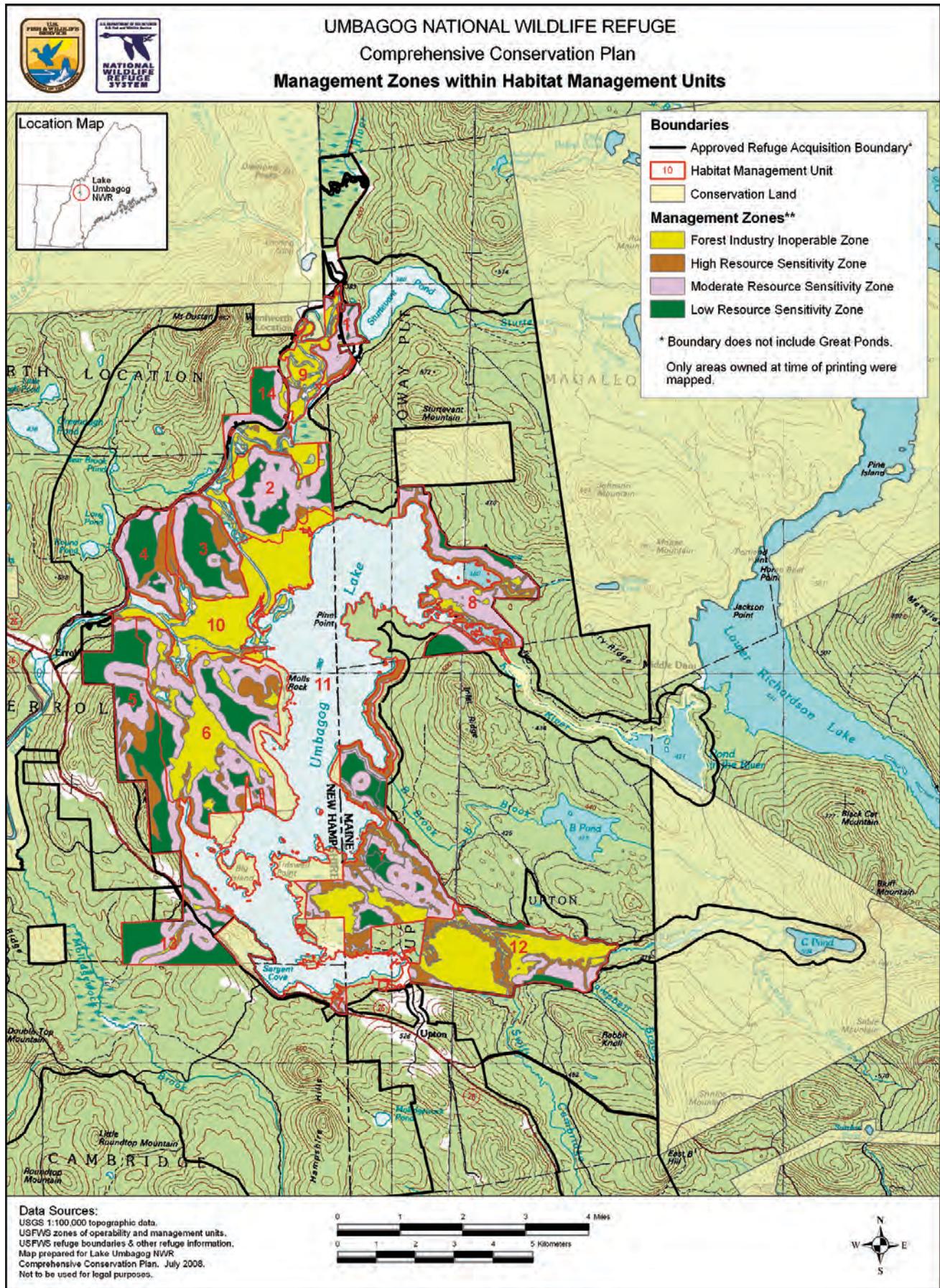
Refuge Name: Lake Umbagog National Wildlife Refuge

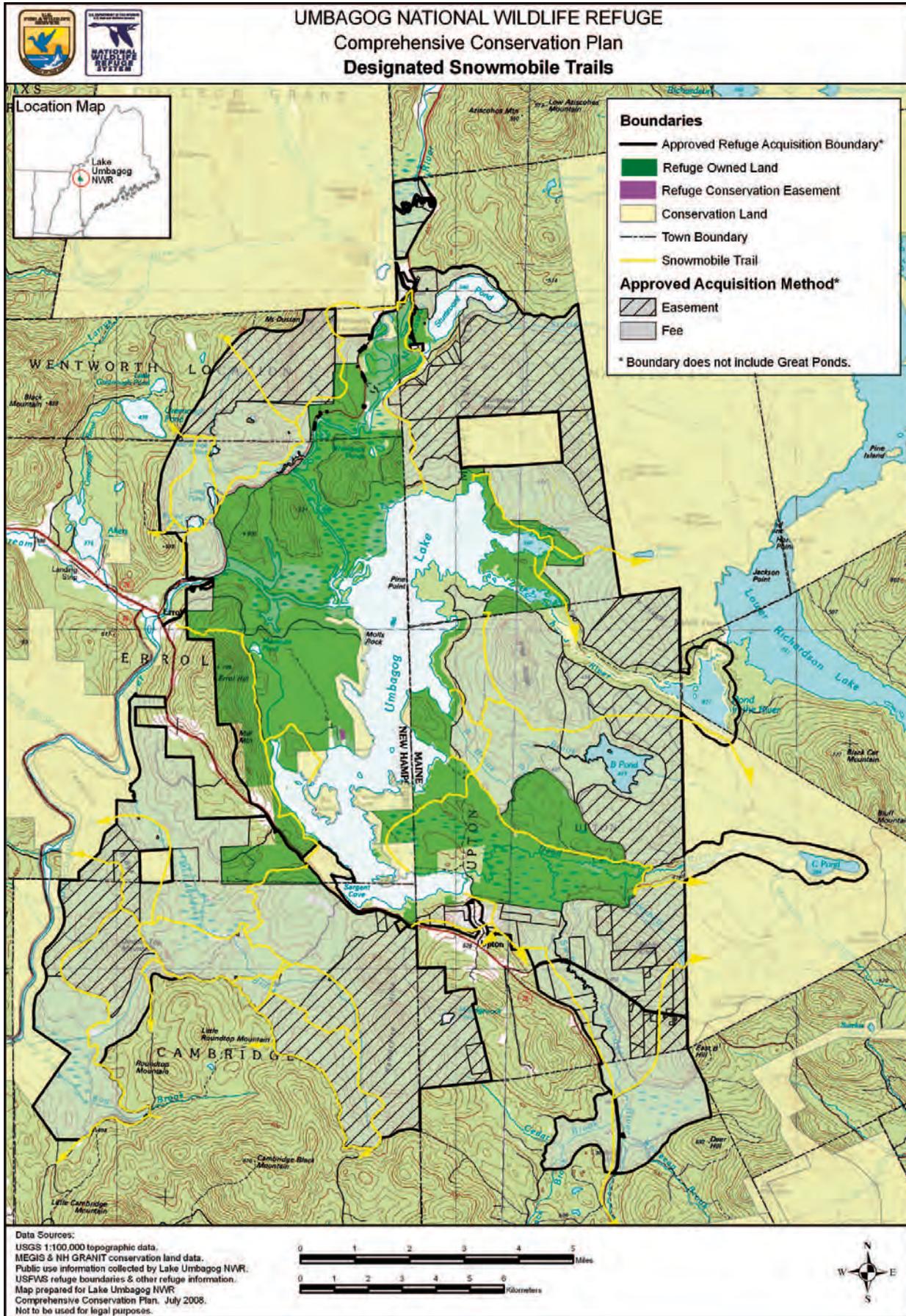
Use: Field Trials for Dogs

Narrative: Field trials typically involve concentrated numbers of participants and spectators which has the potential to disturb wildlife and their habitats. Dog field trials are non-wildlife dependent uses prohibited, as noted, by 50 CFR 27.91.









Appendix D



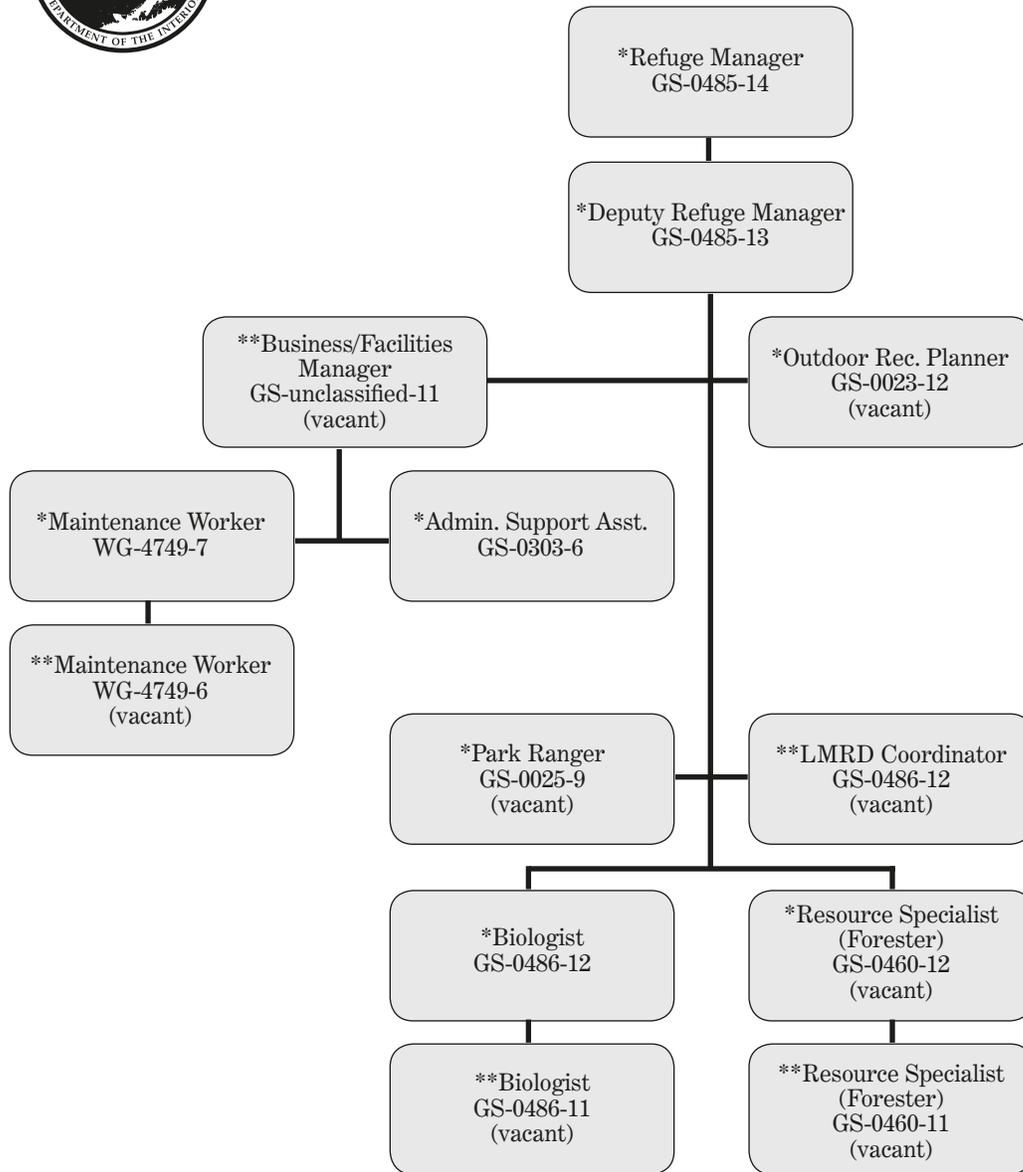
Ian Drew/USFWS

Moose

Staffing Chart



U.S. Fish and Wildlife Service Umbagog National Wildlife Refuge Staffing Chart



* Essential Staff
 ** New Expanded Staff

GS levels indicate full performance level

Seasonal Staff includes:
 2 Biotech (GS-0404-7)
 4 Interns
 1 YCC Crew Leader
 4 YCC Crew
 1 Maintenance Worker (WG-4749-5)
 1 ORP GS-0023-09

Appendix E



Bill Zimm/USFWS

Managed forest lands on the refuge

Forest Management Guidelines

Forest Management Guidelines

Introduction

The purpose of this appendix is to provide further detail on our proposed forest management under the Lake Umbagog Refuge Final CCP/EIS alternative B. It includes information on the desired future condition of our upland forested habitats, focusing on those areas within the current refuge boundary where we expect to operate in the next 15 years. We describe anticipated growth rates, harvest rates, and management techniques that will be used to achieve our habitat management goals and objectives.

Desired Future Forest Condition

We describe a landscape analysis we conducted in appendix H. It resulted in our determination that sustaining a mature, unfragmented, mixed spruce-fir/northern hardwood forest matrix, with a high conifer component, to benefit those species dependent on this type of forest landscape, was the most important ecological contribution the refuge could make through management to the Upper Androscoggin River watershed, the Northern Forest, and the Refuge System.

The 15 year scope of our CCP falls far short of the decades we expect it will take to create a sustainable mature mixed forest. Our expectation is that it will take at least 100 years to fully implement our forest management goals and objectives. This timeframe is based on our prediction of how long it will take to achieve the forest and stand composition and structural characteristics targeted for our refuge focal species identified in the alternative B. Generally, our management will increase the percentage of spruce and fir in our forests, and move our stands toward a mature forest structure, including super canopy trees, and with a high degree of canopy closure. This management will benefit certain refuge focal species, including blackburnian and black-throated green warblers. In woodcock focus areas, management to benefit two other focal species, Canada warbler and American woodcock, will be emphasized. Also, we will improve deer wintering areas, where consistent with our management for focal species. We will plan our management to ensure that large blocks of unfragmented habitat are consistently available over time, for those species that require it. We will also assess the effects of our management at a refuge scale, in order to ensure connectivity between habitat patches. We believe our management will help to build the resilience of our forests to multiple stressors, in the face of climate change, but may have to adjust our management approach as conditions require.

Sustaining a mature mixed forest over the long term requires active management of all forest age and structural classes, which we have grouped in our discussions throughout the Final CCP/EIS into: regeneration, mid- and mature age classes. Silvicultural approaches will differ in different habitat types within the mixed forest, but management will stay within the inherent capability of the site to grow certain tree species (i.e. based on soil properties, moisture regimes, elevation, aspect, etc). Attachment 1 defines techniques we might employ. Where feasible, and assuming favorable site capabilities, our management strategies will favor or increase the spruce-fir component of stands. We will also predominately use forest management techniques to promote uneven-aged stands which we believe will best achieve our habitat goals and objectives. There are some sites, however, where techniques to promote even-aged stands would better meet our objectives. This may occur, for example, in stands where we want to encourage advanced regeneration of spruce/fir, enhance deer wintering areas, and/or to manage for American woodcock and Canada warbler.

Our Final CCP/EIS alternative B (Service-preferred alternative), Objective 3.1 Mixed Spruce-Fir/Northern Hardwood Forest reads:

Conserve the mixed spruce-fir/northern hardwood forest on Service-owned lands within the current and expanded refuge boundaries, to sustain well-distributed, high quality breeding and foraging habitat for species of conservation concern, including blackburnian, black-throated green, and Canada warblers, and American woodcock. Also, where consistent with management for those focal species, protect critical deer wintering areas and provide connectivity of habitat types for wide-ranging mammals.

It is important to understand that our management efforts will focus on providing sustainable high quality habitat conditions for our focal species. As noted above, in order to accomplish this, we would need to manage the various age classes and structures to ensure habitat conditions can be provided over the long-term. It is also important to understand that not every acre on the refuge is forested, nor is every forested acre suitable for active management. Furthermore, not every forested acre on refuge land is adequately stocked. In fact, many parcels of land purchased for the refuge over the last few years have been heavily harvested prior to sale. In these areas, very little, or no, management may be warranted to meet our habitat and focal species objectives during the 15year lifetime of this plan.

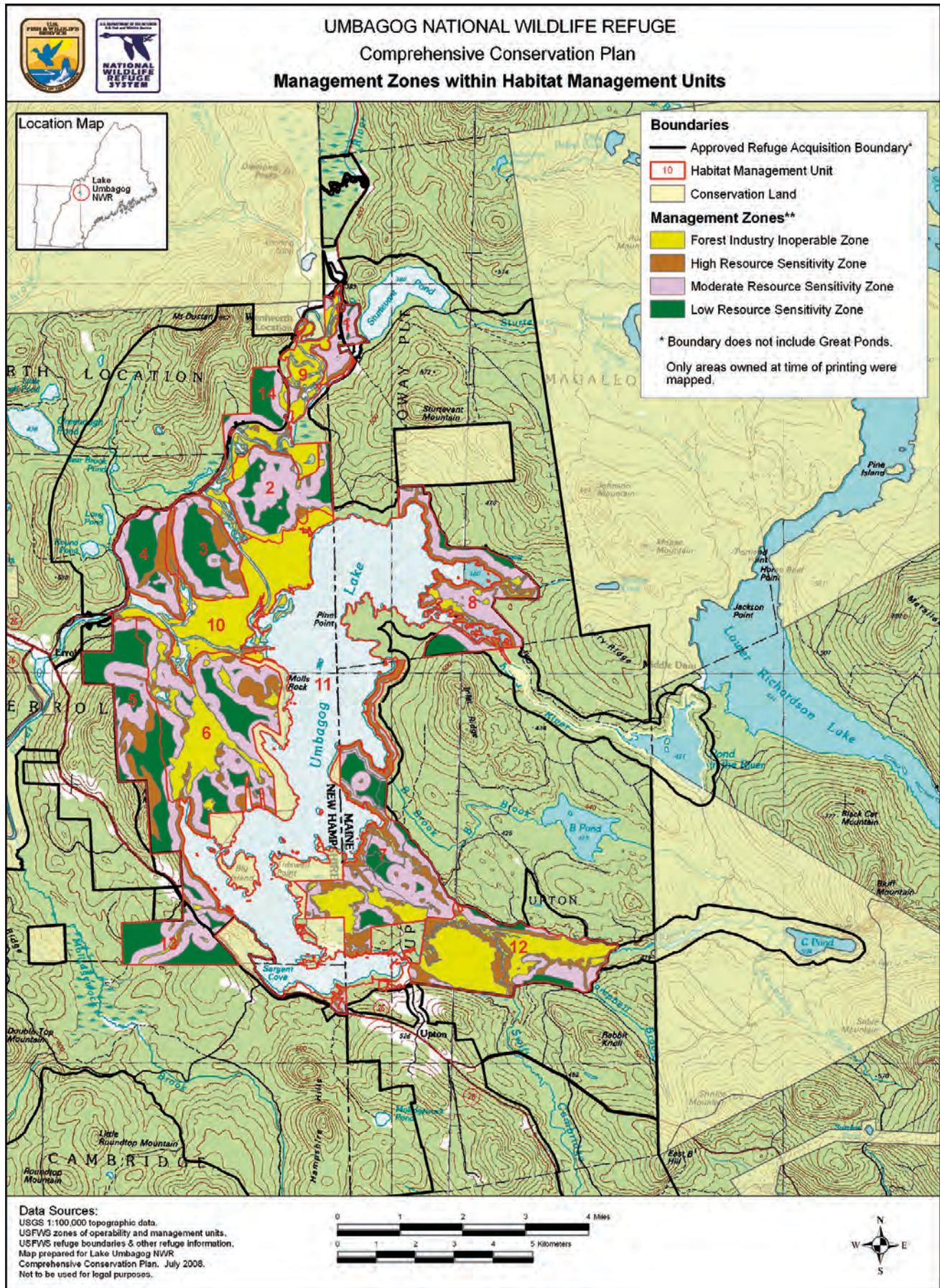
Identifying Management Zones

In conjunction with our habitat type mapping we determined management zones, or zones of operability, to help identify where active management is possible (map E-1). These zones were mapped using stand level vegetation, wetlands, and soils information, and our knowledge of wildlife use. We define below the following four zones: 1) Low Resource Sensitivity (least restrictive; fewest special management prescriptions needed); 2) Moderate Resource Sensitivity; 3) High Resource Sensitivity; and, 4) Forest Industry Inoperable. Best states' recommended forest practices, in terms of both forestry and wildlife management, will be followed in all areas and zones (see below: New Hampshire Forest Sustainability Standards Work Team 1997; Flatebo et al. 1999; Cullen 2000; Calhoun and DeMaynadier 2003; Smith and Whitney 2001; Chase et al. 1997; Reay et al. 1990).

Low Resource Sensitivity Zone: Stands within this zone allow for the greatest flexibility in managing over the long term to diversify forest age class and structure to benefit our focal species. A variety of commercial and noncommercial timber harvesting may occur as described below under each habitat type. All harvesting will follow best forestry and wildlife management practices (BMPs), as recommended by the states of New Hampshire and Maine. Where this zone surrounds or abuts moderate and high sensitivity and industry inoperable zones, stand prescriptions will reflect the need to protect or enhance the resource values on those adjacent, more sensitive areas.

Moderate Resource Sensitivity Zone: Stands within this zone are subject to more restricted silvicultural prescriptions or timing of harvest than in the Low Resource Sensitivity Zone. Restrictions may include (but are not limited to) seasonal operational closures, maintenance of closed canopy conditions, retention of coarse woody debris or snags, etc.

High Resource Sensitivity Zone: Stands within this zone are subject to very few manipulations. We may fell, girdle, or otherwise treat individual trees, or small groups of trees, to benefit wildlife or for safety reasons. Highly restrictive areas may include excessively steep slopes, hydric soils, and/or close proximity to resources of concern, such as streams and wetlands. Most of these areas are also considered "inoperable" by the forest products industry (see below); however, the refuge's high resource sensitivity zone is more extensive than what industry would consider "inoperable".



Forest Industry Inoperable Zone: This zone represents local forest industry standards for inoperability. These areas were mapped by the former timber company landowner. This zone includes stands that are non-forested wetlands, or are too steep or wet to be economically harvested (Johnson 2003). We may fell, girdle, or otherwise treat individual trees, or small groups of trees, to benefit wildlife or for safety reasons; otherwise, tree harvest will be quite limited.

List of Guidelines /Best Management Practices

At a minimum, our forest management will adhere to recommended best management practices for forest and wildlife management listed in the documents below:

Calhoun, A.J.K. and P. deMaynadier. 2003. Forestry habitat management guidelines for vernal pool wildlife in Maine. U.S. Environ. Protect. Agency, Boston, MA.

Chase, V., L. Deming and F. Latawiec. 1997. Buffers for wetlands and surface waters: a guidebook for New Hampshire municipalities. Audubon Soc. of New Hampshire

Cullen, J.B. 2000. Best management practices for erosion control on timber harvesting operations in New Hampshire. NH Dept. of Resources and Economic Development, Div. of Forests and Lands, Forest Info. and Planning Bureau and Univ. of New Hampshire Coop. Extension.

Flatebo, G., C.R. Foss and S. K. Pelletier. 1999. Biodiversity in the forests of Maine: guidelines for land management. C.A. Elliott, ed. Univ. of Maine Coop. Extension. UMCE Bulletin # 7147.

New Hampshire Forest Sustainability Standards Work Team. 1997. Good forestry in the granite state: recommended voluntary forest management practices for New Hampshire. N.H. Div. of Forests & Lands, DRED and Soc. for the Protection of NH Forests.

Reay, R.S., D.W. Blodgett, B.S. Burns, S.J. Weber, and T. Frey. 1990. Management guide for deer wintering areas in Vermont. Vermont Dept. of forests, Parks 7 Rec. and Dept. of Fish & Wildlife.

Smith, S. and S. Whitney. 2001. Guide to New Hampshire timber harvesting laws. Univ. of New Hampshire Coop. Extension.

Identifying Habitat Management Units

To facilitate the development of a detailed habitat management plan (HMP), we divided all refuge lands currently under fee ownership into 14 geographic areas or “habitat management units (HMUs)” (map K-1). The HMP, which is a step-down plan to be completed immediately upon CCP approval, will detail stand-level treatments and prescriptions (e.g. timing, distribution, method or technique, etc) for each HMU. Our HMU boundaries are defined based on ecological systems and landscape features such as roads, waterways, Umbagog Lake, as well as logistical considerations.

Defining Manageable Forest Areas

Of the 21,644 acres owned by the refuge in fee (an additional 6 acres are owned in easement) and delineated in HMUs, 10,845 acres of that is considered upland forest. Of those upland forest acres, more than half falls within high resource sensitivity or forest industry inoperable zones, or includes stands recently harvested and existing in regeneration through sapling/pole age classes. Our management would be limited in these areas. Instead, the focus of our forest management to benefit focal species will fall within existing mature stands within the low and moderate resource sensitivity zones.

We determined where we currently have mature stands through two sources. The first was aerial photo interpretation work conducted for us under contract by James W. Sewall Company. We used their data to identify mature stands which we defined as having a canopy height greater than 30 feet in spruce-fir and mixed woods, and 50 feet in hardwoods. We also utilized information from a timber inventory conducted in 2000 and supplied to us by the previous owner. We used this information to further identify mature habitat conditions, and to evaluate stocking levels and forest products potential associated with each of the habitat types described below.

Table E.1 presents a summary of the acreage on which we will focus forest management over the next 15 years to benefit focal species. It represents the upland forest habitat types, currently owned in fee by the refuge, that are in a mature age class and stand condition, and occur in low or moderate resource sensitivity zones. We refer to these acres as “manageable” in the table below.

Table E.1. By forest habitat type, the acres in upland that are owned in fee, and the resulting predicted “manageable” forest habitat acres on the Lake Umbagog Refuge under the Final CCP/EIS, Alternative B: Service-preferred alternative

Forest Habitat Type	Upland Forest Acreage Owned in Fee	Predicted Manageable Acres Over Next 15 Years
Northern Hardwood	4,640	804
Spruce-fir	2,346	1,032
Mixed Woods	3,859	2,205
TOTAL	10,845 acres	4,041 acres

Limited forest management may also need to occur during the 15 year life-span of this plan in the remaining 5,872 acres of upland forest not meeting the aforementioned criteria. Of those acres, some habitat improvement projects, such as pre-commercial thinning, may be implemented to support our objectives in those stands that exist in the regeneration and sapling/pole size age classes, and in the low and moderate resources sensitivity zones. This will be determined after we conduct a detailed stand inventory. Timber sale areas will be managed and in some cases combined, in order to ensure their commercial viability. The remaining acres, which occur in the high resource sensitivity or in the forest industrial inoperable zones, will largely be unmanaged, but will contribute towards the mature age class in our desired future condition.

Proposed Management by Forest Habitat Type

The following proposed management may be employed by the refuge under full-implementation of the Final CCP/EIS alternative B to achieve the desired future condition over the long-term. It includes commercial and non-commercial forest management on low to moderate resource sensitivity zones designed to meet our focal species habitat management objectives. These descriptions represent anticipated management and resulting harvest figures. More detailed prescriptions by treatment unit will be developed in the HMP and will be based on individual site conditions. Also, Attachment 1 describes the silvicultural techniques in more detail.

Spruce-fir

Desired future condition for focal species: Mature, closed canopy conifer with a high spruce component.

Uneven-aged Management

In the refuge's spruce-fir forested stands, we will utilize uneven-aged management techniques to convert the predominately even-aged forest to a multi-aged, multi-structured condition. We plan to conduct harvest utilizing a combination of group selection, with some single tree selection between groups. Groups should be roughly 1/10 acre in size and will be distributed throughout the entire management unit with 10-15% of the area being removed on 15-20 year cycles. Age class goals, not including reserve snag and cavity trees, will be 100-130 years. Basal area (BA) goals in spruce-fir should strive for a minimum of 80 ft²/acre, with roughly 50% in 6-10" diameter class, 30% in 11-14" diameter class, and 25% in a 15"+ diameter class. Our spruce-fir structural goals are to maintain a $q=1.7$, which has about a 45% of its diameter distribution in an 11"+ diameter class. Use of the "q" is defined by Leak et al.:

Diameter distributions are approximated by the reverse J-shaped curve, with a slope defined by "q" – the quotient between numbers of tree in successively smaller d.b.h. classes."

We predict a stand at this stocking level will grow at a rate of 2 ft²/ acre/year resulting in 30-40 ft²/acre of volume available to harvest during each cutting cycle. Of this growth, we estimate retention of approximately 7 ft²/ acre (approximately 6 trees/acre), to account for our snag and cavity tree requirements resulting in the potential removal of 23-33 ft²/acre during each harvest entry.

It is expected a minimum net annual growth in this habitat will be .3 cords/acre/year which, over a 15-20 year period, equates to 4.5-6 cords/acre net increase. During each harvest entry, a portion of the trees need to be retained to fulfill our snag and cavity tree requirements. Individual trees (11"-20" diameter) are estimated to consist of .25 - 1 cord. It is predicted a retention volume of 2-3 cords/ acre (1000-1500 BF/acre), distributed among 6 trees/acre, will be adequate to attain the desired snag/cavity tree goals. This results in roughly 2.5-4 cords/ acre (1250-2000 BF/acre) available to harvest during each harvest cycle entry. Because our diameter distribution is skewed more towards the larger 11-14" class, it is predicted our gross volume will be 20-25 cords/acre at the beginning of each harvest cycle. With the predicted even distribution of volume per acre, this equates to 15 % area removal at each entry, accounting for 3-3.5 cords/acre, and any remaining volume/acre needed to meet the habitat goal, being removed through single tree selection.

Even-aged Management

In certain areas, such as where there is healthy, advanced spruce-fir regeneration or in critical deer wintering areas, we may employ even-aged management techniques in this habitat type. This is consistent with our objective to perpetuate a multi-aged and multi-structured forest landscape. We would conduct harvests utilizing shelterwood or clearcuts in a shifting mosaic pattern that will result in a progressive patch, block, or strip system, where-in typically 15% of the area is harvested in 15 – 20 year intervals.

Target rotation age is 80-130 years. On 15 year harvest cycles, and an approximate 100 year rotation, this equates to roughly 6 age classes with 33.3% of the area in a 0-30 year age class (regeneration/sapling structural stage), 33.3% in a 30-60 year age class (pole/small sawtimber structural stage), and 33.3% in a 60-100 year age class (small sawtimber/large sawtimber structural stage). If no significant natural disturbance occurs during the rotation of a treatment area, basal area (BA) at the time of harvest will likely be above 140 ft²/acre, and may be in excess of 200 ft²/acre. Scheduling of a harvest is not basal area dependent, and is considered to be the size of the treatment area in its entirety, which is approximately 15% of the HMU.

Snag and cavity trees will need to be retained through a reserve approach during each harvest. We estimate retention of approximately 7 ft²/acre (e.g. approximately 6 trees/acre) to account for our snag and cavity tree requirements. Manipulative efforts through habitat improvement may need to be employed on adjacent areas to account for potential loss of this component from sudden exposure to sun, wind, storm, insect or other natural agents.

Harvest volume will vary greatly by site but 25 to 50 cords per acre is expected from 100 year old, unmanaged, fully stocked even-aged stands. Approximately 2 cords per acre will need to be retained for snag and cavity tree requirements.

Clearcuts on the refuge will be limited in size and typically less than 10 acres; or, in deer winter yards, clearcuts will be one of several regeneration methods used, but would not be applied on more than 20% of a deer wintering area within a 15-year interval.

Mixed Woods

Desired future condition for focal species: Mature, closed-canopy habitat with a high conifer (spruce-fir) component.

Silvicultural approaches will differ within the mixed spruce-fir/northern hardwood forest matrix based on the inherent capability of an individual site to grow a predominance of either spruce/fir or northern hardwoods (i.e. based on soil properties, moisture regimes, elevation, aspect, etc). Habitat types will be perpetuated through time, using accepted silvicultural practices. Where feasible, and assuming favorable site capability, management strategies will favor or increase the conifer component of stands.

Uneven-aged Management

In the refuge's mixed woods stands, we will primarily utilize uneven-aged management techniques to convert the predominately even-aged forest to a multi-aged, multi-structured, condition. We will conduct harvests utilizing a combination of group selection with some single tree selection between groups. Groups should range from 1/5 to 1/2 acre in size and be distributed throughout the entire management unit with 10-15% of the area being removed on 15-20 year cycles. Age class goals, not including snag and cavity trees, should be 100-200 years. BA goals in mixed woods should strive for a minimum of 100 ft²/acre with roughly 42% in a 6-10" diameter class, 28% in 11-14" diameter class, and 30% in a 15"+ diameter class. Mixed woods structural goals are to maintain a $q = 1.5$, which has about 55% of its diameter distribution in an 11"+ diameter class.

We predict a stand at this stocking level will grow at a rate of 2 ft²/ acre/year resulting in 30-40 ft²/ acre available to harvest during each cutting cycle. Of this growth, we estimate retention of approximately 7 ft²/acre (e.g. approximately 6 trees) to account for our snag and cavity tree requirements resulting in a removal of 23-33 ft²/ acre during each harvest entry.

We expect a minimum net annual growth in this habitat will be .33 cords/acre/year, which over a 15-20 year cutting cycle, equates to a 5-6.5 cords/acre net increase. During each harvest entry, a portion of the trees need to be retained to fulfill our snag and cavity tree requirements. Individual trees (11"-20" diameter) are estimated to consist of .25 - 1 cord. It is predicted a retention volume of 3 - 4.5 cords/acre (1500-2250 BF/acre) distributed among 6 trees/acre will be adequate to retain the desired snag/cavity tree goals. This results in approximately 2-3 cords (1000-2000 BF/acre) available to harvest during each harvest cycle.

Because our diameter distribution is skewed more towards the larger 11-14" class, it is predicted our gross volume will be 18-22 cords/acre at the beginning of each harvest cycle. With the predicted even distribution of volume per acre this equates to 10 - 15 % area removal at each entry, accounting for 2 - 3.5 cords/acre, and the remaining volume/acre needed to meet the habitat goal, being removed through single tree selection.

Even-aged management

Where site conditions and management goals deem appropriate (deer wintering areas and areas where advanced spruce/fir regeneration exists), we will employ the even-aged management techniques as described for spruce/ fir management. These techniques will be used to perpetuate a multi-aged and multi-structured forest landscape through even-aged area regulation. We plan to conduct harvests utilizing shelterwood or clearcuts in a shifting mosaic pattern that will result in a progressive patch, block, or strip system, where-in 15% of the area is harvested in 15 – 20 year intervals.

Northern Hardwoods

Desired future condition for focal species: Mature, mid-high canopy closure, with a multi-layered profile, and canopy gaps with understory development.

Uneven-aged Management

In the refuge's northern hardwood stands, we will utilize uneven-aged management techniques to convert the predominately even-aged forest to a multi-aged, multi- structured condition. We will conduct harvests utilizing a combination of group selection with some single tree selection between groups. Groups would be approximately 1/2 acre in size and be distributed throughout the entire management unit with 10-15% of the area being removed on 15-20 year cycles. Age class goals, not including snag and cavity trees, should be 100200 years. BA goals in northern hardwoods should strive for a minimum of 70 ft²/acre with roughly 42% in a 6-10" diameter class, 28% in 11-14" diameter class, and 30% in a 15"+ diameter class. Northern hardwoods structural goals are to maintain a $q = 1.5$, which has about 55 % of its diameter distribution in an 11"+ diameter class.

We predict a stand at this stocking will grow at a rate of 2 ft²/ acre/year resulting in 30-40 ft²/ acre available to harvest during each cutting cycle. Of this growth, we estimate retention of approximately 7 ft²/acre (e.g. approximately 6 trees), to account for our snag and cavity tree requirements, resulting in a removal of 23-33 ft²/acre during each harvest entry.

We expect a minimum net annual growth in this habitat will be .4 cords/acre/year, which over a 15-20 year period, equates to a 6-8 cords/acre net increase. During each harvest entry a portion of the trees need to be retained to fulfill our snag and cavity tree requirements. Individual trees (11"-20" diameter) are estimated to consist of .25 - 1 cord. We predict a retention volume of 2-3 cords/acre (1000-1500 BF/acre) distributed among 6 trees/acre will be adequate to attain the desired snag/cavity objectives. This results in approximately 4-6 cords (2000-3000 BF/acre) available to harvest during each harvest cycle entry.

Because our diameter distribution is skewed more towards the larger 11-14" class, it is predicted our gross volume will be 18-22 cords/acre at the beginning of each harvest cycle. With the predicted even distribution of volume per acre, this equates to 10-15 % area removal at each entry, accounting for 2 - 3.5 cords/acre, and the remaining volume/acre needed to meet the habitat goal, being removed through single tree selection.

Woodcock Focus Areas

Even-aged Management

In woodcock focus areas, we will use accepted silvicultural practices to create openings, promote understory development, and sustain early successional habitat for woodcock and Canada warbler. We will use group selection, clearcuts, or patch cuts of up to 5 acres in size. Some larger roosting fields may also be maintained. Cutting cycles will be approximately 8-10 years on a 40 year rotation. Some 3-5 acre openings may be permanently maintained, primarily by mowing and brush clearing using mechanized equipment. We will perpetuate the aspen-birch community where it currently exists, and maintain it in well-distributed regenerating, young, mid- and mature age classes.

Anticipated Average Annual Harvest Summary

Table E.2 presents the average annual volume and forest product that would result from the stand management described above for the Final CCP/EIS alternative B.

Table E.2. Predicted forest products and average annual harvest volumes under implementation of the Lake Umbagog Refuge Final CCP/EIS alternative B.

Forest Product	Average Annual Quantity under CCP Alternative B
Softwood Sawtimber	135 MBF
Hardwood Sawtimber	27 MBF
Softwood Pulp	125 Cords
Hardwood Pulp	371 Cords
Fuelwood	88 Cords

Anticipated Management on Lands to be Acquired in the Proposed Expansion Area

Over the next 15 years, as land is acquired from willing sellers in functional management units of at least 200 contiguous acres, we will delineate a new HMU and undertake the same evaluation we conducted for current refuge lands. Within two years of acquisition, we will conduct a stand inventory and apply the resource sensitivity zones. We will then develop management prescriptions to support the same goals and objectives for our focal species, using the same methodology we described above for current refuge lands.

Attachment 1

Definitions of Forest Silvicultural Techniques and Methods to Use in our Forest Management for Focal Species

Group Selection

This technique involves the removal of small groups of trees throughout a stand, to initiate and/or maintain an uneven-aged forest. A group selection opening is considered to be less than, or equal to, twice the height of the adjacent mature trees. This method will encourage regeneration of intermediately tolerant and tolerant species, but some intolerant species can appear towards the center of the harvest areas when the groups are at the maximum size. The likelihood of the harvest areas regenerating combined with the ability to schedule continual harvest entries, results in this technique being a method of choice to convert even-aged stands to uneven-aged stands when desired.

Group selection results in moderately- closed to closed-canopy conditions. Regeneration and shrubby vegetation can be expected to develop with reasonable assurance. This technique can be used in combination with singletree selection to ensure canopy closure requirements meet desired conditions. Priority species such as the blackburnian and black-throated green warbler will benefit from the application of this technique in a conifer-dominated habitat area. The predominantly closed canopy condition resulting from this technique will also benefit deer winter cover areas. The technique can be applied in all habitat types. Its application in the refuge's spruce-fir forest most closely resembles the natural disturbance that would be expected to take place if the area were allowed to develop without manipulation.

Single Tree Selection

This technique involves the removal of individual trees throughout a stand. Use of this technique, on a continual harvesting cycle, is considered uneven-aged management. It can also be used during even-aged management, and when done so, is commonly referred to as an intermediate thinning. In uneven-aged management, it is used to introduce small openings in the canopy by focusing the harvest on dominant, older aged trees. In even- aged management, it is used to promote the quality and growth of the remaining trees by focusing the harvest on poor quality, low vigor trees. The technique will likely result in varying quantities of regeneration of mostly shade tolerant species.

Single tree selection results in a relatively closed canopy condition. Understory development is usually minimal. The opportunity for regeneration is created but when trees are selected singularly, the opening produced in the canopy will typically be utilized quickly by the crowns of adjacent older trees. This technique is often used in combination with group selection to ensure regeneration is established and separate age classes are created to perpetuate the overall desired condition. In using single tree selection, with even-aged objectives in the form of a thinning, it will likely result in less opportunity for regeneration and understory development. Often times the suppressed and co-dominant trees are selected for removal resulting in very little change in canopy closure after a treatment. This technique can be applied in all habitat types.

Pre-commercial Stand Treatments to Improve Habitat Conditions

These treatments include entering an even- or uneven-aged stand at any stage of development with the intent of tending to habitat needs through thinning, weeding, cleaning, liberation, sanitation, or other improvement methods. This technique can be used to control species composition and reduce an overabundance of stems per acre to a more desired stocking level. This can be applied through thinning young stands (pre-commercially) to control species composition, conducting intermediate thinnings in middle aged stands to maintain accelerated growth and remove unwanted vegetation, and prescribed

fire. This technique may also be used to control stocking levels of habitat features such as snag trees, cavity trees, den trees, downed wood and other features through girdling, felling, boring, hinging, or other techniques.

This habitat improvement technique is varied in its application, but overall should be applied to alter or enhance young stands and introduce or reduce habitat features when goals and objectives are not being met. This can be applied in all habitat types and may be extended to areas that are not capable of supporting equipment for larger scale manipulation efforts.

Shelterwood System

This technique involves a series of harvests carried out with the intent of regenerating a stand utilizing mature trees that are removed at the end of the scheduled rotation. Essentially, the overstory is removed and the well-developed underlying regeneration then becomes the stand. This technique is typically used to regenerate intermediately tolerant (mid successional) and tolerant (late successional) species, but in certain instances can be used for intolerant (early successional) species. Use of this technique is considered even-aged management, although variations more often found in the irregular shelterwood system can result in a multi-aged stand. In order for a shelterwood system to be considered, a stand should be reasonably well stocked with a moderate to high component of the species desired for regeneration.

A number of shelterwood system applications exist. The more commonly used is the open shelterwood system. Although less commonly used, the dense shelterwood, deferred shelterwood, irregular shelterwood, natural shelterwood, and nurse tree shelterwood systems are also useful in accomplishing specific regenerative needs as well as other resource management objectives.

The shelterwood variations allow a variety of habitat conditions to be created while fulfilling the regenerative objectives of the technique. It can be used to create a denser crown closure when connectivity of an older age forest needs to be maintained. The amount of time needed to establish regeneration and conduct the overstory removal can provide enough time for other areas to develop into an older age condition, and ensure refuge goals are being met continually. Overstory removal can be delayed through a deferred shelterwood if further development of other areas is necessary. It can also be used to create a more open crown closure when development of a shrub component in the understory is desired or residual tree are needed to meet specific habitat requirements. Once regenerative needs have been reached and the “shelter” (seed) trees have been removed, the new stand can then be managed for structural objectives as it develops. Overstory removal can result in a regenerative condition which does offer some early successional benefits as described in the clearcut technique.

This technique can be used in all habitat types. Its application on habitats comprised of predominately shallow root species (e.g. red spruce/balsam fir) or wet soil conditions, does introduce a greater susceptibility of the residual trees to windthrow from wind events.

Clearcutting

This technique involves the removal of an entire stand of trees in one cutting to obtain natural reproduction. Two common methods of clearcutting are patch or block clearcuts, and strip clearcuts. This regeneration technique is considered to be even-aged management, although somewhat coarse multi-aged stands can be developed through progressive patch or progressive strip clearcut systems. Clearcut size does have an effect on regeneration. As clearcuts increase in size,

they tend to favor shade intolerant regeneration. As they become smaller they gravitate towards encouraging intermediately tolerant and tolerant species.

Clearcuts are often used to create an early successional habitat condition. Early successional habitat is when an area is in a young, shrubby, regenerating condition that covers an area large enough to be recognized and perhaps utilized by wildlife or plants associated with such an open or no-canopy condition.

This technique should be utilized when an early successional habitat condition is desired and found to be lacking or not available within the landscape. As mentioned previously in this description, clearcut size does have an impact on tree species composition, and therefore should also be utilized when current species composition is not desired or diverse enough to reach goals and objectives. This technique can be used in all habitat types, and although somewhat limiting in terms of emulating natural processes or conditions, can be used in a continual, progressive system that sustains multiple age classes through a coarse uneven-aged landscape perspective.

Appendix F



Ian Drew/USFWS

Floodplain forest habitat along the Magalloway River

Ecological Land Units and Their Relationship to Refuge Habitat Type

Ecological Land Units and Their Relationship to Refuge Habitat Types

Introduction

During conservation planning processes, habitat, and therefore vegetation, becomes a key element in evaluating a planning unit's contribution to conservation targets. Not only is it necessary to know the current habitat within the planning unit, it may also be necessary to know the potential habitat that could occur in the future. Past and current logging practices have influenced the species composition and do not necessarily represent the vegetation that would naturally occur at a given site. During the Comprehensive Conservation Planning process at Umbagog National Wildlife Refuge, it became necessary to determine potential forest habitats based on site capabilities due to past and current harvesting and the lack of data on lands outside the current refuge boundary.

Detailed soil inventories, often used to determine site capabilities, were not available for the entire planning unit, which is located in northern New Hampshire (Coos County) and western Maine (Oxford County). Kuckler's Potential Natural Vegetation, Refuge specific Order II level soil survey data, photo interpretation, and consultation with forest ecologists were combined with ecological land units (ELUs) to predict sites with favorable conditions for naturally growing hardwood, softwood and mixed wood.

Data Layers

A spatial analysis was conducted using the geographic information system (GIS) ArcMap9 to predict naturally occurring forest habitats based on available abiotic and vegetation data. A base layer of ecological land units (ELUs), which are a composite of broad abiotic data displayed in 30 meter pixels developed by The Nature Conservancy (Mark Anderson, TNC Eastern Resource Office, Boston, MA), was overlaid with more site specific data to assign conifer, mixed and hardwood habitat types to ELU types. Each data layer is described below followed by the method that was used to make the assignments.

Kuchler's Potential Natural Vegetation.

In 1964, A. W. Kuchler of the University of Kansas mapped the conterminous United States depicting the vegetation that would exist if man were to allow plant succession to proceed without interference. The map incorporates abiotic geographical elements similar to Bailey's ecoregions (Bailey 1997) and results in vegetation types. The map is generalized and broad with its mapping units, however, it is of finer delineation than Bailey's ecoregions (Kuchler 1964).

Umbagog NWR planning unit lies within the Northern Hardwoods-Spruce Forest. A tall, dense forest of broadleaf deciduous and needleleaf evergreen trees. This is a mixture of; sugar maple (*Acer saccharum*), yellow birch (*Betula allegheniensis*), beech (*Fagus grandifolia*), and conifer; red spruce (*Picea rubens*) and hemlock (*Tsuga Canadensis*), with components of balsam fir (*Abies balsamea*), red maple (*Acer rubrum*), paper birch (*Betula papyrifera*), red and white pine (*Pinus resinosa*, *P. strobes*).

Photo-Interpretation

To obtain a sense of the forest conditions prior to the most recent logging activity, photo interpretation of the Mollidgewock drainage was conducted by biologist, Bill Zinni (U.S. Fish and Wildlife Service, Hadley, MA), using 1986 color infrared aerial photographs. According to New Hampshire wildlife biologist, Will Staats, this would have been about the time the timber industry began to intensively select softwoods to meet the demand for pulpwood. Through photo interpretation, areas were classified as spruce/fir, northern hardwoods, mixed wood and recently harvested. Ground truthing was conducted to verify photo signatures.

The photo interpretation resulted in the mapping of contiguous linear segments of spruce/fir in the lowland areas and blocks of hardwoods and mixed wood in the uplands along with small blocks of conifers at the higher elevations. Areas of active harvesting in the uplands were apparent in the photographs. Many of the

areas classified as hardwoods had skid trails throughout the parcel, indicating recent logging activity. In some areas, skid trails were coming from patches of conifers which appeared to be in a stage of harvesting, indicating the selective logging of conifers within mixed wood stands. Based on the apparent alteration logging had on the upland habitat, the most confident interpretation occurred in the mapping of lowland spruce/fir areas where logging had not taken place at the time of the photographs.

Refuge-specific Order II Soil Survey Data.

In 2004, the USDA Natural Resources Conservation Service (Homer 2004) conducted an Order II soil survey for portions of the refuge that are capable of forest management based on the refuge forest operability map. The descriptions for the soil map units were used to assist with determining the suitability and potential of a soil unit for specific uses, such as timber growth. The forestry component, of the soil unit description, identifies the type of tree growth and successional trends to be expected for each soil unit. Soil units that overlapped with low lying ELUs (where photo interpretation was most confident) were grouped into softwood, hardwood or mixed soil types based on the tree growth potential and successional trend (table F.1.)

Table F.1. The name of soil units that overlapped with low lying ELUs, and the assigned soil type based on forestry properties and most productive tree species.

#	Soil Unit Name	Forestry Properties	Tree species to manage	Soil Type
567	Howland silt loam	Softwood or hardwood, depends on surrounding seed source.	Eastern arborvitae, E. white pine, white spruce	Softwood
670	Tunbridge-Berkshire-Lyman Complex	Too diverse to generalize successional trends.	Balsam fir, E. white pine, larch, red spruce, white spruce	Softwood
247	Lyme fine sandy loam	Fair to good softwood growth, successional trends towards balsam fir and red spruce.	Eastern white pine, white spruce	Softwood
73	Berkshire very fine sandy loam	Hardwoods in combination with red spruce and balsam fir.	Balsam fir, E. white pine, red pine, white spruce	Softwood
61	Tunbridge-Lyman-Rock Outcrop Complex	Too diverse to generalize successional trends.	Balsam fir, E. white pine, red spruce, Scotch pine, tamarack, white spruce.	Softwood
27	Groveton fine sandy loam	Hardwoods in combinations with red spruce, balsam fir and occasionally white pine and hemlock.	E. white pine, paper birch	Mixed
579	Dixmont very fine sandy loam	Hardwoods in combination with red spruce and balsam fir.	Eastern arborvitae, E. white pine, European larch, white spruce	Softwood
523	Stetson fine sandy loam	Successional trends toward red spruce and balsam fir.	Eastern white pine, red pine	Softwood
590	Cabot gravelly silt loam	Poor for hardwood growth and good for softwoods, especially red spruce and balsam fir.	Eastern white pine, white spruce	Softwood
79	Peru fine sandy loam	Hardwoods in combinations with red spruce, balsam fir and occasionally white pine and hemlock.	Eastern white pine, white spruce	Softwood
995	Wonsqueak mucky peat	Tamarack, cedar, black spruce and alders with balsam fir.	- - -	Softwood

Forest Ecologists Site Visit.

U.S. Forest ecologists Bill Leak and Steve Fay, and USDA-Natural Resource Conservation Service soil scientist Joe Homer, accompanied the core team to sites with various forest conditions on the refuge. At each site, current conditions, soil type and projected successional paths were discussed in relationship to forest management techniques. It was noted that at many of the sites a higher component of hardwood species was present than the soils and site conditions represented.

Based on the soils, topography and species present at a site, the forest ecologists determined if the site conditions would naturally support conifer, hardwood or mixed woods. The sites that were classified as mixed wood, had a lesser degree of conifers than the ecologists thought would be present given the site capabilities. This corresponds to the interpretation of the 1986 aerial photographs.

Ecological Land Units (ELUs).

Ecological land units were developed by classifying and categorizing three abiotic data layers: elevation, bedrock geology and topographic features (Groves 2000). Lake Umbagog lies within the Northern Appalachian/Boreal Forest Ecoregion, as defined by The Nature Conservancy. Using GIS, Mark Anderson of the TNC New England Resource Office, Boston, MA, created ELUs for this Ecoregion by combining the 26 abiotic features listed in table F.2.

Table F.2. Abiotic data layers that were used to develop Ecological Land Units in the Northern Appalachian/Boreal Forest Ecoregion

Elevation Zone	Bedrock Geology	Topographic Feature
0 – 800’	Acidic Sediment/ Meta-sediment	Steep Slope
800 – 1700’	Acidic Granitic	Cliff
1700 – 2500’	Coarse Sediment	Flat Summit/ Ridgetop
2500 – 4000’	Fine Sediment	Slope Crest
	Calcareous Sediment/ Meta-sediment	Low Hilltop (flat)
	Moderate Calcareous Sed./ Meta-sed.	Low Hill (gentle slope)
	Mafic / Intermediate Granitic	Sideslope NW-facing
	Ultramafic	Sideslope SE-facing
		Dry Flats
		Wet Flats
		Valley / Toe Slope
		Bottom of Steep Slope
		Cove / Draw NW-facing
		Cove / Draw SE-facing

Some of the combined elements did not occur within the Northern Appalachian/Boreal Forest Ecoregion and were dropped. Others were found to have no significant difference and were combined, resulting in the following ecological land units in table F.3.

Table F.3. Ecological Land Units of the Northern Appalachian/Boreal Forest Ecoregion

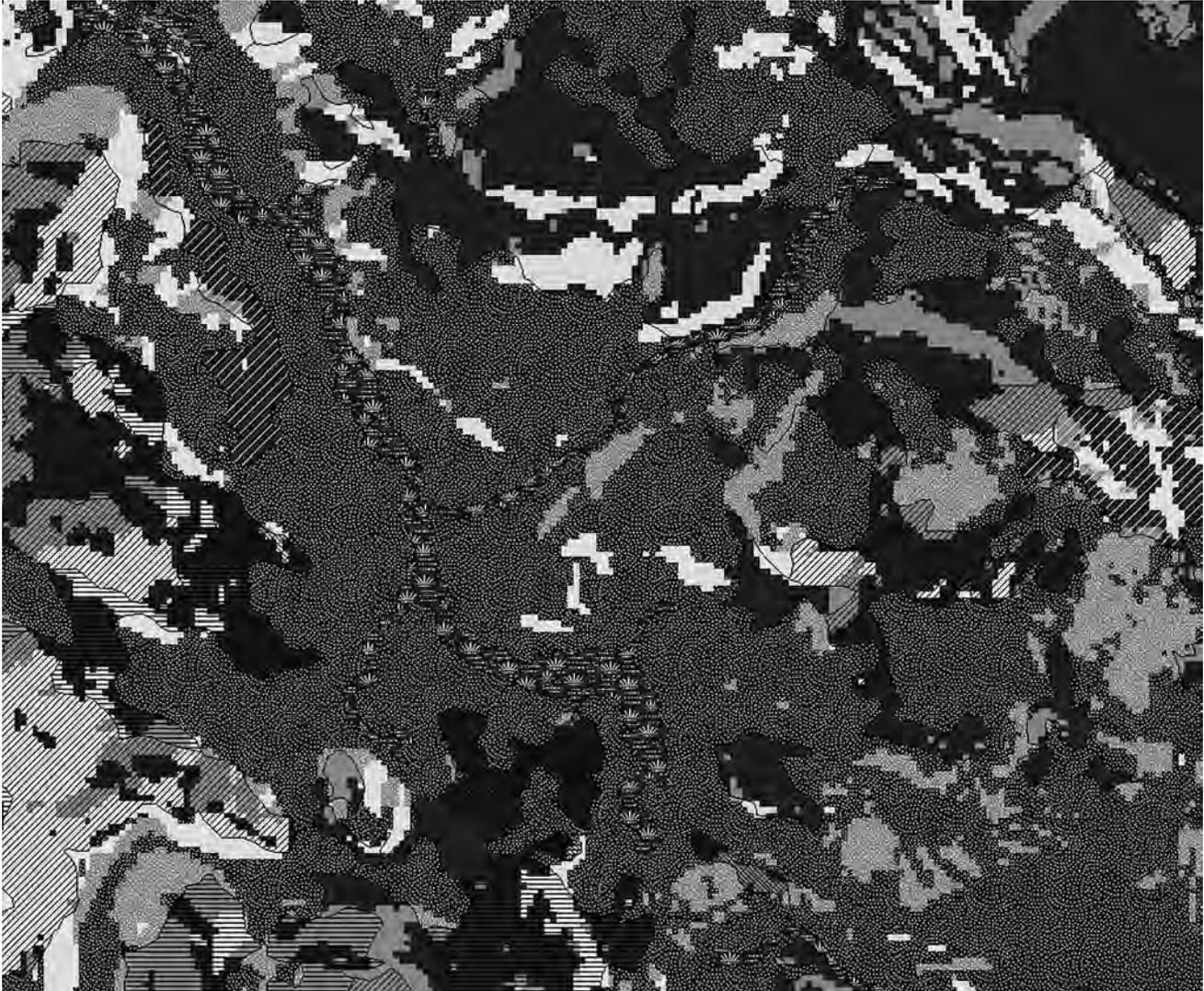
Ecological Land Unit
GSF_low hill/valley, acidic granitic
GSF_low hill/valley, acidic sed/metased
GSF_low hill/valley, mafic/int granitic
GSF_low hill/valley, mod calc sed/metased
Bottom of steep slope
Cliff
Coarse seds on dry flats, GSF
Cove NW facing
Cove SE facing
Dry flats, acidic granitic
Dry flats, mafic/intermed granitic
Flat summit/ridgetop
Sideslope NW facing
Sideslope SE facing
Slope crest
Steep slope
Wet flats
Wet flats on coarse seds
Dry flats, mod calc sed/metased

Methods

Using ELUs as a base in GIS, the photo interpretation layer was overlaid as a see-through texture to identify areas of positive correlation for spruce/fir, mixed and hardwood areas. There was a strong visual correlation between the low lying and mountain top ELUs and the areas mapped as spruce/fir. The location of each stopping point of the forest ecologists site visit were identified on the ELU layer as well. At each point the projected habitat type was correlated to the underlying ELU.

As depicted in figure F.1, the low lying ELUs correlated to areas that were interpreted as spruce/fir stand types (black areas with white speckling) and the uplands to hardwood (gray areas with black diagonal strips) and mixed stands (gray with black horizontal strips).

Figure F.1. Ecological land units are shown in black and shades of gray. The black represents the softwood ELUs. The white speckling represents spruce/fir areas interpreted from 1986 aerial photography. Black hatching represents mixed and hardwood areas.



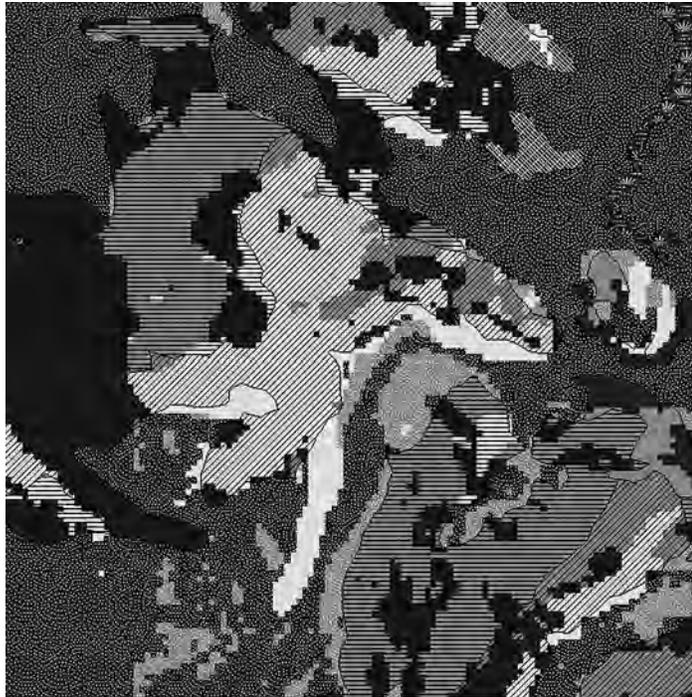


Figure F.2. Ecological land units shown in black and shades of gray, with an overlay of forest habitat shown as white speckling (softwood), black diagonal (hardwood) and black horizontal (mixed)

Figure F.2. shows an example where specific ELUs correlate with areas that were interpreted as hardwood and mixed wood based on the 1986 photos. ELUs are the base layer shown in black and shades of gray. The white speckling and black hatching lines are overlaid and represent forest types interpreted from 1986 aerial photography. The light gray ELUs correspond with areas that were interpreted as hardwood stands, the mid-shade of gray ELUs correspond to areas that were interpreted as mixed wood stands.

The Order II soils data was overlaid as a see-through texture just like the photo interpretation layer. The minimum mapping unit for the soil units of 3 to 5 acres resulted in polygons that overlapped more than one ELU, which are aggregates of much smaller units (30 meter square pixels). Soil polygons that contained more than 50% of a single ELU were chosen for the correlation to that soil unit. The correlation of softwood soil units to low lying ELUs was strong. A few of the combination soil units were too diverse to enable a prediction of the successional trend or were dependant upon the available seed source from adjacent areas. In these instances the adjacent soil type was generally a softwood type, leading to the conclusion of that soil unit to be a softwood type.

Discussion and Results

During the late 1800's and early 1900's, northern New Hampshire and western Maine were heavily logged. The current forest is the result of second or third re-growth. Some areas have recently been logged and are at a very early stage of re-growth. Past and current harvesting have influenced the species composition and do not necessarily represent the vegetation that would naturally occur at a given site. Knowing the tree species that would best grow on a site is

necessary to direct the growth of regenerating sites as well as to manage for the species that flourish with site capabilities in more established sites, maximizing management efforts and supporting healthy forest conditions.

In April, 2001, FWS established a Biological Integrity, Diversity, and Environmental Health policy 601FW3 (Integrity Policy) to guide refuge management. The Integrity Policy states that refuge managers will use sound professional judgment during the comprehensive conservation planning process to determine the conditions which constitute biological integrity, diversity and environmental health. Sound professional judgment incorporates field experience, knowledge of refuge resources and the best available science including consultation with others both inside and outside the Service.

The Integrity Policy describes environmental health to be a composition, structure and functioning of soil, water, air and other abiotic features comparable with historic conditions. During the Umbagog CCP planning process we used available abiotic data in the form of ELUs to assist with determining site capabilities (softwood, hardwood, and mixed) which in turn reflect environmental health and management efficiency. In some areas the current vegetation correlated with ELUs that represented their current forest condition i.e. a hardwood ELU corresponded to site currently dominated by hardwood tree species.

Based on the methods described above, each ELU was assigned to represent either softwood, hardwood or mixed stand site capabilities. The ELUs were used to estimate the amount of softwood, hardwood and mixed wood habitat that would result for Umbagog NWR's CCP alternatives A, B and C. A projection of site capabilities was needed to assist with determining the most appropriate upland resources of concern (appendix H), developing projected forest conditions for current refuge lands, as well as for proposed additional lands outside the refuge boundary (appendix A – Land Protection Plan) in which the refuge lacks specific data on current conditions. Table F.4 lists the ELUs with the corresponding type of habitat that is projected to be represented for alternative A, B and C.

The ELUs for alternative A and C are the same because a continuation of current management (alternative A) and the decision to let nature take its course (alternative C) would result in the forest reflecting the site capabilities of each stand. In alternative A, it would take longer for the climax conditions to be fully represented given areas that may not reflect site capabilities because of selective logging. In alternative C, the refuge would be actively managing to attain natural climax conditions, and therefore reach those conditions sooner. The projected site capabilities for ELUs were used to determine acreages and can be used to guide future forest management strategies.

For alternative B, in which management is focused on priority resources of concern, the site capabilities of an ELU may be pushed toward forest conditions that are most beneficial to the selected species of concern, not necessarily to climax conditions. In alternative B, bird species dependent upon the mixed forest with a high conifer component were determined to be the priority upland resources of concern (appendix H). In this case, management to increase the conifer component of the mixed forest would be obtained by encouraging the establishment and growth of spruce and fir in ELUs that support softwood as well as any ELU that leans toward the growth of softwood.

Table F.4. ELUs and associated habitats for each of the alternatives for the Umbagog CCP.

Alternative A	Alternative B	Alternative C	Ecological Land Unit
Mixed	Softwood	Mixed	GSF_low hill/valley, acidic granitic
Mixed	Softwood	Mixed	GSF_low hill/valley, acidic sed/metased
Mixed	Softwood	Mixed	GSF_low hill/valley, mafic/int granitic
Mixed	Softwood	Mixed	GSF_low hill/valley, mod calc sed/metased
Mixed	Softwood	Mixed	Bottom of steep slope
-	-	-	Cliff
Softwood	Softwood	Softwood	Coarse seds on dry flats, GSF
Mixed	Softwood	Mixed	Cove NW facing
Mixed	Mixed	Mixed	Cove SE facing
Mixed	Mixed	Mixed	Dry flats, acidic granitic
Softwood	Softwood	Softwood	Dry flats, acidic sed/metased
Mixed	Mixed	Mixed	Dry flats, mafic/intermed granitic
Softwood	Softwood	Softwood	Flat summit / ridgetop
Hardwood	Mixed	Hardwood	Sideslope NW facing
Hardwood	Hardwood	Hardwood	Sideslope SE facing
Softwood	Softwood	Softwood	Slope crest
Softwood	Softwood	Softwood	Steep slope
Softwood	Softwood	Softwood	Wet flats
Softwood	Softwood	Softwood	Wet flats on coarse seds
Mixed	Mixed	Mixed	Dry flats, mod calc sed/metased

Literature Citation

Bailey, Robert. 1997. Ecoregions of North America. U.S. Dept. of Agriculture, Forest Service, Washington, DC. Map.

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Appendix G



USFWS

Fen and flooded meadow habitat on the refuge

Vegetation Classification Systems and Their Relationship to Refuge Habitat Type

Table G.1. Vegetation Classification Systems and Relationship to Refuge Habitat Type

CCP Type	UVM-NVC Common Name ¹	NVC Association ²	NVC ³	NWI ⁴	ME NAP ⁵	ME Rarity Rank ⁶	NHNHB ⁷	NH Rarity Rank ⁸	SAF Type ⁹
Boreal Fen & Bog	Circumneutral patterned fen	Dasiphora fruticosa spp. Floribunda/Carex lasiocarpa/Campyllum stellatum shrub herbaceous vegetation	CEGL006525	PSS1, PSS3, PSS4	Shrubby cinquefoil-sedge circumneutral fen; Northern white cedar woodland fen	S2; S4	Circumneutral-calcareous flark; Northern white cedar circumneutral string	S1; S1	
	Leatherleaf poor fen	Chamaedaphne calyculata/Eriophorum virginicum/Sphagnum rubellum Dwarf-shrubland	CEGL006513	PFO4	Leatherleaf boggy fen	S4	Leatherleaf-sheep laurel dwarf shrub bog	S1S3	
	Medium shrub fen	Rhododendron canadense-Chamaedaphne calyculata-Myrica gale Dwarf-shrubland (variant)	CEGL006514var		Sheep laurel dwarf shrub bog	S4	Leatherleaf-black spruce bog	S3	
	Sub-boreal Dwarf-shrub fen	Rhododendron canadense-Chamaedaphne calyculata-Myrica gale Dwarf-shrubland	CEGL006514		Sheep laurel dwarf shrub bog	S4	Leatherleaf-black spruce bog	S3	
	Spruce-fir swamp	Picea rubens-Abies balsamea/Gaultheria hispidula/Sphagnum spp. Forest	CEGL006312		Spruce-fir-cinnamon fern forest	S4	Red spruce swamp; Seasonally flooded boreal swamp (??)	S3; SU	33 Red spruce-balsam fir
	Black spruce-larch swamp	Picea mariana-(Larix laricina)/Ledum groenlandicum/Sphagnum spp. Forest	CEGL005271		Spruce-larch wooded bog	S4	Black spruce-larch swamp	S3	12 Black spruce-sphagnum; 13 Black spruce-tamarack; 38 Tamarack

CCP Type	UVM-NVC Common Name ¹	NVC Association ²	NVC ³	NWI ⁴	ME NAP ⁵	ME Rarity Rank ⁶	NHNHB ⁷	NH Rarity Rank ⁸	SAF Type ⁹
Boreal Fen & Bog cont.	Black spruce wooded bog	<i>Picea mariana</i> / <i>Ledum groenlandicum</i> / <i>Carex trisperma</i> /Sphagnum spp. Forest	CEGL002485		Spruce-larch wooded bog	S4	Black spruce-larch swamp	S3	12 Black spruce-sphagnum; 13 Black spruce-tamarack
Fen & Flooded Meadow	Few seeded sedge-leatherleaf fen	<i>Carex limosa</i> - <i>Rhynchospora alba</i> / <i>Cladopodiella</i> saturated herbaceous vegetation	CEGL006522	PEM1	Low sedge-buck-bean fen lawn	S3	Large cranberry-short sedge moss lawn	S3	
	Cattail marsh	<i>Typha (angustifolia, latifolia)</i> -(<i>Scirpus</i> spp.) Eastern Herbaceous Vegetation	CEGL006153	PSS1, PSS3	Cattail marsh	S5	Cattail marsh	S4	
	Eastern Tussock Sedge Meadow	<i>Carex stricta</i> - <i>Carex vesicaria</i> Seasonally Flooded Herbaceous Vegetation	CEGL006412		Tussock sedge meadow	S4	Tal 1 graminoid emergent marsh	S4	
	Medium fen	<i>Myrica gale</i> - <i>Chamaedaphne calyculata</i> /(<i>Carex lasiocarpa</i> , <i>Carex utriculata</i>)- <i>Utricularia</i> spp. Shrub Herbaceous Vegetation	CEGL006302		Mixed tall sedge fen	S4	Hairy-fruited sedge-sweetgale fen	S3	
	Medium fen-wet phase	<i>Myrica gale</i> - <i>Chamaedaphne calyculata</i> /(<i>Carex lasiocarpa</i> , <i>Carex utriculata</i>)- <i>Utricularia</i> spp. Shrub Herbaceous Vegetation	CEGL006302var		Mixed tall sedge fen	S4	Hairy-fruited sedge-sweetgale fen	S3	
	Seasonally flooded mixed graminoid meadow	<i>Calamagrostis canadensis</i> - <i>Scirpus cyperinus</i> - <i>Dulichium arundinaceum</i> Herbaceous Vegetation	CEGL006519		Mixed graminoid-shrub marsh	S5	Mixed tall graminoid-shrub marsh; Oxbow marsh	S4S5; S3	

CCP Type	UVM-NVC Common Name ¹	NVC Association ²	NVC ³	NWI ⁴	ME NAP ⁵	ME Rarity Rank ⁶	NHNHB ⁷	NH Rarity Rank ⁸	SAF Type ⁹
Fen & Flooded Meadow cont.	Spikerush shallow emergent marsh	Eleocharis palustris shallow emergent marsh			N/A		Short graminoid-forb emergent marsh/mud flat	S4	
Lakeshore Pine-Hemlock	Hemlock-White Pine-Red Spruce Forest	Pinus strobes-Tsuga Canadensis-Picea rubens forest	CEGL006324		White pine-mixed conifer forest	S4	Hemlock-beech-oak-pine forest	S5	21 Eastern white pine; 22 White pine-hemlock
	Hemlock-hardwoods forest	Tsuga canadensis-Betula alleghaniensis-Picea rubens/Cornus canadensis forest	CEGL006129		Hemlock forest	S4	Hemlock-beech-northern hardwood forest	S4	24 Hemlock-yellow birch
	Hemlock Mesic Forest	Tsuga canadensis-Betula alleghaniensis-Picea rubens/Cornus canadensis forest (variant)	CEGL006129var		Hemlock forest	S4	Hemlock forest	S4	23 Eastern hemlock
	Jack Pine/Blueberry/Feathermoss Forest	Pinus banksiana/Vaccinium spp./Pleurozium schreberi Forest	CEGL002441		Jack pine forest; Jack pine woodland	S4; S3	Jack pine rocky ridge woodland	S1	1 Jack pine-balsam fir-black spruce; 1 Jack pine-sheep laurel
	Red pine-White Pine Forest	Pinus strobes-Pinus resinosa/Cornus canadensis forest	CEGL006253		Red pine-white pine forest	S4	Red pine-white pine-balsam fir forest	S3	15 Red pine
Mixed Woods (Spruce-fir-hardwoods)	Aspen-fir woodland	Picea rubens-Betula spp.-Acer rubrum forest (variant)	CEGL006506var		?		N/A		
	Red Spruce-Hardwoods forest	Picea rubens-Betula alleghaniensis/Dryopteris campyloptera forest	CEGL006267		Spruce-northern hardwoods forest	S4	Northern hardwood-spruce-fir forest; Hemlock-spruce-northern hardwoods forest	S4; S3S4	30 Red spruce-yellow birch; 31 Red spruce-sugar maple-beech

CCP Type	UVM-NVC Common Name ¹	NVC Association ²	NVC ³	NWI ⁴	ME NAP ⁵	ME Rarity Rank ⁶	NHNHB ⁷	NH Rarity Rank ⁸	SAF Type ⁹
Mixed Woods (Spruce-fir-hardwoods) cont.	Successional Spruce-Fir Forest	Picea rubens-Betula spp.-Acer rubrum forest	CEGL006505		Spruce-fir-broom-moss forest	S4	N/A		35 Paper birch-red spruce-balsam fir
Northern Hardwood	Early successional aspen-birch forest/woodland	Populus (tremulooides, grandidentata)-Betula (populifolia, papyrifera) Woodland	CEGL006303		Aspen-birch woodland/forest complex	S5	N/A		16 Aspen; 18 Paper birch
	Red maple-yellow birch early successional woodland	Populus (tremulooides, grandidentata)-Betula (populifolia, papyrifera) Woodland (variant)	CEGL-006303var		Aspen-birch woodland/forest complex	S5	N/A		16 Aspen; 18 Paper birch; 17 Pin cherry
	Paper birch talus woodland	Quercus rubra-Betula alleghaniensis/Polypodium virginianum Woodland	CEGL006320		Birch-oak talus woodland	S3	Red oak-black birch wooded talus	S3S4	18 Paper birch
	Semi-rich northern hardwood forest	Acer saccharum-(Fraxinus americana)/Arisaema triphyllum forest	CEGL006211		Beech-birch-maple forest	S4	Semi-rich mesic sugar maple forest	S3S4	27 Sugar maple; 60 Beech-sugar maple
	Northern hardwood forest	Acer saccharum-Betula alleghaniensis-Fagus grandifolia/Viburnum alnifolium Forest	CEGL006252		Beech-birch-maple forest	S4	Sugar maple-beech-yellow birch forest	S5	25 Sugar maple-beech-yellow birch
Northern White Cedar	Northern White-cedar-balsam fir peatland swamp	Thuja occidentalis/Sphagnum (girensohnii, warnstorffii) Forest (variant)	CEGL006007var	PFO4	Northern white cedar swamp	S4	Northern white cedar-balsam fir swamp	S2	37 Northern white cedar
	Northern White-cedar-Black Ash swamp	Thuja occidentalis-Acer rubrum/Cornus sericea Forest	CEGL006199	PFO4/1	Northern white cedar woodland fen?	S4	Northern hardwood-black ash-conifer swamp?	S2	37 Northern white cedar

CCP Type	UVM-NVC Common Name ¹	NVC Association ²	NVC ³	NWI ⁴	ME NAP ⁵	ME Rarity Rank ⁶	NHNHB ⁷	NH Rarity Rank ⁸	SAF Type ⁹
Northern White Cedar cont.	Northern white-cedar-boreal conifer mesic forest	Thuja occidentalis/Abies balsamea-Acer spicatum forest	CEGL002449		N/A		Northern white cedar forest/woodland	S1	37 Northern white cedar
	Northern white- cedar peatland swamp	Thuja occidentalis/Sphagnum (girensohnii, warnstorffii) Forest	CEGL006007		Northern white cedar swamp	S4	Acidic northern white cedar swamp	S1	37 Northern white cedar
	Northern White-cedar Seepage Forest	Thuja occidentalis/Tiarella cordifolia Forest	CEGL006175		Cedar-spruce seepage forest	S4	Northern white cedar seepage forest	S2	37 Northern white cedar
	Northern White-cedar Wooded Fen	Thuja occidentalis-Abies balsamea/Alnus incana/Carex trisperma Woodland	CEGL006507		Northern white cedar woodland fen	S4	Northern white cedar-balsam fir swamp	S2	37 Northern white cedar
Recently Harvested	Recently disturbed	Recently disturbed			N/A		N/A		
Residential & Fields	Residential	Residential			N/A		N/A		
Shrub-Scrub Wetland	(Speckled, Green) Alder Shrubland	Alnus incana-Cornus sericea/Clematis virginiana Shrubland	CEGL006062	PSS1, PSS3	Dogwood-willow shoreline thicket	S2	Alder alluvial shrubland; Alder-dogwood-arrowwood alluvial thicket	S4; S4	
	Speckled Alder Swamp	Alnus incana Swamp Shrubland	CEGL002381		Alder shrub thicket	S5	Alder alluvial shrubland	S3	
	Speckled alder peatland lagg	Alnus incana-Nemopanthus mucronatus/Sphagnum spp. Shrubland	CEGL006158		Mountain holly-alder woodland fen	S4	Highbush blueberry-mountain holly wooded fen; speckled alder wooded fen	S3S4; S3S4	

CCP Type	UVM-NVC Common Name ¹	NVC Association ²	NVC ³	NWI ⁴	ME NAP ⁵	ME Rarity Rank ⁶	NHNHB ⁷	NH Rarity Rank ⁸	SAF Type ⁹
Shrub-Scrub Wetland cont.	Sweetgale mixed shrub thicket	Myrica gale–Spirea alba–Chamaedaphne saturated shrubland	CEGL006512		Sweetgale mixed shrub fen	S4	Highbush blueberry–sweetgale–meadowsweet shrub thicket; Sweet gale–meadowsweet–tussock sedge fen	S4; S4	
Spruce Fir	Black Spruce–Red Spruce Forest	Picea mariana–Picea rubens/Pleurozium schreberi Forest	CEGL006361		Black spruce woodland; Spruce–fir–cinnamon fern forest	S3; S4	Montane black spruce–red spruce forest???	S1	12 Black spruce–dwarf shrub; 12 Black spruce–feather moss; 33 Red spruce–balsam fir
	Lowland spruce–fir forest	Picea rubens–Abies balsamea–Betula papyrifera Forest	CEGL006273		Spruce–fir–broom–moss forest	S4	Lowland spruce–fir forest	S3	32 Red spruce; 33 Red spruce–balsam fir
	Red spruce rocky summit	Picea rubens–Abies balsamea–Betula papyrifera Forest	CEGL006273var		Spruce–fir–broom–moss forest	S4	Lowland spruce–fir forest	S3	32 Red spruce; 33 Red spruce–balsam fir
Open Water and Submerged Aquatic Vegetation	Water ¹⁰	(see footnote) ¹¹		Aquatic bed					
Wooded Floodplain	Red maple–balsam fir Floodplain forest	Acer rubrum–(Abies balsamea)–Viburnum nudum var. cassinoides floodplain forest	CEGL006501	PFO1PFO4	Red maple–sensitive fern swamp	S4	Balsam fir floodplain/ silt plain	S2	108 Red maple

CCP Type	UVM-NVC Common Name ¹	NVC Association ²	NVC ³	NWI ⁴	ME NAP ⁵	ME Rarity Rank ⁶	NHNHB ⁷	NH Rarity Rank ⁸	SAF Type ⁹
Wooded Floodplain cont.	Black ash–mixed hardwoods swamp	Fraxinus nigra–mixed hardwoods–conifers/Cornus sericea/Carex spp. Forest	CEGL002105		?		Northern hardwood–black ash–conifer swamp?	S2	
	Red Maple–Tussock Sedge floodplain woodland	Acer rubrum/Carex stricta–Onoclea sensibilis Woodland	CEGL006119		Red maple–sensitive fern swamp	S4	Seasonally flooded red maple swamp	S4S5	108 Red Maple
	Red Maple Floodplain Forest/Silver Maple–False Nettle Sensitive Fern Floodplain Forest	Acer rubrum–Prunus serotina/Cornus amomum Floodplain Forest	CEGL006503/ CEGL006176		Red maple–sensitive fern swamp/ Silver maple floodplain forest	S4/S3	Red maple floodplain forest/ Silver maple floodplain forest	S2S3/ S2	108 Red Maple/ 62 Silver maple– American Elm
	Red Maple–Black Ash Swamp	Acer rubrum–Fraxinus spp.–Betula papyrifera/Cornus canadensis Forest	CEGL002071		?		?	S2	108 Red Maple
	White spruce–balsam fir berm woodland	Acer rubrum–(Abies balsamea)–Virunum nudum var. cassinooides floodplain forest (variant)	CEGL006501 var		Red maple–sensitive fern swamp	S4	Balsam fir floodplain/ silt plain	S2	

EXPLANATION:

- 1 National Vegetation Classification System categories/associations as mapped by University of Vermont
- 2 National Vegetation Classification System Association
- 3 National Vegetation Classification System Association Number
- 4 USFWS National Wetland Inventory classification (see Cowardin, et. Al. 1979, reprinted 1992 “Classification of Wetlands and Deepwater Habitats of the United States”)
- 5 Maine Natural Areas Program
- 6 Maine Natural Heritage Inventory Rarity Rank
- 7 New Hampshire Natural Heritage Bureau
- 8 New Hampshire Natural Heritage Inventory Rarity Rank
- 9 Society of American Foresters Forest Types
- 10 Floating-Leaved and Submerged Aquatic Vegetation not mapped
- 11 Likely includes associations in the following NVCS Alliances: White Water-lily–Yellow Pond-lily species, Permanently Flooded Temperate Herbaceous Alliance and Pondweed species–Coontail species–Waterweed species, Permanently Flooded Herbaceous Alliance

Appendix H



USFWS

American woodcock

Process for Establishing Refuge Focal Species and Priority Habitats for Refuge Management

Process for Establishing Refuge Focal Species and Priority Habitats for Refuge Management

Introduction and Background

Biological goals and objectives for managing species and habitats serve as the foundation for developing respective refuge comprehensive conservation plans (CCPs) and habitat management plans (HMPs). What follows is the description of a process the Umbagog National Wildlife Refuge (NWR) CCP planning team used to determine which species and associated habitats should be a management priority on this refuge.

The Service is entrusted by Congress to conserve and protect migratory birds and fish, Federal-listed threatened and endangered species, inter-jurisdictional fish, wetlands, and certain marine mammals. These are collectively and individually referred to as Federal trust resources. In addition to this mission to protect and conserve Federal trust resources, each refuge has one or more purposes for which it was established that further guide its management goals and objectives. Finally, there are also a multitude of laws, mandates, policies, and conservation plans at various geographic scales, which influence refuge management priorities.

During the Umbagog NWR CCP process, the planning team identified which species of conservation concern and associated habitats should be a focus for refuge management. In making this determination, the team considered the factors noted above, as well as the refuge's geographic location, local site capabilities, species' relative abundance and distribution, respective species status in national and regional conservation plans, and a determination of what the most important and effective ecological contribution the refuge could make to the Northern Forest ecosystem and the National Wildlife Refuge System. Lastly, species were selected because their habitat needs broadly represent the habitat requirements for many other native wildlife dependent on these same habitat types, including other Federal trust resources. The selected species are referred to herein, and in the CCP, as "refuge focal species."

The following details the process the planning team used to identify priority resources of concern, and ultimately, the refuge focal species and the habitat management priorities to benefit these resources. For each step, a brief synopsis is given, followed by a discussion of the details of each step.

- 1.0) Collect Information and Data
 - 1.1) Legal Mandates, Policies and Establishing Purposes of the Refuge
 - 1.2) Matrix of Potential Resources of Concern Based on National, Regional, State and Local Plans
 - 1.3) Gather Expert Opinion
 - 1.4) Develop Maps
 - 1.5) Conduct Baseline Wildlife Surveys
- 2.0) Identify Potential Resources of Concern
- 3.0) Associate Priority Resources of Concern with Refuge Habitat Types
 - 3.1) Wetland Habitats
 - 3.1 a) Mandates and Plans
 - 3.1 b) Wetland Habitats and Priority Resources of Concern
 - 3.2) Upland Habitats
 - 3.2 a) Scale of Assessment for Refuges
 - 3.2 b) Application of Species Ranks in Bird Plans
 - 3.2 c) Application of Breeding Bird Survey Data to Determine Areas of Concentration
 - 3.2 d) Assess Current and Potential Vegetation
 - 3.2 e) Desired Future Habitat Conditions and Priority Resources of Concern
- 4.0) Select Umbagog Refuge Focal Species
 - 4.1) Habitat Relationships
- 5.0) Common Goals with Partners

1.0) Collect Information and Data

1.1) Legal Mandates, Policies and Establishing Purpose of the Refuge

Legal mandates for the National Wildlife Refuge System along with a refuge's establishing legislation and U.S. Fish and Wildlife Service (FWS) policies guide the process for selecting resources of concern. Umbagog NWR was established under the Emergency Wetlands Resource Act, Migratory Bird Conservation Act and the Fish and Wildlife Act. The Environmental Assessment, used to establish the refuge, states that the purpose of the refuge is to ensure the long-term protection of unique wetland habitat and to protect habitat for bald eagle, black duck, and common loon.

Supporting Discussion:

Legal Mandates:

The establishing authorities allowing purchase of lands for Umbagog NWR are:

1. The Emergency Wetlands Resources Act of 1986 (16 U.S.C. 3901 (b)):

"...for the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to help fulfill international obligations contained in various migratory bird treaties and conventions."

2. The Migratory Bird Conservation Act (16 U.S.C. 715d):

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

3. Fish and Wildlife Act of 1956 (16 U.S.C. 742 f(a)(4)):

"...for the development, advancement, management, conservation, and protection of fish and wildlife resources..."

4. Fish and Wildlife Act of 1956 (16 U.S.C. 742 f(b)(1)):

"...for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude..."

The 1991 Environmental Assessment (EA) for establishing Lake Umbagog NWR states,

"The purpose of the Umbagog National Wildlife Refuge is to ensure the long-term protection of unique wetland habitats adjacent to Umbagog, on the northern New Hampshire/Maine border. These extensive wetlands serve as important breeding and migration habitat for many wetland-dependant migratory wildlife species of current concern to the Service. The refuge includes wetlands and portions of associated surrounding uplands, and would protect habitat for the endangered bald eagle and peregrine falcon, waterfowl species of priority such as the declining black duck, and many species of federal and state management concern including the common loon, northern harrier, American woodcock, and others. The Refuge will serve to protect unique habitats that support a variety of migratory bird and resident mammal, fish, reptile, amphibian, invertebrate, and rare plant species and will thereby contribute to the conservation of biological diversity in the northeastern United States." (USFWS 1991)

FWS Policies:

Section 4(a)(3) of the Refuge System Improvement Act (Improvement Act) states, “(A) each refuge shall be managed to fulfill the Mission of the System, as well as the specific purposes for which that refuge was established.....”

The Improvement Act further states, “In administering the System, the Secretary shall....ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans.....” To meet this mandate the Service, developed a Biological Integrity, Diversity and Environmental Health Policy (Integrity Policy) to provide implementation guidance (601 FW 3). The Integrity Policy uses historical conditions and the evaluation of a refuge at various landscape scales, including refuge, ecosystem, national and international scales, to determine the integrity and environmental health of a refuge’s lands and its contribution to biological diversity.

1.2) Matrix of Potential Resources of Concern Based on National, Regional, State and Local Conservation Plans

An overall list of “Species and Habitats of Conservation Concern Known or Suspected on the Refuge,” which includes species and plant communities, was generated by the CCP planning team using national, regional, state and local conservation plans. This list can be found in Appendix B of the CCP. In addition to the species specific conservation plans, and respective state Wildlife Comprehensive Wildlife Conservation Plans and Natural Heritage Program lists used to develop Appendix B, information from the Federal Energy Regulatory Commission (FERC) license for the Errol Dam was also used.

Supporting Discussion:

Sources used to compile the list of resources of concern included:

- Bird Conservation Region (BCR) 14 – Atlantic Northern Forest
- Partners in Flight (PIF) Physiographic Area 28
- North American Waterfowl Management Plan
- Federal Threatened and Endangered Species
- U.S. Shorebird Conservation Plan
- North American Waterbird Conservation Plan
- Maine Natural Areas Program - State Threatened and Endangered Species
- New Hampshire Natural Heritage Bureau – State Threatened and Endangered Species
- Northeast States Non-game Technical Committee
- Maine and New Hampshire State Comprehensive Wildlife Conservation Plans
- New Hampshire Natural Heritage Inventory
- USFWS Birds of Conservation Concern – Region 5
- FERC Errol Dam License
- Eastern Brook Trout Joint Venture Plan

1.3) Gather Expert Opinion

Wetland Meeting

The core planning team met with freshwater wetland experts, Ron Davis (Univ. of Maine), Curtis Bohlen (Bates College) and Jerry Longcore (USGS) during development of the CCP. The significance of the refuge’s wetlands within the broader landscape was emphasized. The unique flat topography of the area, large shallow lake, large rivers with many meanders and oxbows, creates an area with a high

diversity of nesting waterfowl, wading and marshbirds. These wetlands encompass a number of rare wetland communities, including an unusual circumneutral patterned fen, silver maple floodplain forest and large exemplary peatlands. It was noted that the Dead Cambridge River system was unique in that it is complete and one of the only undammed systems in this region of New Hampshire and Maine.

The hydrological and flooding regimes were discussed in relationship to management, restoration, and research. It was felt that the mimicking of a natural flood regime would tend to convert the fens to open emergent plant communities. It was recommended to conduct studies of the Umbagog system hydrology and current conditions to determine the best water level management.

Forest Ecology Meeting

The core planning team met with forest management and bird conservation subject matter experts from academic institutions and state and federal agencies during development of the CCP to determine potential management options for refuge species and habitats of conservation concern. The group discussed management of forest habitat types based on site capability, managing for structural components necessary for wildlife habitat, managing to provide habitat components that are underrepresented in the industrial forest landscape and managing for the long term. Specific resources of concern that were discussed were early successional forests, including the aspen-birch community type, older aged softwoods, riparian forests, and both young and mature/over mature ages classes in all forest types. It was the opinion of the group that PIF and BCR species of concern should reflect the both the natural capability of the land to produce a given habitat type and under-represented habitat components at the watershed, statewide and Northern Forest levels.

Site Visit with Forest Ecologists

U.S. Forest Service ecologists Bill Leak and Steve Fay, and USDA- Natural Resource Conservation Service soil scientist Joe Homer (USDA), accompanied the core planning team to sites with various forest conditions on the refuge. At each site, current conditions and projected successional paths were discussing in relationship to forest management techniques. It was noted that at many of the sites a higher component of hardwood species were present than the soils and site conditions represented.

1.4) Develop Maps

Maps were developed to assist with determining priority habitats and focal species. The following is a list of maps used through out the CCP process.

Current Vegetation Map — National Vegetation Classification System
Forest Stand Map — Society of American Foresters classification
Soils Map — USDA Natural Resources Conservation Service Soil Types
National Wetlands Inventory Map
Ecological Land Units Map
Landbird Species Distribution and Breeding Bird Survey Relative Abundance Maps

1.5) Conduct Baseline Wildlife Surveys

Baseline wildlife surveys were conducted to assist with determining species presence and abundance on the refuge. The following is a list of surveys which contributed to the selection of priority habitats and focal species.

Anuran Call Counts

This survey was part of a U.S. Fish and Wildlife Service Region 5 Regional amphibian monitoring effort. Four point count routes with 5-10 survey points per route (total of 28 points) were surveyed 3 times/yr. in the spring.

Marshbirds

This survey is part of a national marshbird monitoring effort, using a point count-call playback methodology. Points are surveyed 3 times/ year in the spring. Three point count routes with 4-12 survey points per route (total of 24 points), were surveyed.

Waterfowl

A migratory waterfowl survey was carried out during the fall, 2000 season. The objective of this survey was to gather additional information about waterfowl use of the refuge just prior to and during hunting season. Surveys of the entire lake, Magalloway River, and upper Androscoggin River (including Harper's Meadow and Sweat Meadow) were carried out by boat between September-November

Shorebirds

A shorebird survey was carried out in Spring, 2000, following the standard Manomet Bird Observatory shorebird protocol. Three boat surveys were carried out during May and early June.

Wetland Vegetation

An intensive vegetation survey of the Refuge's largest peatlands was carried out in 2002-2004. Permanent vegetation monitoring plots were established in each peatland. Peat depths, water levels and pH were also measured. Vegetation data are also collected around each marshbird survey point, annually.

Aquatic Macroinvertebrates

Aquatic macroinvertebrates were sampled at 20 sites on Umbagog Lake and the Magalloway River in 2003.

Terrestrial Amphibians and Small Mammals

Pitfall traps, coverboards, and funnel traps were used to survey terrestrial amphibians and small mammals in different habitat types over a 4 year period.

Bats

Bat surveys were carried out using mist-nets at various Refuge locations in 2000, 2001.

Vernal Pool Amphibians and Stream Salamanders

Vernal pools amphibians and stream salamanders were surveyed from 2001-2004, using national protocols.

Landbirds

Landbirds have been surveyed annually using point count methodology from 1999-2008, following a Regional protocol. Sixteen transect routes are surveyed in a wide variety of habitat types. Detail vegetation structure data have been collected at each survey point.

Mid-sized Carnivores

Baited remote camera stations are set-up during the winter months at various locations on the Refuge to help survey for carnivores. Snow tracking surveys are carried out concurrently.

Forest Inventory

Approximately 400 points distributed in 200m x 200m grid were surveyed for forest stand characteristics in 2005.

Eagles, Osprey and Loon Monitoring

Ongoing monitoring to determine breeding success of these species is conducted in cooperation with New Hampshire Audubon and the Loon Preservation Committee.

2.0) Identify Potential Resources of Concern

Potential resources of concern including birds, mammals, fish, invertebrates, plants and plant communities were compiled from the plans listed in section 1.2 above and the refuge’s establishing EA. CCP planning team representatives from Maine and New Hampshire identified state resources of concern that occur in the refuge area. See CCP Appendix B for the compilation of species and plant communities of conservation concern known or suspected on the refuge.

3.0) Select Priority Resources of Concern by Refuge Habitat Types

3.1) Wetland Habitat

3.1 a) Mandates and Plans

In 1990, the Service’s Northeast Region developed a Regional Wetlands Concept Plan. This plan complements the National Wetlands Priority Conservation Plan required under the Emergency Wetlands Resources Act of 1986 (public law 99-645). The regional plan provides more specific information about the wetland resources of the northeastern and mid-Atlantic U.S. Umbagog Lake is specifically mentioned in this plan as a wetland of importance, citing its function and values to wildlife, fisheries, outdoor recreation, and other areas of concern.

Other plans consulted include the North American Waterfowl Management Plan, Atlantic Coast Joint Venture, the North Atlantic Regional Shorebird Plan, the Bird Conservation Region 14 Blueprint, and Service recovery plans, as well as the refuge’s establishing EA.

3.1 b) Wetland Habitats and Priority Resources of Concern

Based on the refuge’s establishing purpose, conservation plans, and expert opinion, the CCP planning team determined that the conservation of wetlands was the highest priority for this refuge. They chose the following priority resources of concern for the freshwater wetlands from the compiled matrix of potential species and habitats of conservation concern (table H.1):

Table H.1. Priority Resources of Concern for Wetland Habitat*

Wetland Habitat	Priority Resources of Concern
Fen and Flooded Meadow	American Black Duck Ring-necked Duck Common Loon Waterfowl and Shorebirds during migration
Boreal Fen and Bog	Floating Island National Natural Landmark Circumneutral Pattern Fen Rare Peatland Plants
Northern White Cedar Swamp	Rare Plant Community
Shrub-Scrub Wetland	American Black Duck Canada warbler American woodcock
Wooded Floodplain	American Black Duck Cavity Nesting Waterfowl Northern Parula American woodcock
Open Water and Submerged Aquatic Vegetation	Native Brook Trout Common Loon Eagle and Osprey Waterfowl during migration

**The order in which wetland habitats are listed does not imply any prioritization or hierarchy. All wetland Habitats are considered a high conservation priority.*

Supporting Discussion:

Umbagog Lake is identified as one of three waterfowl focus areas in New Hampshire under the North American Waterfowl Management Plan, Atlantic Coast Joint Venture (NAWMP; ACJV, unpublished data). The refuge supports the highest concentrations of nesting black duck in New Hampshire (USFWS 1991). The black duck is a species of concern in the NAWMP because of the historic decline in their population, with habitat loss an important contributing factor. The regional importance of Umbagog Lake to the black duck was one of the primary reasons the refuge was established. Although black duck populations are stable or increasing, they are listed as a species of highest priority for conservation in BCR 14 (Dettmers 2006).

The waters of Umbagog Lake are impounded by a hydropower dam and water levels are manipulated by a private power company. Common loons have been used in the past as indicators for monitoring water level impacts to the wetlands and other wildlife as required by agreements in the FERC license. The planning team intends to expand the indicator species monitoring program for the lake to include other waterbirds that nest earlier than common loons, nest close to the water, and are affected by water level changes. For example, ring-necked ducks were identified. Umbagog Lake has the highest nesting concentration of ring-necked ducks in New Hampshire (USFWS 1991). Ring-necked ducks build floating nests over shallow water in the emergent vegetation. For these reasons, ring-necked duck is a priority species of concern.

Within the Refuge System, Umbagog NWR is one of only three national wildlife refuges in the lower 48 states that support a significant number of breeding common loon. The common loon is listed as a species of management concern for the northeast (Schneider 1992). It is also listed as a high priority for conservation in BCR 14 (Dettmers 2006). One of the key reasons for establishing the refuge was to permanently protect this common loon breeding area, therefore making it a focal species for the CCP.

The bald eagle was listed as a threatened species under the Federal Endangered Species Act until 2007, and is state-listed as endangered in New Hampshire and threatened in Maine. The refuge was established, in part, to protect bald eagle and osprey, thus justifying these species as priority species of concern. These species are both dependant on aquatic and upland habitats and serve as good indicators of environmental health.

The Integrity Policy requires the inclusion of plant communities that contribute to biological diversity. The Umbagog NWR has several rare and unique plant communities which contribute to the native biological diversity of this area. These communities include: the 860-acre Floating Island National Natural Landmark, which lies within a much larger peatland complex (Nazaire 2003); a rare circumneutral-patterned fen of high regional significance (Dan Sperduto, NHNHP, unpublished data); 1,031-acre northern white cedar swamp, a 'signature community' of the northern woods (Sperduto and Engstrom 1998) and several peatlands such as black spruce bog, spruce-fir swamp, and shrub fens. Those reasons support the identification of these wetland plant communities as priority resources of concern.

It was previously mentioned that, consistent with meeting refuge purposes, protecting and conserving Federal trust resources is part of the Service mission. Eastern brook trout are a Federal trust species. The Eastern Brook Trout Joint Venture Plan identifies native brook trout as a high priority species for this area. For Umbagog NWR, this species is identified as a priority species of concern since a native brook trout population relies on Umbagog Lake and its main tributary the Magalloway River as wintering habitat (Diane Timmins, NHFG, pers. comm.).

3.2) Upland Habitats and Priority Resources of Concern

To guide the determination of which landbird species and associated upland habitats should be a management priority, the planning team consulted the previously mentioned bird conservation plans, the refuge's purposes, and the Integrity Policy. In addition, the team used breeding bird survey data for the area, and analyzed current and potential natural vegetation and desired future conditions, and evaluated the habitat needs of each of the priority species.

Many conservation projects are applying landbird plans to planning areas using computer modeling to determine areas of high importance for species or groups of species. This approach identifies geographic locations that benefit the most species or benefit a high priority single species, allowing for proactive, focused conservation efforts in those areas. However, if a refuge falls outside of these designated high priority areas, the process does not contribute to establishing priorities for that refuge (Ralph and Rich 2002; Ford and Roedel 2004; Mueller 2000; Probst and Thompson 1996; Rosenberg and Wells 2000b). In those situations, a different process is needed, centered on a given location such as a refuge, to determine how it can best contribute to the priorities for the planning area. This process identifies the habitats that are most beneficial to priority landbirds based on species distributions, refuge site capabilities, and the refuge's location within the planning area.

3.2 a) Scale of Landbird Assessment for Refuges

The Integrity Policy clearly requires managers to look at the refuge at multiple scales, from local to regional to national, when evaluating any refuge's contribution to integrity, diversity and health (Scott 2004). When determining the role of a particular refuge in an ecosystem, Schroeder et al. (2004) poses the question, "What is the appropriate landscape scale to assess the importance of this refuge's resources?" The scale of analysis becomes dependant upon the priority resources being assessed. When determining a specific refuge's contribution to certain landbirds which occur within multiple bird conservation regions, the continental scale is a more appropriate scale of assessment (Freemark 1992).

Supporting Discussion:

Determining which scale and hierarchical context for analyzing a refuge's potential to contribute to priority resources is needed to ensure the goals at various spatial scales are compatible, significant, and relative to the resource. It is also necessary to understand the scale in which other conservation partners are operating within the larger regional planning area, local planning area, state or bird conservation region (Sportza 1999; Freemark 1993). Refuges are often unique within cooperative regional conservation planning efforts. They are one of the few conservation entities that need to consider their role at the continental scale as part of the National Wildlife Refuge System. While it may seem counter-intuitive, incorporating large-scale perspectives can assist in narrowing the focus in deciding management priorities within certain management units (Knopf 1994). In fact, a refuge's highest priority may be decided based on its contribution to priority resources at the continental scale.

3.2 b) Application of Species Ranks in Bird Conservation Plans

The PIF Area 28 and BCR 14 species assessment identify species ranks as a means to measure conservation need and identify geographic areas of greatest importance to the long-term conservation of that species (table H.2). The planning team used these plan's rankings to select a sub-set of species which are a national concern, as well as have a high proportion of their population within BCR 14. By first developing this sub-set of species and identifying their associated habitats, the team could then evaluate, given the geographic location of the refuge within the continent and BCR 14, which species' could be impacted the most through refuge management.

A sub-set of 32 species were selected from the PIF Area 28 and BCR 14 plans to assess Umbagog NWR's potential contribution to their conservation. The 32 species, and their PIF and BCR rank, are listed at the end of this Appendix in table H.7.

Table H.2. The combination of Continental Concern, BCR Responsibility, and BCR Concern define the species Tier ranks of “Highest,” “High” or “Medium.” There is also the corresponding PIF Tier of similar definition. Species with ranks that are shaded formed the sub-set of species for refuge analysis.

BCR Tier	Continental Concern	BCR Responsibility	BCR Concern	BCR Rank	Corresponding PIF Tier
Highest	High	High or Moderate	High	A	1a
High	Moderate	High or Moderate	High	B	2a
	High	High or Moderate	Moderate	C	1a
	Moderate	High	Moderate	D	2a
Medium	High or Moderate	Low	High	E	1b or 2c
	Low	High or Moderate	High	F	2a
	High	Low	Moderate	G	1b
	Moderate	Moderate	Moderate	H	-
	Low	High	Moderate	I	-
	High	High or Moderate	Low	J	-
	Moderate	High	Low	K	-
	Low	High	Low	L	-

Supporting Discussion:

Partners In Flight (PIF) assessments for Physiographic Areas, and Bird Conservation Regions (BCRs) have incorporated the regional as well as the continental scale into their species ranks (Rosenberg 1995; 2000a; 2000b; Panjabi 2001), providing a starting point for selecting priority species for a refuge. Rosenberg and Wells used PIF scores, along with Breeding Bird Survey and Breeding Bird Atlas data to identify species that are ‘high-priority’ for the Northeast Region for two different reasons. Land managers are ‘responsible’ for selected species based on their ability to affect a portion of the species population and contribute to long term population stability, and because of their geographic location (regional or BCR responsibility). Land managers need to also be ‘concerned’ about a suite of species who are experiencing long-term declines, threats to their habitat, or threats from other factors that could limit the species’ long-term viability within their region (regional or BCR concern).

Prioritization of species in need of immediate management action or long-term responsibility based on the level of contribution due to geographic location, has been conducted at the continental scale (Rich et al. 2004), the USFWS regional scale (Rosenberg and Wells 2000b), the PIF Physiographic scale, and is now being incorporated into BCR plans (draft BCR landbird analysis rules, R. Dettmers, pers comm).

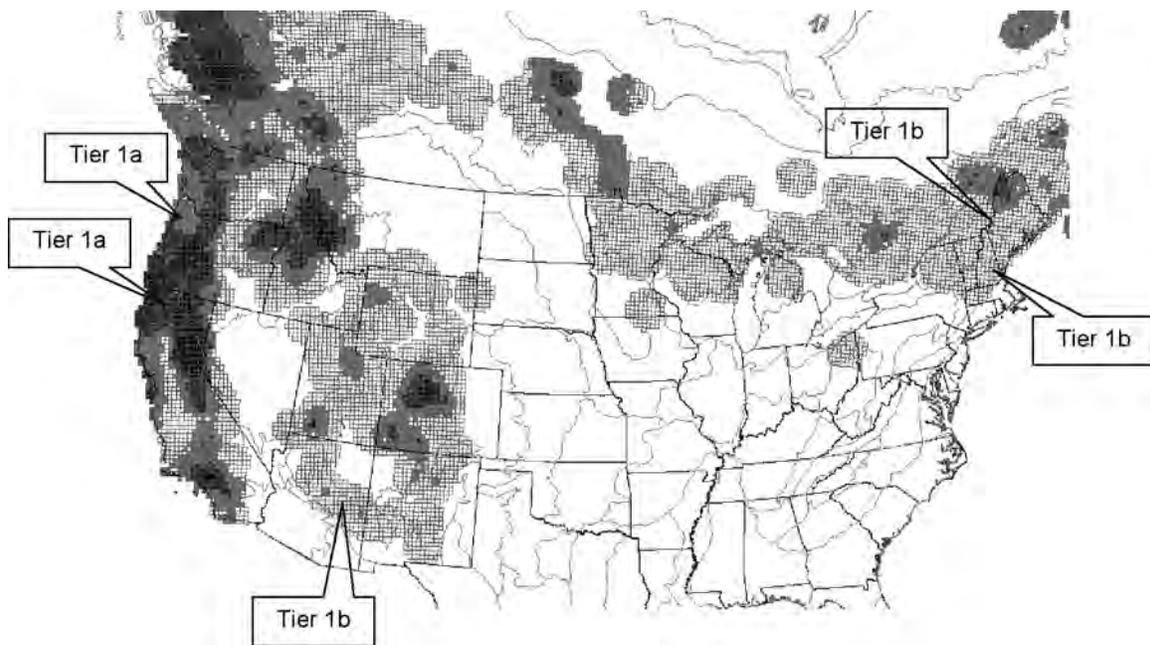
The PIF/BCR tiering allows for prioritizing landbird conservation efforts at different scales. The role of refuges is to address the habitats of species of high continental concern and species that have a high proportion of their population in a BCR. This will allow an individual refuge to have the greatest effect nationally and regionally, while contributing to BCR goals. By first looking at the habitats of selected species, we maximize the efforts of the Refuge System by managing for the habitats with the highest ranking species, which typically represent the habitats unique to that portion of the continent.

There have been a number of conservation planning projects in Canada and the U.S., in which PIF scoring and the identification of centers of abundance for species and species assemblages within the planning unit have been used to determine priority areas (Ford 2004; Dunn 1999; Probst 1996).

The level of concern identified for a species in one BCR plan may not be consistent with the level of concern in another BCR plan. With refuges located in every state, a species may be of a lower continental concern on one refuge in a certain BCR and a high continental concern on another refuge in another BCR. Refuge management for a particular species should concentrate only where it can make an important contribution within the species range.

In summary, different areas of the country (and, hence the Refuge System) have varying potentials to make a significant contribution to the conservation of a species. This can be demonstrated below by the PIF Tiers for the olive-sided flycatcher. The PIF areas that contain the majority of this species' population concentration (western U.S. and Canada) are ranked high continental concern (Tier 1a), while the eastern PIF areas have a lower population concentration, and hence a lower level of conservation responsibility (Tier 1b). Depending on where a refuge is located, this information has implications to refuge planning and the development of habitat goals and objectives.

Figure H.1. Olive-sided flycatcher distribution and relative abundance based on Breeding Bird Survey data. The darkest area has the highest concentration; the lightest areas are the lowest concentration for this species. The gray lines delineate PIF physiographic areas.



3.2 c) Application of Breeding Bird Survey Data to Determine Areas of Concentration

Breeding Bird Survey (BBS) data was used to display the relative abundance for selected bird species, species were grouped by their primary breeding habitat. Thirty-two species were selected based on their PIF/BCR Tier, and relative abundance was compared in relationship to the refuge's location, the remaining BCR 14 and FWS Region 5. Table H.2 has the results of this analysis.

Table H.3 lists which species showed a high relative abundance in the vicinity of Umbagog NWR:

Table H.3. Species with a High Relative Abundance for Umbagog NWR

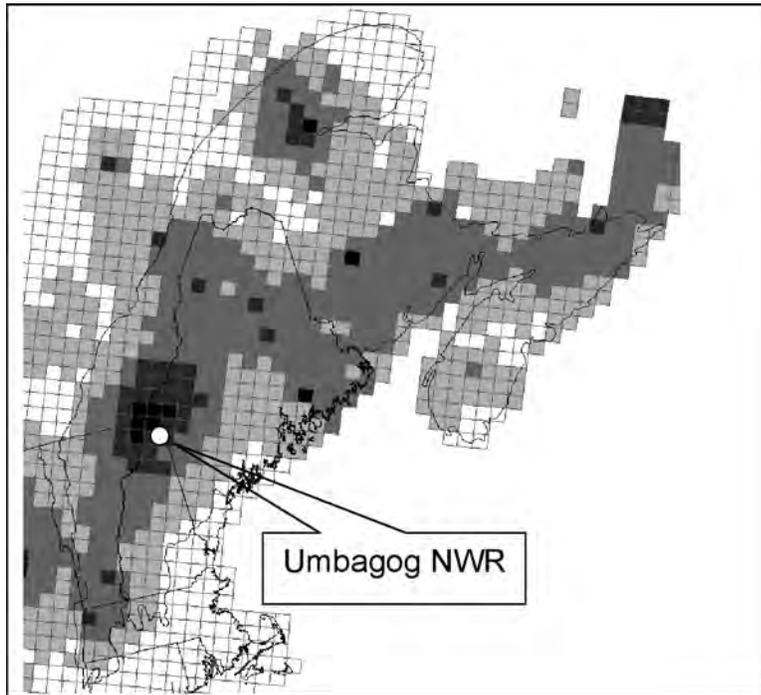
Selected Species	BBS Relative Abundance Code *	Primary Habitat
Blackburnian Warbler	5	Mixed and Conifer Forest
Black-throated Green Warbler	4	Mixed and Conifer Forest
Canada Warbler	4	Mixed Forest and Shrub-Scrub Wetland
Black-throated Blue Warbler	4	Hardwood Forest
Northern Parula	4	Wooded Floodplain
American Woodcock	4	Shrub-scrub Wetland

**Relative abundance is displayed in a range of 1 to 5, one indicating the areas of lowest concentration; 5 indicating the area of highest concentration*

Supporting Discussion:

An ArcView Geographic Information System (GIS) project was developed to display relative abundance from the Breeding Bird Survey data for 32 species. Each species' relative abundance at the refuge's location was assessed with the relative abundance within the rest of BCR 14. Relative abundance is displayed in a range of 1 to 5, one indicating the areas of lowest concentration, 5 indicating the area of highest concentration. Sauer (2004) cautions against using BBS data to assess management actions at the local scale based on trends, and acknowledges its usefulness at providing a large-scale view of bird populations, setting a regional context for evaluation (Sauer 2004). We used the Breeding Bird Survey data at the regional, BCR scale.

Figure H.2. Blackburnian warbler relative abundance based on Breeding bird Survey data. Umbagog NWR is an area of the highest concentration for BCR 14.



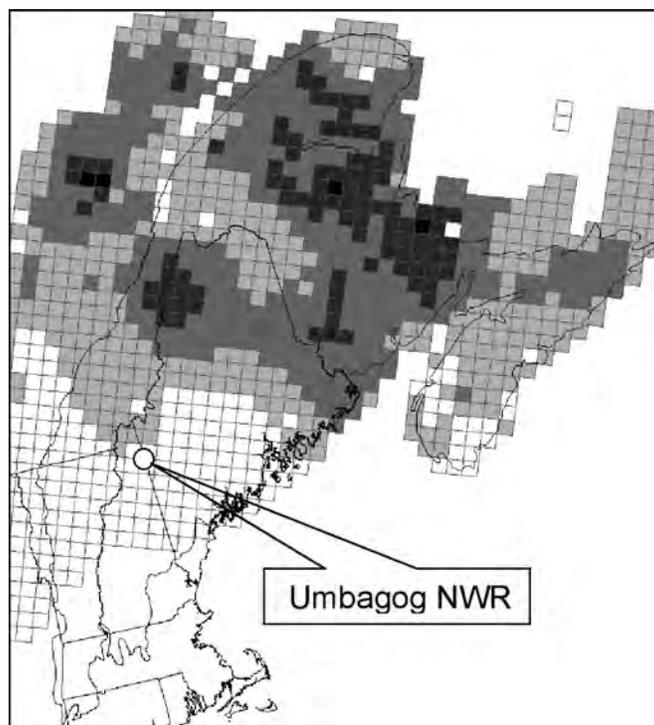
Many of the selected species, although they are of high conservation concern for BCR 14, did not occur in the vicinity of the refuge or were at the edge of the species range. In order for management efforts to be most effective, it is best to target areas of high existing or predicted concentrations. Table H.7, at the end of this Appendix, lists the relative abundance for the selected species.

Species preferring the spruce fir/northern hardwood mixed forest, including Canada warbler, blackburnian warbler, black-throated green warbler, and northern parula, occurred at the highest relative abundances (4 and 5) in the vicinity of the refuge. This is also reflected in refuge survey data, blackburnian warblers and northern parula are among the most frequently detected species. In the PIF Eastern Spruce-Hardwood Physiographic Area 28 Plan, the mixed forest is identified as a high priority habitat that is critical for 'long-term planning to conserve regionally important bird populations' (Rosenberg and Hodgeman 2000).

Species preferring hardwood forests, including wood thrush, black-throated blue warbler, American redstart and veery, showed relative abundances of 2 to 4. A notable exception was the high relative abundance for American woodcock (4), which is dependant upon early successional and aspen/ birch habitat in conjunction with moist soil areas (the riparian areas at Umbagog Lake). Relative abundance for American woodcock was obtained through summarized Woodcock Survey data (Sauer, USGS, Patuxent Wildlife Research Center, MD, unpublished data). The American woodcock is a species of highest concern for BCR 14 and showed a relative abundance of 4 in the vicinity of the refuge.

While species dependant on coniferous forest, boreal chickadee, bay-breasted and Cape May warblers are of high and highest concern in BCR 14, they showed the lowest relative abundances of 1 and 2. Refuge survey data reflect this low abundance as well, where only one Cape May and four bay-breasted warblers were detected in 2005. Higher concentrations of these species occur in northern Maine and New Brunswick where extensive areas of conifer forest are more prevalent.

Figure H.3. Bay-breasted warbler relative abundance based on Breeding Bird Survey data. Umbagog NWR is not in an area of the highest concentration for BCR 14.



3.2 d) Assessing Current and Potential Vegetation

Current and potential vegetation was assessed using national landcover data and predicted vegetation based on computer modeled ecological land units (ELUs). The results of the analysis showed a smaller existing softwood component in the current landscape, than predicted by ELUs. Cogbill (pers. comm., 2004) also found the historic forest to include more conifer, particularly in the lowlands, than exists today. Current conditions most likely reflect past logging practices that selected softwoods, resulting in a higher presence of hardwood species.

Supporting Discussion:

During the conservation planning process, habitat and therefore vegetation, becomes a key element in evaluating a planning units contribution to conservation targets. Not only is it necessary to know the current vegetation within the planning unit, it may also be necessary to know the potential vegetation that could occur in the future. Past and current harvesting have influenced the species composition and do not necessarily represent the vegetation that would naturally occur at a given site. It is most efficient to manage for the species that naturally occur at a site.

The Integrity Policy describes environmental health to be a composition, structure and functioning of soil, water, air and other abiotic features comparable with historic conditions. A spatial analysis was conducted using the geographic information system (GIS) ArcMap9 to determine sites with favorable conditions for naturally growing hardwood, softwood and mixed wood, and therefore environmental health. A base layer of ecological land units (ELUs), a composite of broad abiotic data displayed in 30 meter pixels developed by The Nature Conservancy (Mark Anderson, TNC Eastern Resource Office, Boston, MA), was overlaid with more site specific data to assign conifer, mixed and hardwood habitat types to ELUs. This analysis is outlined in Appendix F.

3.2 e) Desired Future Habitat Conditions and Priority Resources of Concern

After conducting the above species and landscape analysis, the refuge planning team determined that sustaining the mixed spruce-fir/northern hardwood forest, was the most important and efficient ecological contribution the refuge could make through management to the Upper Androscoggin River watershed, BCR 14, and the National Wildlife Refuge System. The priority species chosen as refuge focal species for this habitat are the Blackburnian, black-throated green, and Canada warblers (table H.4). Refuge management will strive to promote the conifer component in the mixed forest landscape to benefit the focal species, which were selected in part, because they have a higher relative abundances in this landscape and they generally represent habitats with the highest site capability. Secondary benefactors of an increased conifer component will be the bay-breasted and Cape May warblers, which are both species of highest concern for BCR 14. We recognize that climate change may influence the trajectory of our forest systems in unpredictable ways and anticipate that we may have to adjust our objectives and management strategies accordingly. This is in keeping with our intent to implement adaptive management.

American woodcock was chosen as a refuge focal species for recently harvested habitat and fields, in close proximity to aspen/birch and riparian habitat. The northern parula was also chosen as a refuge focal species for riparian habitat (table H.1).

Table H.4. Refuge Focal Species for Upland Habitat Types

Upland Habitat	Refuge Focal Species
Mixed Spruce-Fir/Northern Hardwood Forest	Canada Warbler Blackburnian Warbler Black-throated Green Warbler American Woodcock
Lakeshore Pine Hemlock	Bald Eagle Osprey Landbirds during migration
Recently Harvested & Fields	American Woodcock

Supporting Discussion:

The species that showed the highest relative abundances within the Upper Androscoggin River watershed basin are those of the mixed spruce-fir/northern hardwood forest. As mentioned earlier, this mixed forest is the past, current, and potential future, dominant landscape forest, despite decades of manipulation. It is the anticipated climax forest condition that would naturally occur, under a climate regime uninfluenced by global climate change.

The blackburnian, black-throated green, and Canada warblers were selected as refuge focal species because of the refuge’s location within the areas of high concentration for these species, and because of the refuge’s site capabilities and its extensive, existing and sustainable mixed spruce-fir/northern hardwood forest landscape. Managing in areas of high concentration within priority species’ ranges, which also represent the habitat that would naturally occur in that location, maximizes refuge efforts and is most efficient. The planning team has determined that maintaining the mixed forest, with emphasis on managing for these focal species, is the highest and best contribution Umbagog NWR can make within the northern New Hampshire and western Maine conservation estate as well as the National Wildlife Refuge System.

While we will emphasize the mixed forest with a high conifer component, and associated focal species for the reasons noted above, this should not be construed as indicating that we will ignore other important species of conservation concern. The BCR 14 conservation plan identifies Cape May and bay-breasted warblers among the highest priority landbirds. They occur on the refuge in low abundances because of their preference for extensive, contiguous, mature conifer forests. Although they are not a refuge management priority, they would increasingly benefit over time from proposed management designed to increase the conifer component within the refuge landscape and promote larger blocks of mature spruce-fir. We will continue to monitor their presence and response to management along with our focal species.

Species that prefer hardwood forest showed moderate relative abundances in the refuge landscape; however, refuge management for this habitat type would not be a high priority. The site capabilities of current and proposed future refuge lands do not favor large blocks of hardwoods at this time. Also, other areas of BCR 14 and the Northeast U.S. (USFWS Region 5) provide better opportunities to manage and sustain extensive areas of this habitat type. In addition, the planning team anticipates the refuge’s surrounding landowners would continue conducting management as in the past, driven by the timber market, resulting in a higher hardwood component and a higher presence of hardwood-dependant landbird species.

4.0) Refuge Focal Species for Umbagog NWR

From steps 1 through 3 above, the following table (table H.5) identifies high and moderate refuge habitats that will be a priority for active management in the next 15 years, and the refuge focal species associated with those habitats types.

Table H.5. Refuge Management Priority Habitats and Associated Focal Species*

High Management Priority Habitats	Refuge Focal Species
Fen and Flooded Meadow	American Black Duck Ring-necked Duck Common Loon
Wooded Floodplain	American Black Duck Cavity Nesting Waterfowl Northern Parula
Shrub-Scrub Wetland	American Woodcock American Black Duck Canada Warbler
Open Water and Submerged Aquatic Vegetation	Native Brook Trout Eagle and Osprey Common Loon
Mixed Forest – “Mixed Woods” Habitat Type	Blackburnian Warbler Canada Warbler Black-throated Green Warbler
Mixed Forest – Spruce/fir Habitat Type	Blackburnian Warbler Black-throated Green Warbler
Moderate Management Priority Habitats	Refuge Focal Species
Boreal Fen and Bog	Floating Island National Natural Landmark Rare Plant Communities
N. White Cedar Swamp	Rare Plant Community
Lakeshore Pine Hemlock	Eagle and Osprey Nest Sites
Mixed Forest – Northern Hardwood Habitat Type	Canada Warbler American Woodcock

**Priorities listed above indicate which habitat types will be our highest priority for active management over the next 15 years. They do not reflect the refuge’s conservation priorities. For example, although boreal fen and bog (a wetland type) is a higher priority for conservation than mixed forest (an upland type), we anticipate needing to undertake significantly more active management in areas of mixed forest than in boreal fen and bog habitat types over the course of the next 15 years. Management of boreal fens and bogs is more likely to focus on acquiring and protecting this habitat type.*

4.1) Refuge Habitat-Focal Species Relationships

Table H.6 below identifies the key habitat structure elements for refuge focal species associated with respective refuge habitat types. Other species that will benefit from the management of the refuge focal species are listed in the far right column. Other benefiting species of conservation concern within the BCR, the State, or regional plan (Appendix B).

Table H.6. Key Habitat Structural Elements for Refuge Focal Species

Habitat	Refuge Focal Species	Habitat Structure	Other Benefiting Species
Fen and Flooded Meadow	American Black Duck	Nests within 145 meters of water. Food requirements include bulrush, arrowhead and wild rice. Key vegetation include sweetgale and conifers.	Pied-billed Grebe American Bittern Sora Migrating shorebirds, waterfowl and wading birds Leopard Frog Mink Frog Beaver
	Ring-necked Duck	Prefer shallow freshwater wetland with stable water levels and abundant emergent and submerged or floating plants. Nests are typically on a floating mat of vegetation, but often in clumps of herbaceous or shrubby growth or on islands. Peak nesting is in mid-May.	
	Common Loon	Nesting habitat associated with lakes in spruce-fir or spruce-fir northern hardwood transition zones. Bodies of water with stable water levels and little or no human disturbance. Nests on the ground at water's edge, usually on sand, rocks or other firm substrate. Prefers small islands to shore.	
Boreal Fen and Bog	Floating Island National Natural Landmark	Appropriate hydrology and nutrient input to maintain diverse plant community.	Palm Warbler Rusty Blackbird Yellow-bellied Flycatcher
	Circumneutral Pattern Fen		
	Rare Peatland Plants		
Northern White Cedar Swamp		Grows on sites with shallow organic layers, relief to have flowing groundwater, well decomposed organic layers and neutral or slightly basic pH.	Boreal Chickadee Gray Jay Black-backed Woodpecker American three-toed woodpecker Spruce Grouse
Shrub-Scrub Wetland	American Black Duck	Listed above.	Alder Flycatcher Common Yellowthroat Eastern Kingbird Beaver
	Canada Warbler	Forest with dense understory, especially along streams, bogs, swamps or moist areas. Northern hardwoods with softwood understory. High percent shrub cover (70%), moderate canopy cover (64%) and few conifers in the canopy. First appear in clear-cuts 5 yrs. after harvest, become common after 15 yrs. and remain abundant until next cutting cycle.	
	American Woodcock	Moist, rich soil dominated by dense shrub cover (75-90%); alder is ideal, young aspen and birch are suitable as feeding areas and daytime cover. In close proximity to one another: clearings, large openings for roosting, young second growth hardwood (15-30 yrs) for nesting and brood-rearing, and shrub foraging areas.	

Table H.6. (cont'd)

Habitat	Refuge Focal Species	Habitat Structure	Other Benefiting Species
Wooded Floodplain	American Black Duck	Listed above.	Wood Duck Common Goldeneye Common Merganser Hooded Merganser Rusty Blackbird American Redstart Big Brown Bat Hoary Bat Little Brown Bat Northern Long-eared bat Vernal Pool Obligate species (Blue-spotted salamander, wood frog) Mink Frog
	Cavity Nesting Waterfowl	Large trees with cavities for nesting, near clear, clean water with abundant aquatic invertebrates for feeding (Goldeneye); sandy, gravelly, or cobbled bottom with abundant small fish, less than 24 in. deep (hooded merganser); calm to rapid flowing water 1.5 to 6 ft. deep (common merganser); water with brushy overstory, stumps and fallen logs, cavities within 1.2 miles of water (wood duck).	
	Northern Parul	Mature, moist spruce woods along forest or forest/shore edge where moss-like lichens (Usnea) are found. Close-canopy forests, variable conifer cover, and trees in the smaller size classes. Tolerates moderate levels of timber harvest, but absent from clear-cut and strip-cut areas. Sensitive to fragmentation, requires approximately 250 acres to sustain breeding populations.	
Open Water and Submerged Aquatic Vegetation	Native Brook Trout	Cool, well-oxygenated water, temperature not to exceed 68°F for extended periods and oxygen levels remain at 5 ppm or greater. Vulnerable to the effects of predation and competition from other fishes, particularly in the first year or two of life. Spawn in flowing broods or streams, shore spawning successful in some ponds with spring-water inflows in gravelly shallows.	Migrating Waterfowl Land-locked Salmon American Eel Lake Chub
	Common Loon	Listed above.	
	Eagle and Osprey	Preferred feeding habitat: large bodies of water containing abundant fish resources (eagle); shallow-water areas of rivers, shoals of lakes where fish are close to the surface, abundant fish resources, preferably with little human disturbance (osprey).	

Table H.6. (cont'd)

Habitat	Refuge Focal Species	Habitat Structure	Other Benefiting Species
Mixed Spruce-Fir/Northern Hardwood Forest	Mixed Woods Habitat Type	Canada Warbler	Listed above.
		Blackburnian Warbler	Mature conifer forest of hemlock, pines, fir, spruce and mixed forests or moist forest where spruces are thickly draped with bearded lichen (Usnea). Strong affinity for saw-timber-size spruce and fir. Inhabits forests with high canopy cover (84%), variable coniferous cover and many trees in the smaller class sized >3 to <9.1 inches dbh. Nests high up in tree (usually spruce or hemlock), situated well away from the trunk or in a small fork near the top of the tree.
		Black-throated Green Warbler	Mid-to-mature mixed woodlands (especially hardwood-hemlock stands in northern hardwood-spruce), coniferous forest with large trees and larch bogs. Sensitive to logging activity, decline in heavily thinned forests. Large spruce for singing perches. Require large patches (>250 acres). Nest height 3 to 80 ft., typically 15 to 20 ft. on a horizontal or drooping branch in conifers and occasionally in hardwoods
	Spruce-fir Habitat Type	Blackburnian Warbler	Listed above.
		Black-throated Green Warbler	Listed above.
	Northern Hardwood Habitat Type	Blackburnian Warbler	Foraging substrate of small limbs and bases of leaves.
		Black-throated Green Warbler	Foraging substrate of paper birch. Occasional nesting.
		Canada Warbler	Listed above.
		American Woodcock	Listed above.
	Lakeshore Pine Hemlock	Bald Eagle and Osprey	Large trees adjacent to water for nesting, perching and roosting, preferring areas with minimal human disturbance (eagle): elevated nest sites to 60 ft. preferring nest sites in or near water that provide good visibility, security and little human disturbance (osprey).

5.0) Common Goals with Partners

From the onset of the CCP process, wildlife partners from the States of Maine and New Hampshire have been involved with the selection of priority habitats, focal species and the development of refuge goals and objectives. Throughout the process, differing agency goals and scales of responsibility to conservation

targets, was apparent. However, participative planning with professional wildlife stakeholders is useful to address issues that may otherwise result in controversy. The additional time and effort that is needed to identify priority habitats that offer commonality with partners’ goals, is worthwhile and results in more broadly accepted decisions (Sportza 1999).

The planning team determined the most appropriate biological goals and objectives for the refuge based on National Wildlife Refuge System policy, and then found commonalities with the State partners in meeting State wildlife habitat goals. The freshwater wetlands and resources of concern that were identified as priorities for the refuge, are a direct overlap with State wetland goals. The mixed spruce-fir/northern hardwood forest contributes to State goals for the priority landbird species that were chosen, as well as provide habitat for other State species of concern. The mixed forest will provide connectivity of habitats for mammals with large home ranges and protection of white-tailed deer wintering areas.

Table H.7. Landbird species from the Bird Conservation Region 14 Plan. Species rankings for the BCR and for PIF Area 28 along with their Breeding Bird Survey relative abundance near the Refuge. Species selected for analysis based on their rank have a relative abundance. Species that were chosen as focal species for priority habitats are shaded.

Species Common Name	BBS	Bird Conservation Region 14			BCR Concern	Blueprint Document Rule	Partners In Flight
	Relative Abundance near Refuge	BCR Tier	Continental Concern	BCR Responsibility			PIF 28 Tier
American Woodcock	4	Highest	*	*	*	1	1a
Canada Warbler	4		H	H	H	1	1a
Wood Thrush	2		H	M	H	1	1b
Olive-sided Flycatcher	1		H	M	H	2	1b
Ipswich Savannah Sparrow	0		*	*	*	1	-
Black-throated Blue Warbler	4	High	M	H	M	4	2b
Chestnut-sided Warbler	3		M	M	M	3	2a
Eastern Wood-Pewee	2		L	M	M	3	-
Rusty Blackbird	1		H	M	M	2	1a
Bay-breasted Warbler	1		H	H	M	1	1a
Cape May Warbler	1		M	M	M	3	2b
Black-billed Cuckoo	1		M	M	H	6	2a
Common Nighthawk	0		L	L	M	4	4
Bicknell’s Thrush	0		H	H	M	1	1a
Nelson’s Sharp-tailed Sparrow	0		H	M	M	1	1a
Chimney Swift	-		M	L	H	4	-
Long-eared Owl	-		M	M	M	4	4

Table H.7. (cont'd)

Species Common Name	BBS	Bird Conservation Region 1			BCR Concern	Blueprint Document Rule	Partners in Flight
	Relative Abundance near Refuge	BCR Tier	Continental Concern	BCR Responsibility			PIF 28 Tier
Short-eared Owl	-	Medium	H	L	H	9	1b
Blackburnian Warbler	5		L	H	M	7	
Black-throated Green Warbler	4		L	H	M	7	
Northern Parula	4		L	H	M	7	2b
Purple Finch	3		L	H	M	4	2a
Brown Creeper	3		*	*	*	9	4
Ovenbird	3		L	M	L	7	2b
Veery	3		L	H	M	3	2a
American Redstart	2		L	H	M	4	
Boreal Chickadee	2		L	M	H	4	
Black-backed Woodpecker	2		*	*	*	9	4
Rose-breasted Grosbeak	2		M	M	M	5	2a
Bobolink	2		L	M	M	3	2a
N. Flicker	2		*	*	*	9	
Palm Warbler	1		*	*	*	9	
Gray Jay	1		*	*	*	9	4
Yellow-bellied Flycatcher	1		*	*	*	8	
Blackpoll Warbler	1		M	L	H	6	4
Ruffed Grouse	1		L	M	H	5	
Pine Grosbeak	0		*	*	*	9	
Peregrine Falcon	-		*	*	*	9	3
Boreal Owl	-		*	*	*	9	
N. Goshawk	-		*	*	*	8	3
Yellow-bellied Sapsucker	-		L	H	M	4	
Whip-poor-will	-		*	*	*	9	4
Blue-winged Warbler	-		H	L	M	2	
Vesper Sparrow	-		*	*	*	9	
Upland Sandpiper	-		*	*	*	9	1b
Barn Swallow	-		*	*	*	9	

Table H.7. (cont'd)

Species Common Name	BBS	Bird Conservation Region 1			BCR Concern	Blueprint Document Rule	Partners in Flight
	Relative Abundance near Refuge	BCR Tier	Continental Concern	BCR Responsibility			PIF 28 Tier
Bank Swallow	-		*	*	*	9	
Horned Lark	-		*	*	*	9	
N. Harrier	-		*	*	*	9	4
Willow Flycatcher	-		L	L	L		1b

*BBS Relative Abundance near Refuge: * Relative abundance is displayed in a range of 1 to 5, one indicating the areas of lowest concentration, 5 indicating the area of highest concentration, - = species that were not analyzed because they are not present near the refuge or were not represented by BBS data.*

*BCR 14: * indicates that the species was not in the BCR landbird database so Continental Concern, BCR Responsibility and BCR Concern could not be calculated based on the new BCR landbird rules.*

Blueprint Document Rules are from Dettmers, 2006.

PIF 28 Tier: from Rosenberg, Kenneth V. and T.P. Hodgman, 2000.

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Appendix I



USFWS

Planning Team meeting

List of Preparers

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Appendix J



USFWS

Bald eagle

Record of Decision for the Final Comprehensive Conservation Plan and Environmental Impact Statement

Umbagog National Wildlife Refuge

Coos County, New Hampshire and Oxford County, Maine



Record of Decision

for the

Final Comprehensive Conservation Plan and Environmental Impact Statement

U.S. Fish and Wildlife Service



January 2009

Record of Decision

For the Final Comprehensive Conservation Plan and Environmental Impact Statement

U.S. Department of the Interior, Fish and Wildlife Service

Umbagog National Wildlife Refuge

Coos County, New Hampshire and Oxford County, Maine

This Record of Decision (ROD) presents the decision regarding the selection of a Comprehensive Conservation Plan (CCP) for Umbagog National Wildlife Refuge (formerly “Lake Umbagog” National Wildlife Refuge). It includes a brief summary of the alternatives considered, public involvement in the decision making process, and the reasons for selecting Alternative B for implementation. The Umbagog National Wildlife Refuge CCP will provide management guidance for conserving refuge resources and providing public use activities during the next 15 years.

Alternatives Considered

The U.S. Fish and Wildlife Service (Service) evaluated the following three alternatives contained in the Final CCP and Environmental Impact Statement (EIS) for the management of Umbagog National Wildlife Refuge (NWR).

Alternative A (Current Management): This “no action” alternative, required by regulations under the National Environmental Policy Act of 1969, would simply extend the way we now manage the refuge over the next 15 years. It also provides a baseline for comparing the two “action” alternatives. We would continue to protect the refuge from external threats, monitor its key resources, and conduct baseline inventories to improve our knowledge of its ecosystem. We would continue our public use programs for wildlife observation, hunting and fishing, allow snowmobiling and camping at their present capacities in designated areas, and offer limited environmental education and interpretation. We would continue to acquire from willing sellers 7,482 acres within the approved refuge boundary, adding to its current 21,650 acres.

Alternative B (Management for Particular Habitats and Focal Species): This is the Service-preferred alternative. Its highest priority is to protect the biological integrity, diversity and environmental health of habitats for Federal trust species on the refuge, as well as protect the associated wetlands, rivers and streams in the Umbagog Lake watershed. Active forest management would help conserve the upland mixed forest and sustain those native species dependent on the forest, including species of regional conservation concern whose habitat needs generally represent those of many other Federal trust resources. Alternative B would improve the quality of our wildlife-dependent recreation programs, and result in several new public uses being offered. New infrastructure would also be developed to provide additional trail and access

opportunities. It would also strengthen our partnerships with state and local entities and complement other recreational programs in the area. Another partnership would focus on developing a Land Management Research Demonstration (LMRD) program for applying the best available science in management decisions that affect wildlife resources in the Northern Forest. This alternative includes expanding the refuge as part of a network of conservation lands by acquiring 47,807 acres from willing sellers; our goal would be to acquire 56 percent in fee simple and 44 percent in easements. These proposed additions to the refuge are important for conserving refuge focal species and other Federal trust resources. Alternative B also proposes a new refuge headquarters and visitor contact facility. Refuge staffing and budgets would increase commensurately.

Alternative C (Management to Create Natural Landscape Composition, Patterns and Processes):

This alternative focuses on sustaining natural ecological communities, rather than selected Federal trust species or their habitats. It would result in passively or actively manipulating vegetation to create or hasten the development of natural communities, landscape patterns and processes. It would improve current wildlife-dependent recreational opportunities with primary emphasis on providing low-density, dispersed, back-country opportunities away from the lake. Alternative C would not, however, allow the new public uses planned under Alternative B nor develop all the new trails. Alternative C would strengthen our partnerships, develop the LMRD program, and add a new refuge headquarters and visitor contact facility similar to Alternative B. It would expand the refuge by 74,414 acres, which we would purchase entirely in fee simple from willing sellers. Our target would be to create contiguous blocks of hydrologically connected conservation areas greater than 25,000 acres: the size we estimate as the minimum necessary to facilitate the natural progression of ecological processes in the Northern Forest conservation network.

Environmentally Preferable Alternative

The alternative which causes the least damage to the biological and physical environment and best protects, preserves, and enhances natural resources is Alternative C. Its proposed refuge expansion of 74,414 acres, all in fee title, would provide the most extensive land protection of all the alternatives and would allow for complete Service management authority. In addition, compared to Alternative B, less active management in the refuge's upland forests is planned, and fewer recreational infrastructure developments would be implemented.

Alternative C, however, does not represent the best balance between resource conservation and impacts to public use, recreational opportunities, and local communities.

Public Involvement and Comments Received

Public comment has been requested, considered, and incorporated throughout the planning process in numerous ways. Public outreach has included open houses, public meetings, technical workshops, planning update mailings, and Federal Register notices. Four previous notices were

published in the Federal Register concerning this CCP/EIS (67 FR 46682, July 16, 2002; 72 FR 37041, July 6, 2007; 72 FR 45044, August 10, 2007; and 73 FR 73661, December 3, 2008). Numerous national, state, and local organizations; agencies; neighboring landowners; and interested citizens were involved in the review process. Comments and concerns received early in the planning process were used to identify issues and draft preliminary alternatives. During the 77-day draft CCP/EIS comment period that occurred from July 6, 2007 to September 21, 2007, we received a total of 14,269 comments via email, letters, faxes, comment sheets, oral testimony at public hearings, visits, or telephone calls. All substantive issues raised in the comments on the draft CCP/EIS have been addressed through revisions incorporated into the final CCP/EIS text or responses contained in Appendix O of the final CCP/EIS. With a few exceptions, management guidance and actions in Alternative B of the final CCP/EIS remain consistent with those presented in the draft CCP/EIS. The exceptions or most important modifications to Alternative B that were made between draft and final documents are detailed below under “Decision.”

Responses to Comments Received On the Final CCP/EIS

The Service issued a final CCP/EIS in December 2008 for a 33-day review period. We held a public information session on December 16, 2008 attended by 50 people. People attending the session were asked to submit any comments to us in writing. We received 90 emails in support of implementing Alternative B, and 3 emails in support of additional land protection, but with concerns for Federal government ownership. We also received support or concurrence for Alternative B from the following federal and state agencies: Environmental Protection Agency; Maine Department of Conservation – Land Use Regulatory Commission; Maine Historic Preservation Commission; Maine Department of Inland Fisheries and Wildlife; New Hampshire Fish and Game; and, New Hampshire Division of Historical Resources. Four additional emails state opposition to Alternative B as detailed in the final CCP/EIS; however, their comments did not raise significant new issues, or result in changes to the analysis, or warrant any further changes to Alternative B. Their comments were previously addressed in our response to public comments detailed in Appendix O of the final CCP/EIS.

Decision

We have selected Alternative B, Management for Particular Habitats and Focal Species, as specified in the final CCP/EIS as the CCP for Umbagog NWR. Alternative B is the most effective alternative at addressing the issues and concerns identified during the planning process and will best achieve the purpose and need for developing a CCP, the purpose and goals of the refuge, as well as the mission and goals of the National Wildlife Refuge System. Implementation of the CCP will occur over the next 15 years. This decision includes the following important modifications we made to Alternative B in the final CCP/EIS in response to public comment:

- 1) Designated areas on the refuge will be open to certain public uses not included in the draft document. These include dog-sledding, horseback riding, bicycling, and the collection of berries, fiddleheads, mushrooms and shed antlers.

- 2) The number of acres proposed for acquisition from willing sellers will be 47,807 acres. The Service now proposes a target goal of acquiring 56 percent of these lands in fee title (full ownership) and 44 percent in conservation easement, rather than 65 percent in fee title and 35 percent in easement as proposed in the draft document.
- 3) Two new maps in the final CCP/EIS clarify the roads, trails, and boat launches we will open or maintain for public use on both current refuge lands and proposed refuge expansion lands. These are presented as Maps 2-8 and 2-9 in Chapter 2.
- 4) We will postpone a decision on whether to manage furbearer species, and whether that management should include trapping. We will conduct further analysis and prepare a more detailed Furbearer Management Plan, if appropriate, under a separate planning and public involvement process within three years of CCP approval.
- 5) We will postpone a decision on whether to expand our current hunt program to include bobcat hunting in Maine and turkey hunting in Maine and New Hampshire. We will conduct further analysis in conjunction with preparing an environmental assessment under a separate planning and public involvement process within two years of CCP approval.
- 6) We clarify in Chapter 2 under the Alternative B discussion that our hunting and fishing programs will not change, and we better explain that we intend to implement those programs similarly on any newly acquired lands.
- 7) We commit to completing a Fire Management Plan within two years of CCP approval.
- 8) We modify our proposal in alternatives B and C regarding boat access, by eliminating our original proposals for a boat launch at Sturtevant Pond and major improvements at B Pond. We are scaling back our proposal at B Pond to include a small parking area near the road, away from the shore. We also propose keeping the boat launch at the current refuge headquarters on Route 16 North open to public access, instead of closing it.

Factors Considered in Making the Decision

This decision was made after considering the impacts identified in Chapter 4, Environmental Consequences, of the draft and final CCP/EIS; the results of public and other agency comments; how well the alternative achieves the stated purpose and need for action and the seven goals presented in the final EIS/CCP Chapter 1; how well the alternative addresses the relevant issues, concerns, and opportunities identified during the planning process; and other relevant factors, including fulfilling the purposes for which the refuge was established, contributing to the mission and goals of the Refuge System, and statutory and regulatory guidance.

Compared to the other two alternatives, Alternative B includes the suite of actions that best meet those evaluation criteria using the most balanced and integrated approach, and with due consideration for both the biological and human environment. Alternative B will best fulfill the biological goals as a priority, with its emphasis on managing for particular Federal trust species and habitats that are of regional conservation concern. It clearly defines which Federal trust species and habitats will be a management priority in both uplands and wetlands, and details specific objectives and strategies for their management. Within the biological program,

protecting the biological integrity, diversity and environmental health of Umbagog Lake and its associated rivers and wetlands is paramount, followed by the conservation of migratory birds in both wetland and upland habitats. These are the two primary areas of emphasis stated in the refuge's establishment purposes. Alternative B also integrates management for other native regional species of concern, such as the Eastern brook trout, to assist in implementation of the goals and objectives in the interagency Eastern Brook Trout Joint Venture.

The proposed refuge expansion of 47,807 acres, acquired through a combination of fee title and conservation easement from willing sellers, is essential to meeting the biological goals and objectives. These lands are predominantly undeveloped; either are or have the potential to be high quality wildlife habitat; occur in an amount and distribution to provide the Service management flexibility to achieve our habitat goals and objectives; and, will collectively result in a land base that affords a vital linkage to other conserved lands in the Upper Androscoggin watershed and Northern Forest Region. This proposal is the result of a very active regional partnership and fully complements the management on adjacent conserved lands, both public and private. It also complements the original purposes and intent for which the refuge was established. The easement option is not provided for under Alternatives A and C, but is an important benefit of Alternative B for many landowners. It allows the landowner and the Service greater flexibility with potential acquisition methods (fee versus easement) in order to meet the stated resource goals and objectives. Ultimately, the method of acquisition within the approved refuge boundary is dependent on the desires of the willing seller.

Alternative B also provides the best balance of new and improved recreational opportunities and visitor services, and allows new public uses desired by the public that would not occur under Alternatives A and C. It will enhance the existing priority public use opportunities for hunting and fishing by providing better outreach and information materials, and improving access and parking. Opportunities for other priority public uses, such as viewing and photographing wildlife and interpretation will expand, primarily by providing new infrastructure such as trails, viewing areas, new roadside pullouts, information kiosks, and viewing platforms. As for other public uses, we will continue to allow recreational activities established in the area such as snowmobiling and camping in designated areas. Under Alternative B, in response to public comment, we plan to formally open the refuge to new uses including collecting berries, fiddleheads, mushrooms and antler sheds for personal use, and allowing bicycling, dogsledding, and horseback riding on designated trails. Alternative B will also extend permanent protection for that public access and recreation through the proposed refuge expansion.

Umbagog NWR's role in the regional land conservation partnership is clearly defined under Alternative B, as is its role in contributing to the Land Management and Research Demonstration program in the Northern Forest. This partnership with other Northern Forest national wildlife refuges will promote research and the development of applied management practices to benefit species and habitats of conservation concern. It will also provide us an opportunity to showcase an adaptive management approach to dealing with spatial and temporal changes and environmental events, whether foreseen or unforeseen, and other new information or events that

occur. This process will be especially critical as we deal with the uncertainty surrounding the extent and potential impacts of climate change. Alternative B also includes an enhanced monitoring program to ensure we are assessing management actions and outcomes and tracking critical resources and indicators of biological integrity, diversity and environmental health.

Alternative B will have a positive local and regional socio-economic impact. It will enhance local community outreach and partnerships, support a Friends Group, and provide valuable volunteer experiences to both youth and adults. It emphasizes improved communications and problem-solving with local communities and adjacent landowners. Alternative B contributes positively to the overall two-county economy through Refuge Revenue Sharing payments, staff purchases and other expenditures, and the expenditures of refuge visitors to the local area. A detailed economic analysis showing the various economic contributions was provided in Appendix G of the final CCP/EIS.

In summary, Alternative B was selected for implementation because it provides the greatest number of opportunities for Umbagog NWR to contribute to the conservation of fish, wildlife, and habitat in the region, will increase the capacity of the refuge to meet its purposes and contribute to the Refuge System mission, will provide the means to better respond to changing ecological and socio-economic conditions within the surrounding environment, and will make a positive contribution to the local and regional communities.

Measures to Minimize Environmental Harm

Public concerns, potential impacts, and measures or stipulations to mitigate those impacts are addressed in the final CCP/EIS. All practicable measures to avoid or minimize environmental impacts that could result from implementation of Alternative B have been identified and incorporated into Chapter 2 (Alternatives Considered, Including the Service-preferred Alternative), Chapter 4 (Environmental Consequences), and Appendix C (Findings of Appropriateness and Compatibility Determinations) of the final CCP/EIS. The stipulations identified in the compatibility determinations in Appendix C ensure that public and other uses are compatible with the purposes for which the refuge was established. These compatibility determination stipulations and other mitigation measures identified for Alternative B in Chapters 2 and 4 of the final CCP/EIS are adopted by the Service in this ROD and will be followed or enforced by refuge staff or their designee.

Findings Required by Other Laws and Executive Orders.

The final CCP/EIS complies with all Federal laws and Executive Orders (EO) related to the planning process and Umbagog NWR. These include, but are not limited to, the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57); the National Environmental Policy Act of 1969 (Public Law 91-190, as amended); the Endangered Species Act of 1973 (Public Law 93-205, as amended); the National Historic Preservation Act of 1966 (Public Law 89-665); the Wilderness Act of 1964 (Public Law 88-577, as amended); EO 12898,

Environmental Justice; EO 11988, Floodplain Management; EO 11990, Protection of Wetlands; EO 12372, Intergovernmental Review; EO 13186, Protection of Migratory Birds; and EO 13175, Consultation and Coordination with Indian Tribal governments.

For Further Information

For further information contact the Refuge Manager, Umbagog National Wildlife Refuge, P.O. Box 240, Route 16 North Errol, New Hampshire 03579, Phone (603) 482-3415. Copies of the final CCP/EIS and ROD may be viewed at refuge headquarters and at the following libraries in the states of New Hampshire: Errol Public Library, Berlin Public Library, White Mountains Community College, and Gorham Public Library; and, in Maine: Bethel Public Library. The final CCP/EIS and this ROD will also be available for viewing and downloading online at <http://www.fws.gov/northeast/planning/Lake%20Umbagog/ccphome.html>.



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January 9, 2009
Date

Umbagog National Wildlife Refuge
P.O. Box 240
Route 16 North
Errol, NH 03579-0240
E-Mail: lakeumbagog@fws.gov
Phone: 603/482-3415

<http://lakeumbagog.fws.gov>

Federal Relay Service
for the deaf or hard of hearing
1800/877 8339

U.S. Fish and Wildlife Service Website
<http://www.fws.gov>

For National Wildlife Refuge System Information:
1800/344 WILD

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