Chapter 4

USFWS

Riparian floodplain forest at the Sandy Stream Unit.

Management Direction and Implementation

- **Introduction**
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Introduction

This chapter presents the array of management actions that, in our professional judgment, will best achieve the refuge and WPA's purposes, vision, and goals, and best respond to public issues. It begins with a description of the process we used to formulate the management direction for Sunkhaze Meadows NWR and Carlton Pond WPA. Next, we present the management direction for the refuge and WPA, including the goals, objectives, and strategies for managing them. Unless otherwise noted, refuge staff will implement all actions.

Formulating the Management Direction

Refuge and WPA goals are intentionally broad, descriptive statements of the desired future condition of their resources. By design, the goals define the targets of our management actions in prescriptive rather than quantitative terms. They also provide a foundation for developing specific management objectives and strategies.

Objectives are steps toward achieving a goal and further define management targets in measurable terms. They provide the basis for developing the strategies that monitor refuge and WPA accomplishments and evaluate progress. "Writing refuge Management Goals and Objectives: A Handbook" (USFWS 2004a) recommends writing "SMART" objectives that possess five properties: (1) specific; (2) measurable; (3) achievable; (4) results-oriented; and (5) time-fixed.

Where possible, we incorporated the principles of SHC in the development of our objectives and strategies. According to "Strategic Habitat Conservation: Final Report of the National Ecological Assessment Team" (USFWS 2006b): "This approach focuses on the ability of the landscape to sustain species as expressed in measurable objectives. Developing a strategy to attain a biological outcome, such as a population objective, requires documented and testable assumptions to determine whether the objective is met." Not only will this approach ensure refuges are contributing to the Refuge System and Service mission and goals in a strategic, standardized, and transparent way, it also helps refuges ensure that they contribute to local and regional conservation priorities and goals as well.

A rationale accompanies each objective to explain its context and importance. We will use the objectives described later in this chapter to write the refuge and WPA step-down plans.

Next we identified strategies, or the actions, tools, and techniques we may use to achieve each objective. The list of strategies in each objective represents the suite of actions we propose to implement. We will evaluate most of them further as to how, when, and where we should implement them when we write our step-down plans. We will measure our successes by how well our strategies achieve our objectives and goals.

We believe the management goals, objectives, and strategies described below provide the best combination of actions to meet the Refuge System mission and policies, meet the refuge and WPA purposes, vision, goals, and respond to public issues.

General Refuge Management

There are some actions we will take in managing Sunkhaze Meadows NWR and Carlton Pond WPA over the next 15 years that are required by law or policy, or represent actions that have undergone previous NEPA analysis, public review, agency review, and approval. Others may be administrative actions that do not necessarily require public review, but we want to highlight them in this public document. They may also be actions we believe are critical to achieving the refuge and WPA's purposes, vision, and goals.

- Continuing land protection by purchasing fee title and conservation easements from willing sellers, and accepting donations, within the current acquisition boundaries.
- Monitoring and controlling invasive species.
- Managing pest species.
- Monitoring and abatement of diseases affecting wildlife and forest health.
- Facilitating or conducting biological research and investigations.
- Managing furbearers.
- Expanding cultural resource protection and interpretation.
- Providing wildlife-dependent recreational opportunities.
- Completing findings of appropriate use and compatibility determinations.
- Administering the refuge, current FmHA conservation easements, and the WPA.
- Completing the wild and scenic river eligibility study.
- Completing refuge and WPA step-down plans.
- Conducting additional NEPA analysis as necessary.
- Employing adaptive management.
- Expanding partnerships to achieve management needs.
- Establishing climate change monitoring protocols.

Protect Land

The Service will continue to work with willing sellers and in partnership with other agencies and organizations, to protect the remaining 92 acres within the refuge’s current authorized acquisition boundary.

Although we intend to acquire suitable and available habitat within the approved refuge boundary from willing sellers, acquiring those lands is not a primary focus of refuge management since the Service already owns the majority of lands within the approved boundary. Instead, we will focus on creating partnerships with adjacent and nearby landowners in support of broader conservation issues that affect the refuge (e.g., providing additional public access, reducing habitat fragmentation).

We will continue to protect Service interests in the FmHA conservation easements and Carlton Pond WPA. We have already acquired all of the parcels within the current acquisition boundary for Carlton Pond WPA.

Monitor and Control Invasive Species

The establishment and spread of invasive species, particularly invasive plants, is a significant problem that reaches across all habitat types. For the purposes of this discussion, we use the

definition of invasive species contained in the Service Manual (620 FW 1.4E): "Invasive species are alien species whose introduction does or is likely to cause economic or environmental harm, or harm to human health. Alien species, or non-indigenous species, are species that are not native to a particular ecosystem. We are prohibited by Executive Order, law, and policy from authorizing, funding, or carrying out actions that are likely to cause or promote the introduction or spread of invasive species in the U.S. or elsewhere."

In this section we discuss only nonnative species. In some instances, native species whose overabundance in a particular area interferes with our management objectives are undesirable from a management standpoint, and we address their management in a later section of this chapter.

The unchecked spread of invasive plants threatens the biological diversity, integrity, and environmental health of all refuge habitats. In many cases, they have a competitive advantage over native plants and form dominant cover types, reducing the availability of native plants as food and cover for wildlife. Over the past several decades, government agencies, conservation organizations, and the public have become more acutely aware of the negative effects of invasive species. Many plans, strategies, and initiatives target more effective management of invasive species, including The National Strategy for Management of Invasive Species for the National Wildlife Refuge System" (USFWS 2003), Silent Invasion—A Call to Action, by the National Wildlife Refuge Association (NWRA 2002), and Plant Invaders of Mid-Atlantic Natural Areas, by the Service and the National Park Service (Swearingen et al. 2010). The Refuge System biological discussion database and relevant workshops continually provide new information and updates on recent advances in control techniques. Sources of funding are also available, both in the Service budget and through competitive grants, to conduct inventory and control programs.

Sunkhaze Meadows NWR and Carlton Pond WPA contain few species targeted for invasive species management, but threats from invasive species are likely to increase over time. Our staff and volunteers continue to be vigilant for other invasive plants and animals should they be identified at Sunkhaze Meadows NWR and Carlton Pond WPA.

Guidance on managing invasive species on Refuge System lands appears in the Service Manual (620 FW 1.7G). The following actions define our general strategies on the refuge and WPA:

- Manage invasive species to improve or stabilize biotic communities to minimize unacceptable change to ecosystem structure and function and to prevent new and expanded infestations of invasive species.
- Conduct habitat management to prevent, control, or eradicate invasive species using techniques described through an integrated pest management plan, or other similar management plan. The plans comprehensively evaluate all potential integrated management options, including defining threshold/risk levels that will initiate the implementation of proposed management actions.
- Evaluate native habitat management activities with respect to their potential to accidentally introduce or increase the spread of invasive species and modify our habitat management operations to prevent increasing invasive species populations.
- Refuge integrated pest management planning addresses the abilities and limitations of potential techniques including chemical, biological, mechanical, and cultural techniques.

- Manage invasive species under the guidance of the National Strategy for Invasive Species Management (USFWS 2003b) and within the context of applicable policy.

The following actions define our specific strategies for the refuge and WPA:

- Continue the treatment of the most problematic species ranked in management priority based on (a) the extent to which the species is established on the refuge or WPA, (b) the potential ecological impact of the species on refuge or WPA plant communities, and (c) the degree of management difficulty involved in controlling the species.
- Maintain early detection and rapid-response readiness regarding new invasions.
- Maintain accessibility to affected areas for control and monitoring.
- Continue to promote research into biological control alternatives.
- Continue and increase efforts to involve the community in promoting awareness of invasive species issues and seek assistance for control programs on and off the refuge and WPA.

While not currently on the refuge or WPA, two nonnative insect pests found elsewhere do pose a long-term concern for refuge and WPA habitats: emerald ash borer (*Agrilus planipennis*) and the Asian longhorn beetle (*Anoplophora glabripennis*). Emerald ash borer is a nonnative insect originally from Asia. It was first identified in Michigan in 2002. Since then, it has spread to 14 states and 2 Canadian provinces (MSU 2012). Emerald ash borer reduces the health of and often kills the trees it infects. Emerald ash borer feeds exclusively on ash trees, although it does feed on all varieties of ash, including black, green, and white (MDNR 2012). While this pest has not been found in Maine to date, it has been confirmed as close as Pennsylvania and New York. Its rapid spread and devastating effects on ash populations is a concern for the long-term habitats of Sunkhaze Meadows NWR and Carlton Pond WPA: both of which contain populations of various ash species. Asian longhorn beetle is a destructive wood-boring beetle that impacts maples and other hardwoods such as birch, elm, and willow. Adults and larvae chew and bore into their host tree, which weakens and often kills the tree. Asian longhorn beetle was first discovered in the U.S. on several hardwood trees in Brooklyn, New York, in 1996. It is currently found within New York, New Jersey, and Massachusetts. It was previously found in Chicago, Illinois, but was successfully eradicated in 2008 (USDA 2012). We will continue to monitor the spread of these pests nationally and continue to evaluate the potential for their presence at both the refuge and WPA.

Manage Pest Species

At times, native plants and animals interfere with management objectives. The Refuge Manual (7 RM 14.4A) defines a pest as “Any terrestrial or aquatic plant or animal which interferes, or threatens to interfere, at an unacceptable level, with the attainment of refuge objectives or which poses a threat to human health.” That definition could include the invasive species defined above, but in this section, we are limiting our discussion to native species that may interfere with management. Currently, we are unaware of any native plant or animal species on the refuge or WPA that meets this definition of a pest species. If we identify pest species on the refuge in the future, we will use established best management practices to control them as appropriate.

Monitor and Abate Wildlife and Plant Diseases

The Service has not yet published its manual chapter on Disease Prevention and Control. In the meantime, we derive guidance on this topic from the Refuge Manual and specific directives from the Director of the Fish and Wildlife Service and the Secretary of the Interior. The Refuge Manual (7 RM 17.3) lists three objectives for the prevention and control of disease.

1. Manage wildlife populations and habitats to minimize the likelihood of the contraction and contagion of disease.
2. Provide for the early detection and identification of disease mortality when it occurs.
3. Minimize the losses of wildlife from outbreaks of disease.

Chronic wasting disease (CWD) is a disease of concern for many refuges in the Northeastern states. According to the Chronic Wasting Disease Alliance, CWD is a transmissible neurological disease of deer and elk that produces small lesions in brains of infected animals. It is similar to mad cow disease in cattle and can be fatal to deer and elk (CWDA 2012). From Sunkhaze Meadows NWR and Carlton Pond WPA, the nearest known location of this disease has been verified in central New York State. Even though this is nearly 400 miles away from the refuge and WPA, the disease has been known to spread rapidly. As of 2012, it has been identified in 19 states across the country. While not currently found within Maine, we continue to monitor the spread of this disease nationally and continue to evaluate the potential for it at both the refuge and WPA.

In addition to diseases that cause serious mortality among wildlife, diseases transmitted through wildlife to humans have received more attention. One example is Lyme disease. In 2002, the Service published a Service Manual chapter (242 FW 5) on Lyme Disease Prevention to inform employees, volunteers, and national service workers about this disease, its prevention, and treatment. Other wildlife diseases may be a concern in the future. While eastern equine encephalitis is not currently known to occur within Maine, it has been found in other parts of the Northeast such as Massachusetts, New Jersey, and New York. West Nile virus has been found in localized areas of Maine and Vermont, but most frequent cases of this disease typically occur in southern New England in states like Connecticut, Massachusetts, and New Jersey (CDC 2012). Eastern equine encephalitis is transmitted by infected mosquitos in and around freshwater hardwood swamps in the Atlantic and Gulf Coast states and the Great Lakes region (CDC 2010). As with other diseases known to occur within the surrounding region, we will continue to monitor the spread of this disease nationally and continue to evaluate the potential for it at both the refuge and WPA.

Biological and Ecological Research and Investigations

The Refuge Manual and the Service Manual both contain guidance on conducting and facilitating biological and ecological research and investigations on refuges. In 1982, the Service published three objectives in the Refuge Manual for supporting research on units of the Refuge System (4 RM 6.2):

1. Promote new information and improve the basis for, and quality of, refuge and other Service management decisions.
2. Expand the body of scientific knowledge about fish and wildlife, their habitats, the use of these resources, appropriate resource management, and the environment in general.
3. Provide the opportunity for students and others to learn the principles of field research.

In 2006, the Service Manual provided supplemental guidance on the appropriateness of research on refuges: "We actively encourage cooperative natural and cultural research activities that address our management needs. We also encourage research related to the management of priority general public uses. Such research activities are generally appropriate. However, we must review all research activities to decide if they are appropriate or not as described in chapter 1. Research that directly benefits refuge management has priority over other research." (603 FW 1.10D(4))

All research conducted on the refuge must be consistent with an approved finding of appropriateness and compatibility determination for research. If a research project does not fall within the scope of a current finding of appropriateness and compatibility determination, we will need to complete project-specific evaluations before authorizing the research. Research projects may also contribute to specific needs identified by the refuge or the Service. As we note in chapter 3, we have allowed many research projects that meet these criteria. We expect additional opportunities to arise under this CCP. A special use permit will be issued for all research projects we allow. In addition, we will employ the following general strategies:

- Seek qualified researchers and funding to help answer refuge-specific management questions.
- Participate in appropriate multi-refuge studies conducted in partnership with the USGS.
- Facilitate appropriate and compatible research by providing compatible access and utilization of the refuge as a location for ongoing research.

Furbearer Management

Under this plan, we will continue to allow trapping on WPA lands and on the Sunkhaze Meadows Unit of the refuge according to refuge and State regulations, as specified in the existing furbearer management plan and EA (USFWS 2001) and compatibility determinations (updated as part of this process). We will continue to conduct furbearer management as a mechanism to collect survey and monitoring information that otherwise will be expensive and difficult to obtain using refuge resources and as a way to collect initial data that may lead to research on furbearer (and other wildlife) occurrence, activity, movement, population status, and ecology. By maintaining a trained, experienced group of trappers, the Service can use their skills and local knowledge to perform or assist in valuable management or research functions. Trappers who participate in the refuge and WPA programs may provide assistance with the implementation of management objectives, such as the alleviation or reduction of wildlife damage conflicts, negative interactions among species, and negative effects of species on habitats.

Expand Cultural Resource Protection and Interpretation

As a Federal land management agency, we are responsible for locating and protecting all historic resources: specifically, archaeological sites and historic structures eligible for listing or listed on the National Register of Historic Places. That applies not only to refuge land, but also to land affected by refuge activities, and includes any museum properties.

Recent cultural resource surveys conducted by the University of Maine in Orono identified known and potential locations of cultural resource areas requiring protection and preservation at Sunkhaze Meadows Unit (Robinson 2012). At this time, no management actions are proposed that we believe will impact known or suspected cultural resources. The Penobscot Indian Nation

has expressed interest partnering with us in the future management of Sunkhaze Meadows Unit to ensure protection of cultural resources and interpretive opportunities available at that site. Under this plan, the Service will use results from the cultural resource overview to develop a step-down cultural resource management plan. This plan outlines considerations for the ongoing protection of cultural resources on Service lands as well as identifies opportunities for expanding cultural resource interpretation both on and off refuge.

Under this plan, we will evaluate the potential for our management activities to impact archeological and historical resources as required, and will consult with the Service's regional archaeologists, Maine Historic Preservation Commission, and federally recognized tribes as appropriate to ensure compliance with Section 106 of the National Historic Preservation Act and any other applicable laws and regulations. That compliance may require any or all of the following: a survey of State historic preservation records, a literature survey, or a field survey.

Wildlife-dependent Recreational Program

The Refuge System Improvement Act designated six priority public uses on national wildlife refuges: hunting, fishing, wildlife observation, photography, environmental education, and interpretation. Per the Service Manual (605 FW 1), we will continue to use the following criteria for a quality wildlife-dependent recreation program in developing refuge programs. According to this policy, quality, wildlife-dependent recreation:

- Promotes safety of participants, other visitors, and facilities.
- Promotes compliance with applicable laws and regulations and responsible behavior.
- Minimizes or eliminates conflict with fish and wildlife population or habitat goals or objectives in an approved plan.
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation.
- Minimizes conflicts with neighboring landowners.
- Promotes accessibility and availability to a broad spectrum of the American people.
- Promotes resource stewardship and conservation.
- Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources.
- Provides reliable/reasonable opportunities to experience wildlife.
- Uses facilities that are accessible to people and blend into the natural setting.
- Uses visitor satisfaction to help to define and evaluate programs.

While no formal assessment has been conducted, Service staff and volunteers have observed that most visitors to the refuge and WPA engage in some form of wildlife-dependent recreation. Wildlife observation, fishing, and hunting are the three of the most common activities (see chapter 3). Under this plan, we will continue to offer opportunities for all six priority uses.

Appropriateness and Compatibility Determinations

Chapter 1 describes the requirements for determinations of appropriateness and compatibility. Appendix B includes appropriateness and compatibility determinations consistent with implementing this plan. Our final CCP includes all approved findings of appropriateness and compatibility determinations. These activities will be evaluated based on whether or not they contribute to meeting or facilitating refuge purposes, goals, and objectives. As noted above, environmental education and interpretation, wildlife observation and photography, hunting, and

fishing are the priority, wildlife-dependent uses of the Refuge System. According to the Refuge System Improvement Act and the Service Manual (605 FW 1), these uses are automatically considered to be appropriate and should receive preferential consideration in refuge planning and management.

Activities Not Allowed

As specified in the Refuge Administration Act, we cannot, "initiate or permit a new use of a refuge or expand, renew, or extend an existing use of a refuge" unless we have determined that the use is compatible. In addition, certain uses are generally or specifically prohibited on refuges by Service regulation (see 50 CFR 27 for details). Federal regulations for WPAs are different. As specified in 50 CFR 31.16, 32.1, and 32.4, WPAs are open to hunting, fishing, and trapping unless closed. However, WPAs are closed to other public uses unless opened. The refuge and WPA are closed to public uses except those specified. According to Service policy (603 FW 1), if the refuge manager finds a use is not appropriate, it can be denied without determining its compatibility. We are not required to formally document all activities that are not found to be appropriate; however, if a use is requested frequently by several individuals or organizations we may choose to prepare a finding of appropriateness and compatibility determination if warranted. Historically, we have received requests for activities that are typically not allowed on refuges or WPAs (e.g., ice skating, firewood and peat harvesting at Sunkhaze Meadows Unit). Other areas nearby or elsewhere provide most of these activities, so the lack of refuge or WPA access does not eliminate opportunities for these activities within the region.

Activities Allowed

As part of the CCP process, we have reviewed all existing public uses of the refuge and WPA. In addition to the six priority public uses, we have determined that several other existing public uses are appropriate and compatible on refuge and WPA lands under certain conditions. These non-priority public uses include: boating; skiing and snowshoeing; snowmobiling on designated trails (Sunkhaze Meadows NWR Units only); gathering of blueberries, blackberries, strawberries, raspberries, cranberries, mushrooms, fiddleheads, and antler sheds for personal use; dog walking on trails (Sunkhaze Meadow Unit only); limited dog trials (Carlton Pond WPA only); bicycling; orienteering; commercial guiding; geocaching; and certain types of scientific research conducted by non-Service personnel. Authorized scientific research conducted by non-Service personnel is expected to contribute to goals 1, 2, 3, and 6. It is subject to Refuge Manual (4 RM 6.2) and Service Manual (603 FW 1.10D(4)) guidance on allowing research on Refuge System lands.

Please see the compatibility determination for this use in appendix B for additional information. The other non-priority public uses contribute to goals 3, 4, and 5 of this document, and support commitments we made in the refuge's establishing documentation that we will allow certain traditional uses of the refuge, if compatible (USFWS 1988). Boating, skiing, snowshoeing, bicycling, commercial guiding, and orienteering also facilitate visitor participation in priority public uses during certain times of year.

The current snowmobile trail runs through the middle of the Sandy Stream Unit. Under this plan we will work with the local snowmobile club to relocate the snowmobile trail at the Sandy Stream Unit. It will be closer to Prairie Road in order to reduce habitat fragmentation and maximize the riparian buffer width along Sandy Stream itself.

We will continue to allow all six priority public uses and the existing, compatible public uses outlined above. Details on how we will administer the six priority public uses and scientific research, and how we will continue to administer boating; skiing, snowshoeing, gathering of berries, antlers etc. for personal use; dog walking on trails (Sunkhaze Meadow Unit only); and limited dog trials (Carlton Pond WPA only) are described below. Additional details on all of these authorized public uses and how we will administer them are also available in appendix B.

Under this plan, we will:

- Allow limited dog trials in a small area of Carlton Pond WPA no more than 4 days a year.
- Allow recreational boating on Carlton Pond WPA waters and the Sunkhaze Meadows Unit of Sunkhaze Meadows NWR.
- Allow visitors to gather, for personal use only, blueberries, blackberries, strawberries, raspberries, cranberries, mushrooms, fiddleheads, and antler sheds at Sunkhaze Meadows NWR.
- Allow motorized and non-motorized boating on Sunkhaze Stream, its tributaries, and Carlton Pond.
- Allow cross-country skiing and snowshoeing, on and off trail, at all units of Sunkhaze Meadows NWR and Carlton Pond WPA.
- Allow dog walking on trails at the Sunkhaze Meadows Unit only.
- Allow use and maintenance of about 6 miles of snowmobiling trails at the Sunkhaze Meadows Unit, Benton Unit, and Sandy Stream Unit of Sunkhaze Meadows NWR through a special use permit to local snowmobile organizations.
- Open Sunkhaze Meadows NWR to geocaching, orienteering, and commercial guiding for priority public uses.
- Work with local snowmobile clubs to relocate the snowmobile trail at the Sandy Stream Unit closer to Prairie Road (see map 4.6).

Refuge and WPA Staffing and Administration

Our proposals in this document do not constitute a commitment for staffing increases or funding for operations, maintenance, or future land acquisition. Congress determines our annual budgets, which the Service's national headquarters and regional offices distribute to the field stations.

Permanent Staffing and Operational Budgets

Permanent staffing and operational budgets for the refuge and WPA are subject to the annual discretion of the Service's Northeast Regional Chief of the National Wildlife Refuge System and allocations provided through the Federal budget. As noted in chapter 3, Sunkhaze Meadows NWR and Carlton Pond WPA have been unstaffed as of 2008. Under this plan, Sunkhaze Meadows NWR and Carlton Pond WPA will continue to be administered and supported, at least in part, by staff at Maine Coastal Islands NWR Complex.

Under this plan, our objective is to achieve levels of annual funding and staffing that allow us to achieve refuge purposes, as described by the goals, objectives, and strategies that we will establish in the final CCP. Implementing the described management actions will be dependent on the level of staffing available over the 15-year life of the CCP. Appendix E identifies current and proposed staffing levels.

Facilities Construction and Maintenance

Some minor infrastructure including observation platforms, boardwalks, and trails will continue to be maintained (to varying degrees). Only non-essential structures, including unused cabins and building remnants, will be eliminated from refuge lands. This plan includes identifying and acquiring an appropriate site for refuge management facilities on or near the Sunkhaze Meadows Unit.

Previous owners of refuge lands at the Sunkhaze Meadows Unit authorized five leases for private cabins. Four of these cabins are no longer used by the former occupants, and we have purchased the cabins. We will continue to maintain two of these buildings at the Sunkhaze Meadows Unit to store refuge equipment and provide work space for refuge staff and occasional use by the Friends of Sunkhaze Meadows. We will remove the remaining two cabins we currently own. We do not need these structures and it is wise practice to remove unused buildings that are not needed rather than let them deteriorate and invite vandalism. If we acquire interests in the remaining privately-owned cabin, we will determine whether to maintain or remove the structure after assessing its condition and refuge needs.

We intend to renew the annual agreement with a private citizen allowing access to and use of the one remaining cabin, provided the agreement remains in good standing. Maintenance of the cabin will continue to be the sole responsibility of the owner; the Service will not be responsible for any maintenance on this building. Once the agreement is terminated, we will acquire interests in this last cabin as needed. We will not enter into any additional agreements allowing private use of refuge cabins.

There are no Service buildings on the other units or Carlton Pond WPA. We will continue to maintain the dam at Carlton Pond WPA.

Distributing Refuge Revenue Sharing Payments

As discussed in chapter 3, we pay local municipalities annual refuge revenue sharing payments based on the number of acres in each municipality and the appraised value of refuge lands in their jurisdiction. We will continue these payments as long as they are authorized by the Revenue Sharing Act or other legislation, commensurate with changes in the appraised market value of refuge lands and new appropriation levels dictated by Congress.

Refuge and WPA Operating Hours

This plan includes keeping the refuge and WPA open for authorized public uses from official sunrise to sunset, 7 days a week. Additionally, the refuge and WPA maintains extended hours specifically for hunting access: a half hour both before sunrise and a half hour after sunset. They are also open to night hunting of coyote and raccoon per refuge and State regulations. In addition, the refuge manager has the authority to issue special use permits to allow access outside those periods. For example, we may permit access for research personnel or organized groups to conduct nocturnal activities such as wildlife observation, and educational and interpretive programs.

Complete a Wild and Scenic Rivers Review

The Wild and Scenic Rivers Act (Public Law 90-543 as amended: 16 U.S.C. 1271 through 1287) established a method for providing Federal protection for free-flowing rivers that possess one or more "outstandingly remarkable" natural or cultural values, and are judged to be of more than regional or local importance. A Wild and Scenic River designation preserves these rivers and their immediate environments for the use and enjoyment of present and future generations. Wild and Scenic River designation seeks to protect and enhance a river's current condition; therefore, current uses and activities are incorporated into the review process and are generally allowed to continue.

Similar to the Wilderness Review, as part of the CCP process, we are required to consider rivers and streams within the refuge and WPA boundaries for inclusion in the National Wild and Scenic River System. The process for recommending rivers for inclusion in the National Wild and Scenic River System has three steps: eligibility, classification, and suitability. Our review only applies to rivers and streams within the refuge and WPA boundaries. Also, because of time constraints, our review only includes the first two steps, determining eligibility and a tentative classification. Our findings of river eligibility and classifications assigned during this review are subject to further consideration during the study phase which we will complete after the CCP.

Based on our analysis, we determined that Sunkhaze Stream and its tributaries meet the criteria for wild and scenic river eligibility and we have tentatively classified these as scenic under the act. We will need to complete the study phase, including additional public review, to determine final classification and suitability. If we determine these waters are suitable for designation under the Wild and Scenic Rivers Act, we will make a recommendation to Congress. Only Congress may act to designate rivers or segments as wild and scenic under this act.

Once a river or river segment is found eligible by an agency, the agency must evaluate any subsequent actions within its jurisdiction to ensure the actions do not affect potential wild and scenic river designation. In other words, for Sunkhaze Stream and its tributaries, we need to ensure that Service activities do not affect the characteristics of the stream that make it eligible for designation. We do not expect the results of the review process, or designation if it occurs, to affect any of the existing public uses or proposed habitat management of the refuge's or WPA's lands or waterways. For more details, please see the Wild and Scenic River Review (appendix D).

Monitor and Enforce Farmers Home Administration Easements

As discussed in chapter 1, from the late 1980s to the mid-1990s, the FmHA acquired many properties throughout the country through foreclosure sales. Before reselling the properties, the FmHA placed permanent conservation easements on most of these properties to protect important habitats. The responsibility for monitoring and enforcing those easements and managing the retained properties rests with the Service, which has usually delegated it to the manager of the closest refuge.

Sunkhaze Meadows NWR currently administers four FmHA easements. Under this plan, the responsibility for administering these properties is expected to remain with the refuge manager responsible for managing Sunkhaze Meadows NWR. Currently, refuge staff check on Service

interests in these properties once a year, additional visits may be made, in response to land owner calls. Routine annual visits usually take three staff days. It is difficult to predict how much additional time and effort will be required to administer these interests in the future.

We will continue to implement the following strategies to meet our obligations on FmHA properties:

- Respond to reports of violations or possible violations as we learn of them. Work with landowners and partners to cooperatively resolve and remedy any violations. If necessary, work with the Northeast Region Solicitor's Office or Assistant U.S. Attorney's Office to ensure remediation and future compliance.
- Have refuge staff, typically the law enforcement officer, check on Service interests in these lands once per year.

Complete Refuge and WPA Step-down Plans

Service planning policy identifies up to 25 step-down plans that may be applicable on any given refuge. The refuge and WPA's existing step-down plans are summarized previously in Chapter 1, Conservation Plans and Initiatives Guiding the Proposed Action.

Under this plan, we have identified a few of these step-down plans that we consider to be of highest priority for updating or completing after the CCP is finalized. In particular, we will update the fisheries management plan and hunting management plan within 5 years of completing the CCP. We will also revise and finalize the habitat management plan (HMP) after we complete the final CCP. We will also develop annual habitat work plans and an inventory and monitoring plan to assist us in addressing CCP objectives and measuring our progress. To keep them relevant, we will modify and update them as we obtain new information. Below is a more detailed description of the HMP, annual habitat management plan, and inventory and monitoring plans. The completion of these plans supports all refuge goals.

Habitat Management Plan

An HMP for the refuge is the first step toward achieving the habitat-based goals and objectives. For example, this plan will identify specific "what, which, how, and when" actions and strategies that will be implemented over the 15-year period to achieve those objectives. Specifically, the habitat management plan will define management areas and treatment units, identify the 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 strategies in each objective identify how we intend to manage habitats on the refuge. We base both the CCP and HMP on current resource information, published research, and our own field experiences. We will update our methods, timing, and techniques as new, credible information becomes available. To facilitate our management, we will regularly maintain our GIS database, documenting any major changes in vegetation as needed.

Annual Habitat Work Plan and Inventory and Monitoring Plan

The annual habitat work and inventory and monitoring plans 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. Each year, we will generate an annual habitat work plan based on the habitat management plan. The annual habitat management plan will outline specific management activities for that year. The inventory and monitoring plan

will outline the methodology to assess whether our original assumptions and proposed management actions support our habitat and species objectives. We will prioritize our inventory and monitoring needs in this plan. 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.

Additional NEPA Analysis

For all major Federal actions, NEPA requires the site-specific analysis and disclosure of their impacts, either in an EA or in an environmental impact statement (EIS). NEPA categorically excludes other, routine activities from that requirement.

Most of the major actions proposed and fully analyzed in this CCP are described in enough detail to comply with NEPA, and will not require additional environmental analysis. Although this list is not all-inclusive, the following projects fall into that category:

- Completing the habitat management plan, including its specified restoration projects and habitat management programs (provided no major changes from the CCP).
- Completing the inventory and monitoring plan.
- Controlling invasive plants.
- Implementing a predator or pest management program.
- Constructing small kiosks, signs, parking areas, and other small-scale visitor facilities.
- Enhancing our priority public use programs.

The refuge's fire program (including all three refuge units and Carlton Pond WPA) went through a separate NEPA process in 2001. At that time, the fire management plan and associated EA were completed (USFWS 2001). The fire management plan is in the process of being updated.

Adaptive Management

This plan includes some flexibility in management to allow us to respond to new information, spatial and temporal changes and environmental events, whether foreseen or unforeseen, or other factors that influence management. The need for flexible management is very compelling today because our present information on refuge species and habitats is incomplete, provisional, and subject to change as our knowledge base improves.

Adaptive management requires formulating predictions about habitat or species responses to management actions, implementing management actions, and then monitoring to determine if species or their habitats are responding as predicted. Secretarial Order No. 3270 provides guidance on policy and procedures for implementing adaptive management in departmental agencies. In 2007, an intradepartmental working group developed a guidebook to assist managers and practitioners. This adaptive management guidebook was updated in 2009 (Williams et al. 2009). It defines adaptive management, the conditions under which we should consider it, and the process for implementing it and evaluating its effectiveness. The guidebook defines adaptive management as, "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."

For the refuge, monitoring key resources and management actions and outcomes, will be critical to implementing an adaptive management process. It is designed to facilitate more effective decisions and enhanced benefits. Habitat management to benefit showy lady's slipper or the northern white cedar exemplary plant community are examples of refuge activities where an adaptive management approach will be implemented and refined under this plan. The refuge manager will be responsible for changing management actions and strategies if they do not produce the desired conditions. Significant changes in management actions from what we present in the CCP may warrant additional NEPA analysis and public comment.

Generally, we can increase monitoring and research that support adaptive management without additional NEPA analysis. Our inventory and monitoring plan will determine future survey efforts and prioritize inventory and monitoring efforts (see "Annual Habitat Work Plan and Inventory and Monitoring Plan" under "Completing Refuge Step-down Plans" below).

Expand Partnerships to Achieve Management Needs

The Service will expand its involvement in partnerships with State, Tribal, and local agencies and organizations, as well as academic institutions, to achieve its management goals. Under this plan, we will explore partnership opportunities to inventory use of habitat by reptiles, amphibians, and priority birds of conservation concern as well as monitor or research variables related to climate change on Service-owned lands.

Refuge staff will work with Moosehorn NWR staff, Umbagog NWR, MDIFW, town representatives, and members of the Penobscot Indian Nation and other Tribes as warranted, collaborating on natural resource and public use management.

Establish Climate Change Monitoring Protocols

There is consensus among the scientific community that global climate change, occurring in part as a result of emissions of carbon dioxide and other greenhouse gases from human activities, will lead to significant impacts across the U.S and the world (National Academies 2005). We discuss the potential effects of climate change on refuge and WPA resources in chapter 3, under Climate.

Uncertainty about the future effects of climate change requires refuge managers to use adaptive management to maintain healthy ecosystems in light of unpredictability (Inkley et al. 2004). This involves improving or adjusting policies and practices based on the outcomes of monitoring or management activities and may result in changes to regulations, shifts in active habitat management, or changing management objectives. Refuge managers can plan and respond to changing climate conditions. A few recommendations include managing for diverse and extreme weather conditions (e.g., drought and flood) and maintaining healthy, connected, genetically diverse wildlife populations (see Inkley et al. 2004).

Under this plan, the Service proposes establishing baseline monitoring protocols that will allow us to evaluate climate change impacts over time. These protocols may track the status of habitats, individual species, or ecological processes over time. The exact protocols will be developed based on available data, climate change projections, and availability of funding and expertise. In conjunction with the partnerships emphasis noted below, the Service will explore partnership opportunities to monitor or research variables related to climate change on Service-owned lands.

Refuge Goals, Objectives, and Strategies

Habitat Management

Under this plan, we emphasize refuge management focused on preservation of the peat bog complex and surrounding mature forest lands within the Sunkhaze Meadow Unit. We also propose improvements to protect the ecological integrity of other refuge units and their habitats through supporting naturally-occurring successional processes and more targeted management. At the same time, we promote more grassland and shrubland habitat management at Benton and Sandy Stream Units. Management of Carlton Pond WPA will largely remain unchanged under this plan.

Refuge Administration

We used the Refuge System's national staffing model developed in 2008 to guide proposed staffing under this plan. The Staffing model was developed to answer the question, "What level of staffing is needed to operate and manage a station to achieve the station's purpose, contribute to the mission and goals of the Refuge System, and comply with the Refuge Improvement Act and other laws, regulations, and policy?" The model estimates the total number of full-time employees needed at a station to do the work, but management must still decide the best mix of disciplines to do that work and whether to deploy part-time, seasonal, or full-time employees.

In addition to this national staffing model, the Refuge System and the International Association of Chiefs of Police began working together in 2003 on a law enforcement staffing and deployment model. The goal for this effort was to develop a defensible staffing model to quantify law enforcement resource needs for the Refuge System, help refuge managers deploy law enforcement resources, and justify budget requests. The result was a "Deployment Model for the National Wildlife Refuge System" (International Association of Chiefs of Police), completed in May 2005.

Under this plan, the refuge and WPA will continue to be administered as satellites with ultimate management responsibility residing at Maine Coastal Islands NWR Complex or possibly Moosehorn NWR. We used the national staffing model to help determine the appropriate level of non-law enforcement staffing, and the law enforcement deployment model to determine the proposed number of law enforcement staff. Based on our priorities, we are proposing five full-time staff. They will be stationed at or near the Sunkhaze Meadows Unit, but will be responsible for activities occurring at the other refuge units and at Carlton Pond WPA.

The five positions we propose, based on the staffing models, are:

- One wildlife refuge specialist.
- One park ranger (visitor services).
- One wildlife biologist.
- One maintenance worker.
- One park ranger (law enforcement).

The staff for Sunkhaze Meadows NWR and Carlton Pond WPA will be supported by staff at Maine Coastal Islands NWR Complex. If additional staff is hired in the future, the Service will

identify and acquire an appropriate site for refuge management facilities, located on or near Sunkhaze Meadows Unit. Please see appendix E for the current and proposed staffing charts.

As discussed previously, actual staffing levels are subject to approval of the Service's Northeast Regional Chief of the National Wildlife Refuge System and are based on Federal budget allocations. This document does not represent a commitment of resources. While a few of the strategies proposed could be implemented at current funding and staffing levels, most will depend on additional funding and staff.

Public Use

We will work closely with partners to increase and enhance the public use experience at all refuge units and Carlton Pond WPA. If staffing is increased as proposed under this plan, we will enhance public use of Sunkhaze Meadows NWR and Carlton Pond WPA. For example, we will increase Service-led programming and update and maintain public use infrastructure such as signs and trails.

Goals, Objectives, and Strategies

Goal 1. Sunkhaze Meadows Biological Management. Promote the environmental health of Sunkhaze Meadows Unit wetland, forest, and aquatic habitats to protect water quality and sustain native rare plants, natural communities, and wildlife, including species of conservation concern.

Objective 1.1 Sunkhaze Meadows Unit: Freshwater Wetland-Peatland Complex

Conserve the 3,461-acre freshwater wetland-peatland complex on Sunkhaze Meadows Unit that includes open water, marsh, beaver marsh, and shrub swamp to protect and buffer the ecological integrity of the 1,649 acres of peatland, protecting water quality, rare plants, and habitat for American black duck and other breeding waterfowl, bitterns, sedge wren, yellow rail, rusty blackbird, and other wetland-peatland dependent-species. Specifically, we will work to maintain:

- The peatland with the full assemblage of native plants including rare bog bedstraw and showy lady's slipper, and less than 5 percent cover of nonnative, invasive plants such as purple loosestrife.
- Beaver activity and minimal human disturbance to support black duck breeding (Diefenbach and Owen 1989).

Rationale

With 3,461 acres of contiguous freshwater-peatland wetland, this diverse wetland complex includes a mix of open water and emergent marsh communities, along with the unique peatland system. Davis et al. (1983) ranked Sunkhaze Meadows' peatlands high in ecological value among 31 other peatlands in Maine based on its developmental-morphological diversity, pristine character, and exemplary quality of peatland type or feature. It is the second largest peatland in the State (MNAP 2011). Protecting this peatland system was the primary purpose for the establishment of Sunkhaze Meadows NWR.

The wetland-peatland complex is just part of the diverse mix of natural communities and habitats on this unit (see map 4.1). An exemplary floodplain forest lies next to the peatland, Sunkhaze Stream meanders through a portion of this habitat, and the wetland complex is surrounded by a

mix of wetland and upland forest. One of the current potential threats to the integrity of the Sunkhaze Meadows Unit's wetland-peatland complex is expansion of invasive species populations. The impacts of invasive species have been described previously under the section titled "General Refuge Management."

Thousands of acres of open wetlands provide breeding habitat for wetland-dependent birds on this unit. This large wetland system supports breeding American black duck and other waterfowl. The American black duck is one of the Service's national focal species and is a highest priority species in the Atlantic Northern Forest Bird Conservation Region (BCR 14) (Dettmers 2006) and is of high priority in the North American Waterfowl Management Plan (NAWMP) (USFWS 2004). Black ducks were once the most abundant freshwater duck in North America. However, their populations have dropped steadily since the 1950s, reaching an all-time low in the 1980s. Black duck pairs arrive in Maine by April and the peak hatch is from June 1st through 10th (Longcore et al. 2000). They are quite intolerant of human disturbance even during brood rearing stage so minimizing human disturbance from late May through June may be important (Longcore et al. 2000).

Breeding pairs and calling males of the sedge wren and yellow rail have both been observed (and may breed) in an area of tall emergent vegetation along the Sunkhaze Stream shore (MDIFW 2005). The sedge wren, a State endangered species, reaches its northeastern limit in Maine. The sedge wren breeds in freshwater meadows of sedges and grasses, shallow sedge marshes, and in the moist edges of freshwater wetlands. Objective 3.2 provides more details on the habitat needs of the sedge wren. The yellow rail is a Service bird of national conservation concern (USFWS 2008a). It is a small, secretive wetland bird that breeds in sedge meadows; it hides and runs beneath vegetation. Their numbers have declined across their range, although accurate population assessments are difficult given their elusive nature. Yellow rails build their nest on damp ground among marsh vegetation and feed on insects, snails, and seeds. The yellow rail and sedge wren are considered birds of greatest conservation need in the Maine Comprehensive Wildlife Conservation Strategy (MDIFW 2005).

American and least bitterns have been observed during the breeding season at Sunkhaze Meadows Unit. Both are priority species for the Service (2008) and the State (MDIFW 2005). Both species may be affected by a decline in wetland habitat quality including encroachment by the invasive purple loosestrife (MDIFW 2005). Several other bird species nest in the unit's peatland habitat including olive-sided flycatcher, Lincoln's sparrow, swamp sparrow, and palm warbler. The olive-sided flycatcher, a species of conservation concern (MDIFW 2005, Dettmers 2006, USFWS 2008a) breeds on the refuge. It favors openings in conifer forests and forest edges with tall spruce and high exposed snags from which to forage and sing. Edges of bogs, wooded streams, and burned over areas are also favored habitats (DeGraaf and Yamasaki 2001).

Current threats to the integrity of the Sunkhaze Meadows wetland-peatland complex include potential degradation of water quality from surrounding land uses (e.g., runoff and spills from roads, timber harvesting), expansion of invasive species populations, and changing hydrologic regimes.

Aquatic habitats, including peatlands and coldwater rivers and streams, are likely to be affected by temperature increases, hydrology changes, and invasive species expansion resulting from climate change over the next 100 years (Whitman et al. 2010). North American peatlands have been sustained for millennia over long wet and dry periods, but their future stability under climate change is uncertain (Environment Canada 2004). Peatlands occur in northern latitudes. Maine's peatlands are found near the southern extent of their range. This may cause them to be more vulnerable to climate change than peatlands farther north because their distribution is determined primarily by climate (Davis and Anderson 2001). Projected increases in summer drought, despite overall increasing precipitation, could impair southern peatlands (Gorham 1991, Burkett and Kusler 2000). Overall, climate change might cause some peatlands to decline and community compositional changes in other peatlands, such as bog plant communities slowly converting into fen plant communities (Almendinger and Leete1998, Siegel and Glaser 2006). Under this plan, we will begin a monitoring program that will help us to track any potential changes to this habitat associated with climate change.

Strategies

Continue to:

- Allow natural processes to maintain wetland system in this unit.
- Control invasive species infestations, such as purple loosestrife, as opportunities arise.

Within 5 years of CCP approval and with at least one full-time employee:

- Develop baseline monitoring protocols for climate change monitoring.
- Limit invasive plant infestation to less than 5 percent of the area.
- Work with MDIFW to establish a waterfowl banding program, particularly for American black duck, to contribute to the Atlantic Flyway waterfowl banding goals.

Over the 15-year life of this CCP and three full-time positions:

- Develop an index of ecological integrity to measure and track the biological diversity, integrity, and environmental health of the Sunkhaze Meadows freshwater wetland-peatland complex.
- Evaluate the effectiveness of allowing natural processes to maintain the ecological communities of the peatlands.
- Explore the establishment of a waterfowl banding program to collaborate with other Federal and State partners and to help track movements of priority species such as American black duck.
- Use standard protocols to conduct migratory and breeding bird surveys. Surveys will be designed to detect species presence/absence and long-term population trends. We will focus on priority species including rusty blackbird, olive-sided flycatcher, American black duck, sedge wren, yellow rail, and bitterns.

Objective 1.2 Sunkhaze Stream and Aquatic Habitats

Preserve 17 miles of Sunkhaze Stream and its tributaries that flow through the refuge to protect the water quality and biological integrity by maintaining vegetated streambanks and safeguarding the absence of human-created barriers (physical, chemical, or thermal) along the stream to benefit native species like Atlantic salmon, brook trout, wood turtles, and breeding and migrating birds like American black duck. In particular, maintain waters that have low turbidity

levels, suitable dissolved oxygen levels, suitable water temperatures, and are free of environmental contaminants at concentrations injurious to fish and wildlife.

Rationale

The Sunkhaze Meadows Unit encompasses 5 miles of the approximately 20-mile Sunkhaze Stream, which bisects the unit, flowing from the northeast to southwest. The refuge has another 16 miles of tributary streams that include Buzzy, Little Buzzy, Baker, Dudley, and Johnson Brooks, and Birch and Little Birch Streams (see map 4.1).

Optimal brook trout habitat includes clear, cold water; a silt-free rocky substrate in riffle-run areas; an approximate 1:1 pool-riffle ratio with areas of slow, deep water; well vegetated stream banks; abundant stream cover; and relatively stable water flow, temperature regimes, and stream banks. Fifty to 75 percent midday shade is optimal for trout streams and optimal water temperatures are 11 to 17 °C (51 to 63 °F) and no higher than 24 °C (75 °F). Brook trout are not highly tolerant of competition from other fish species and thrive in waters not inhabited by other species (Smithwood and McKeon 1999).

Beavers inhabit permanent streams of up to 15 percent gradient, with adequate food resources, that do not have major fluctuations in discharge (Allen 1983). They are active in the Sunkhaze Meadows wetland system. Beaver flowages are attractive to many species of dabbling duck, particularly American black duck and wood duck, as well as other waterfowl, water birds, raptors, songbirds, mammals, amphibians, and reptiles. The effects of beavers on brook trout vary. Beavers may negatively affect brook trout in lowland streams by inhibiting passage (Salyer 1935, Reid 1952); however, brook trout may benefit from increased food resources in beaver impoundments (Rupp 1954).

Riparian ecosystems are areas adjacent to water bodies and nonforested wetlands and are often areas with high species richness with dynamic and complex biophysical processes. Riparian areas along rivers provide important structural habitat components including large nest and roost trees for eagles and ospreys and cavity trees for wood ducks, hooded mergansers, and songbirds. Mature riparian forests are important for many species. For example, wood ducks, common goldeneyes, and hooded and common mergansers nest in cavities in live trees with a diameter at breast height (DBH) of 18 inches or more (Bellrose 1976, Peck and James 1983, Robb 1986, Soulliere 1990). Riparian areas often contain a mix of native shrubs including alder, elderberry, and viburnum that provide food and cover for nesting and migrating songbirds. The wood turtle, a species of special concern in Maine, has been observed in the Sunkhaze Stream system. Wood turtles are often considered one of the most terrestrial of Maine's turtles; however, they still depend on the streams and associated riparian areas with sufficient natural cover (Hunter et al. 1999).

Current potential threats to the integrity of Sunkhaze Stream and its tributaries include degradation of water quality from surrounding land uses (e.g., runoff and spills from roads, residential and commercial development), expansion of populations of invasive species, and changing hydrologic regimes as a result of predicted climate change. According to a recent report on climate change and effects on biodiversity in Maine, streams and rivers in the State are projected to undergo a significant hydrological shift from a snowmelt-dominated regime (with high-flow and ice scouring conditions in the spring) to a rain-dominated regime with reduced

high-flow conditions in winter (Whitman et al. 2010). Based on modeling results for various climate change scenario's in Hayhoe et al. (2007), if low emissions scenarios prevail, Maine could retain much of its snow season, between 2 and 4 weeks of snow cover per winter month. If a high emissions scenario results are accurate, Maine's snow season could decline by about half by 2050.

Strategies

Continue to:

- Allow natural processes to maintain the water quality and biological integrity of Sunkhaze Stream and its tributaries.
- Respond to reports of invasive species as needed.

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Evaluate surrounding land uses at least every 2 years for potential impacts on water quality in refuge waterways.

Over the 15-year life of this CCP and with the hiring of at least three full-time positions:

- Monitor brook trout populations every 1 to 5 years in Sunkhaze Stream and its tributaries in collaboration with MDIFW, Penobscot Indian Nation Fisheries Biologist, the Service's Fisheries Program, and other partners.
- Annually, work with at least two partners or area land owners to protect streams and riparian areas within the Sunkhaze Stream watershed for example, by providing technical support on best management practices for maintaining healthy riparian habitats or by finding ways to conserve and protect land and water.

Objective 1.3 Sunkhaze Meadows Unit: Northern White Cedar Woodland Fen and Cedar–Spruce Seepage Forest

Protect the 390-acre exemplary northern white cedar woodland fen at Sunkhaze Meadows Unit, to ensure a continued canopy dominated by northern white cedar ranging between 4 to 23 inches diameter DBH, with 20 to 60 percent canopy closure, and less than 5 percent invasive plant species cover, to maintain the population of the State-listed, threatened showy lady's slipper, and to provide habitat for species of conservation concern that breed in this habitat type including boreal chickadee and Canada warbler.

Rationale

In a recent survey of the Sunkhaze Meadows Unit, MNAP (2010) mapped an exemplary 390-acre northern white cedar woodland fen (see map 4.1). The cedar woodland fen is a broad, flat peatland dominated by a canopy of northern white cedar, with a dense mix of rough-leaved alder, winterberry, and black ash. Most of the cedar trees are small, although some are up to 23 inches (60 cm) DBH. Sphagnum and other mosses dominate the abundant hummocks, but hollows are largely unvegetated and often saturated. The woodland fen is bordered by a narrow swath of cedar-spruce seepage forest, then upland softwood forest on the southeast side, a road on the east side, and by the extensive open wetlands of the Sunkhaze Meadows peatland complex on the remaining sides (MNAP 2010). Beaver dams constructed over the past decade have increased water levels in some portions of the cedar woodland fen. At this time, we are unsure of the long-term impact of this altered hydrology on the northern white cedars. Under this plan, we will

evaluate the current and potential impacts of beaver dams and any other sources of altered hydrology on the cedar woodland fen.

Northern white cedar seepage forests are found primarily in the northern region of Maine. Most known occurrences of this rare (S3) community type in Maine were harvested in the past. Although timber harvest generally does not result in permanent conversion of this type, more than a century may be required for recovery from heavy cutting as northern white cedar is slow to regenerate (MNAP 1998, Gawler and Cutko 2010). This forested wetland at Sunkhaze Meadows Unit contains a very dense stand of small cedar trees with an average diameter of less than 5 inches (MDIFW 2005). Northern white cedar is a long-lived, shade tolerant species; browsing by white-tailed deer and snowshoe hare can limit the regeneration of northern white cedar seedlings. At the nearby Penobscot Experimental Forest researchers observed extensive browsing on cedars by deer, and recommended reducing deer populations to encourage advance regeneration, browsing control to minimize seedling stress, and thinning of white cedar saplings in subsequent entries to promote height growth of the remaining white cedar (Larouche et al. 2010).

The showy lady's slipper, a State-listed, threatened plant species, has been found on this unit. Showy lady's slippers apparently require constant moisture, some sunlight and neutral pH soil conditions. In acid bogs, their roots go under the acid *Sphagnum* moss to more neutral groundwater below. In clearings or woods edges, colonies may be very large and flowering abundant, but plants in deep shade often lack flowers. The seeds seem to germinate best at depths of at least 2 inches. It has been suggested that this may account for the presence of dense colonies in deer yards where the deer hooves may help to push seeds to the appropriate depth. Showy lady's-slipper takes about 15 years to reach flowering age, which explains why they are slow to reappear after colonies have been dug up. The foliage of nonflowering plants emerges in early spring and may be mistaken for false hellebore (*Veratrum viride*). Flowering plants are unique with tall leafy stems bearing one or two large flowers with white petals and sepals contrasting with magenta pink pouch. In Maine, it flowers from late June to July (MNAP 2004).

The showy lady's slipper is a rare plant in Maine due in part to habitat destruction and over picking. Orchids are popular among some specialty gardeners, and populations of this species are vulnerable to unauthorized collection. Plants dug from the wild usually do not survive; more importantly, removing these plants harms the natural population and may cause its eventual disappearance. Tissue-culture propagation of this species has been tried in limited instances, but any plants offered for sale have almost certainly been dug from the wild (MNAP 2004). Harvesting of plants, including orchids, is not permitted on the refuge.

Some bird species that typically nest in spruce-fir or mixed softwood forests, may also nest or forage in the northern white cedar swamp. These include palm warbler, yellow-bellied sapsucker, boreal chickadee, and Canada warbler. The Canada warbler is a high-priority conservation species for the Service (USFWS 2008a), the State (MDIFW 2005), and in BCR 14 (Dettmers 2006). It breeds in a range of habitat types including deciduous forested swamps, cedar bogs, and cool, moist, mature forest or streams and swamps with dense undergrowth. Forests with dense understory particularly along streams, swamps, bogs, or other moist areas are

important to Canada warblers (DeGraaf and Yamasaki 2003). The white cedar woodland fen at Sunkhaze Meadows Unit does not contain a dense shrub understory, but it still may contain suitable foraging and breeding habitat for Canada warbler. In reviewing habitat requirements, Reitsma et al. (2010) note that they can nest in wet, mossy areas within forest among ferns, mossy hummocks, stumps, and fallen logs. The boreal chickadee, a BCR 14 priority species, depends on forests containing softwood trees with suitable cavities (DeGraaf and Yamasaki 2001).

Climate change could pose long-term concerns for this exemplary community type at the Sunkhaze Meadows Unit. Projected changes in precipitation could negatively alter ground water levels, which play a crucial role in the accumulation and decay of organic matter and governs plant community structure in fens (Seigel and Glaser 2006). Under most climate change scenarios, ground water levels will fall as evapotranspiration increases with temperature, unless it is offset by an increase in summer precipitation (Moore et al. 1997, Myer et al. 1999). Some fens that have deep groundwater systems may be resilient to these changes (Winter 2000). To better understand current conditions and future changes, this plan includes monitoring refuge habitats using an ecological index that we will develop. This will aid refuge staff in monitoring and adapting management to projected climate change impacts.

Strategies

Continue to:

- Allow natural disturbances and natural plant succession to maintain the northern white cedar woodland fen.

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Assess regeneration of northern white cedar in the woodland fen and in the seepage forest.
- Study which factors (e.g., browsing by white-tailed deer) are affecting showy lady's slipper and northern white cedar regeneration.
- Develop management prescriptions (e.g., selective harvest, seedling planting, beaver control) if feasible for improving the regeneration of northern white cedar and for sustaining the exemplary community.
- Develop management prescriptions (e.g., invasive species control, deer exclosures, and understory vegetation management) and implement adaptive management if feasible for maintaining or increasing the unit's showy lady's slipper population.

Over the 15-year life of this CCP and with the hiring of at least three full-time positions:

- Conduct annual migratory and breeding bird surveys for identified focal species according to standardized protocols to detect presence/absence and long-term trends as staff resources and time allow.
- Work with partners to develop an index of ecological integrity and monitoring protocol for the northern white cedar woodland fen and cedar-spruce seepage forest. After the index and monitoring protocol are developed, monitor for changes to this index every 1 to 3 years.
- Collect baseline data and monitor for habitat changes, particularly changes potentially associated with climate change.

Objective 1.4 Sunkhaze Meadows Unit: Conifer and Northern Hardwood-Mixed Forests
Manage and preserve 2,904 acres of conifer and 5,002 acres of northern hardwood-mixed forests on the Sunkhaze Meadows Unit to promote a self-sustaining, mature forest characteristic of the Atlantic northern forest, to benefit a suite of species of conservation concern in BCR 14 including bay-breasted warbler, Cape May warbler, northern parula, blackburnian warbler, olive-sided flycatcher, black-throated blue warbler, and wood thrush. Forests should include trees greater than 70 years old, some trees more than 100 years old, canopy dominated by shade tolerant species, trees greater than 16 inches DBH, presence of large logs on forest floor, presence of trees with long (greater than 6 inches) *Usnea* spp. (lichen), and presence of *Collema* and *Leptogium* lichen species.

Rationale
Although there are large tracts of privately owned forest land in the region, very little, if any, old-growth forest remains outside refuge boundaries. Old forests and their associated features are declining globally. In Maine, old-growth forest accounts for about 4 to 6 percent of the State's forestland (Cutko 2009). Estimates of pre-settlement forests suggest that 50 percent or more of Maine supported stands over 150 years old (Lorimer 1977). Economic pressures make it difficult for private landowners to retain or restore late successional conditions (Whitman and Hagan 2007). The refuge can fulfill an important role by providing these late successional stages (i.e., older forests) that are significantly under-represented in the region.

Late successional and old growth forests are important to conserving forest biodiversity. They contain forest features not found in young forests including large trees, snags and logs, large amounts of dead wood, and diverse vertical structure (Whitman and Hagan 2007). While many of the bird species of conservation concern in the northeast are not entirely dependent on late successional or old growth forest, some bird species may have higher abundances in older forests (Hagan and Grove 1999). There are other types of at-risk species that are dependent on the habitat features found in older forests. These tend to be species such as mosses, fungi, lichen, and insects (Hagan and Whitman 2003). In addition, older forests have ecological processes that are mostly absent from young forests, such as trees and roots tipped over and torn up by winds (Whitman and Hagan 2007). Therefore, a management emphasis on late successional forest is important to sustaining the biological integrity, diversity, and environmental health of the Atlantic northern forest region since it provides an important component largely missing from the landscape at present.

The largest suite of priority landbird species in BCR 14 is associated with spruce-fir habitats, especially mature or late successional stages (Dettmers 2006). High priority bird species in BCR 14 that also prefer mature spruce or other conifers include the olive-sided flycatcher (tall spruce), Cape May warbler (mature spruce), and boreal chickadee (conifer forests with decaying trees). Moderate priority species identified as moderate priority in BCR 14 include the northern parula, Blackburnian warbler, and black-throated green warbler (Dettmers 2006), all of which are associated with mature conifer (DeGraaf and Yamasaki 2001). 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 spp.*) that they use in nest building. In some areas where the northern parula has declined, such as southern New England, the decline may be related to the decline of *Usnea spp.*, a lichen that is sensitive to air pollution (DeGraaf and

Yamasaki 2001). The bay-breasted warbler, one of the highest priority species, which is at the southern edge of its breeding range on the refuge; this species requires mature conifer habitat. Other priority species, such as wood thrush, favors large mature mixed hardwood forests for breeding (Evans et al. 2011).

Species such as the bay-breasted warbler that have southern range extent near Sunkhaze Meadows NWR may be vulnerable to warmer temperatures and increased pest outbreaks resulting from climate change. As a result, these species could shift their range further north (Whitman et al. 2010). Preserving large expanses of self-sustaining, mature Atlantic northern forest can help these species accommodate these large scale transitions in climate and population range.

The MDIFW (2005) also identified bay-breasted warbler, Cape May warbler, northern parula, blackburnian warbler, olive-sided flycatcher, black-throated blue warbler, and wood thrush associated with conifer forests or deciduous-mixed forest as high conservation priorities. The State identified several risk factors for these species and associated forest habitats including large-scale logging operations that convert stands to other species and that use short rotations. Habitat loss to development is also a threat (MDIFW 2005).

The presence of downed trees and logs are an important characteristic of late successional and old growth forests that support a variety of migratory birds. Small downed trees and snags that are greater than 12 inches DBH help support species such as black-backed woodpecker. Larger snags and downed trees help support species such as pileated woodpecker and boreal chickadee by providing conditions suitable for cavity nest site excavation and foraging for insects (Flatebo et al. 1999).

The diversity in plant species composition in the northern hardwood-mixed forest explains, in part, the great diversity of bird species of concern that occur in this habitat type. A majority of high priority species in this habitat, including the black-throated blue warbler and wood thrush, are dependent on a relatively dense forest understory for foraging and nesting. The wood thrush inhabits a wide variety of deciduous and mixed forests throughout Maine. The wood thrush breeds in cool, mature, lowland, mixed or more typically, deciduous forests, particularly mesic to damp woodlands with an abundance of saplings, often near swamps or water (Kendeigh 1948, Dilger 1956, DeGraaf and Rappole 1995). It prefers a shrub sub-canopy layer, shade, and an intermediate soil moisture regime (Morse 1971, Bertin 1977, Roth et al. 1996). The highest density of wood thrush is found in forest patches greater than 200 acres, with a sharp decline in abundance below 100 acres. The black-throated blue warbler occurs in large areas of northern hardwood forests with a dense understory of deciduous or coniferous shrubs or saplings (Darveau et al. 1992).

The rusty blackbird is a priority species of concern for the Service (USFWS 2008a) and the State of Maine (MDIFW 2005), and within BCR 14 (Dettmers 2006). Although the breeding bird survey (BBS) trend for Maine is unreliable for rusty blackbird, there is strong anecdotal evidence of significant, long-term decline (MDIFW 2005). The rusty blackbird nests in riparian areas, boreal wooded wetlands, and beaver flowages in northern New England and Canada (DeGraaf and Yamasaki 2001, Rich et al. 2004). Rusty blackbirds are monogamous and live in very loose

colonies during the breeding season. Their bulky nests are made of twigs and are almost always placed near water (Avery 1995), usually less than 10 feet high in thick foliage near the trunk of a young spruce or fir or in a shrub thicket. Some disturbance (e.g., windthrow, fire, beaver activity) helps create forest openings allowing regeneration of softwoods creating nesting habitat (Avery 1995). During migration rusty blackbirds congregate in flocks in wooded swamps (DeGraaf and Yamasaki 2001) and are known to use Sunkhaze Meadows Unit wetlands during spring and fall migration. The rusty blackbird shows some aversion to clearcutting which creates suitable habitat for competitors including red-winged blackbird and common grackle (Dettmers 2006). Other causes for the severe decline of rusty blackbird across its range are attributed to loss of wintering habitat, blackbird control programs, logging, peat extraction, and drought conditions in parts of its range (Rich et al. 2004).

Climate change projections indicate that northern hardwood forests in the Northeast may change significantly in the next 100 years (Prasad et al. 2007). Under high emission scenarios, the extent of oak and pine forests is projected to increase and expand into central and possibly northern Maine (Iverson et al. 2008). Under the lowest emissions scenario, Maine will likely retain its northern hardwood forest. Northern hardwood tree species may have increased growth rates under any emissions scenario due to higher temperatures, a longer growing season, and increases in photosynthesis and water-use efficiency (Whitman et al. 2010). Similar shifts or changes in species are expected for conifer and boreal forests as well. Tang and Beckage (2010) and Prasad et al. (2007) both project a significant decline of boreal conifer forest over the next 100 years. Under this plan we will initiate monitoring of this habitat type using an ecological index developed by Service staff. This will aid refuge staff in monitoring and adapting management to projected climate change impacts.

This habitat also supports a deer overwintering yard mapped by MDIFW. These areas are utilized by whitetail deer during winters with heavy snow because of their added shelter from wind and snow. In conjunction with our habitat management for priority bird species, we will work with our State partners to ensure that our habitat management activities do not alter the conditions needed to sustain these habitats.

The threat of nonnative pest species, such as emerald ash borer, was detailed earlier in General Refuge Management. Under this plan, we will utilize the eventual addition of staff to implement a more thorough early detection and rapid response program to identify potential infestations early on and react appropriately to prevent or minimize its impact to the northern hardwood-mixed forest.

Strategies

Continue to:

- Allow natural disturbances and natural plant succession to maintain this forested habitat.
- Use mechanical, biological, chemical and prescribed fire, as appropriate, to control invasive plants. The control method varies by invasive species and should follow recommendations by invasive species subject matter experts. Ice storms, strong winds, insect and disease outbreaks all cause damage to forest health and contribute to unnatural or excessive buildup of dead, woody vegetation at the surface, increasing the risk of a

damaging wildfire. When these events occur, consult with regional fire staff for ways to mitigate risks and restore forest health.

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Work with the Refuge System regional forester (stationed at Moosehorn NWR) to ground truth and update the forest stand land cover type data derived from aerial photography interpretation.
- Work with the Refuge System regional forester to inventory and delineate forest stand types and dominant species.
- Work with the State to ensure refuge management for priority species in conifer forest areas does not decrease the quality of potential and existing deer yards.
- Meet or exceed State of Maine best management forestry practices if we conduct forest management activities.

Over the 15-year life of this CCP and with the hiring of at least three full-time positions:

- Manage remaining 2,904 acres of forest stands using best management practices to promote forest health and provide the best mix of forest age class and structural diversity to benefit nesting and migratory birds, and other native species (e.g. deer) across the landscape. Consider the most appropriate management of age classes given the surrounding land ownership and management and what unique role the refuge can fulfill over time.
- During active forest management maintain nut-producing oak and beech trees, snags, cavity trees, and downed woody material to benefit pileated woodpecker and boreal chickadee, and bears.
- Prior to any active forest management, survey for presence of any vernal pools. Implement seasonal restrictions or buffer zones around any vernal pools identified near proposed work areas to prevent impacts to this sensitive habitat and associated species (e.g., amphibians).
- Identify and monitor potential forest pest species such as emerald ash borer using early detection and rapid response protocols.
- Work with the Service's Northern Forest Land Management Research and Demonstration (LMRD) biologist stationed at Umbagog NWR to coordinate management with recommendations from the LMRD Program.
- Conduct a forest health and condition assessment, as well as stand exams, to determine the current condition of the forest and its species and structural characteristics and to determine if any active forest management is needed to promote mature spruce-fir forest.
- Monitor rare plant populations and the 100-acre exemplary floodplain forest in collaboration with the MNAP to confirm population size and long-term viability.

Objective 1.5 Sunkhaze Meadows Unit: Early Successional Habitats

Over the life of the plan, support at least 107 acres of early successional habitats, primarily shrubland, on the Sunkhaze Meadows Unit to benefit species of conservation concern such as American woodcock and chestnut-sided warbler. Specifically:

- Work with the electric companies to manage their 107-acre transmission line right-of-ways as primarily shrubland with over 30 percent areal coverage of native tree and shrub

species, no more than 5 percent bare ground, and at least 95 percent of the area comprised of native species.

- Allow natural processes to maintain or create additional acres of young forest habitat, shrubland, or grassland dominated by trees less than 40 years old and less than 40 feet tall (Whitman and Hagan 2007).

Rationale

Early successional habitats include a range of habitat types depending on their age and disturbance frequency: from grassland dominated by non-woody species, to shrublands dominated by various shrubs and small trees, to young forests (typically less than 40 years old) dominated by small trees less than 40 feet tall (Whitman and Hagan 2007). While early successional wildlife habitats have become rare in much of the eastern U.S. (Trani et al. 2001), and the Northeast (Brooks 2003), the proportion of early-successional habitat in northern industrial forests (such as those commonly found around the refuge and WPA) is currently several times that which occurred in presettlement times (Lorimer and White 2003). Historically, early successional habitat was created by natural disturbances such as flooding, beaver activity, severe storms, landslides, insect outbreaks, treefalls, and fire. These communities sometimes occur as a relatively short-lived vegetation stage after natural disturbance, agricultural abandonment, or logging (Rosenberg and Hodgman 2000).

Research conducted by Anderson (1999) and others suggests that even in preserved areas, early successional habitat (which may include areas of shrublands and grasslands) may account for as much as 25 percent of the cover resulting from natural disturbances, particularly in softwood-dominated stands that are subject to spruce budworm, wind events, and beaver inundation (Cutko 2009). Seymore et al. (2002) noted that “most such disturbances will occur regardless of human activity.” These young forest conditions scattered throughout a matrix of older forests will also be used by bird species that are linked to mature forest, as they often forage for insects and other food sources in these openings. Most migratory birds rely on seeds, fruits, and insects to sustain them through migration. Opportunities to manage shrub and young forest habitat to increase seed, fruit, and insect production will be an important consideration.

Large-scale, right-of-way clearing for transmission line right-of-way management generally occurs on reoccurring multiple-year intervals, between every 5 to 10 years depending on the vegetation type and growth. This periodic clearing can temporarily remove all woody vegetation within the right-of-way easement within the Sunkhaze Meadows Unit. We understand the need for right-of-way management in light of Federal energy regulations.

Under this plan, we will work with the electric companies and their vegetation management contractors to selectively remove trees where possible and maintain primarily shrubland within their right-of-ways. In doing so, we will sustain long-term shrub growth and adequate migration and breeding cover for species that prefer shrublands, such as American woodcock and chestnut-sided warbler. Not only will this improved coordination sustain long-term and consistent shrubland cover, it will also prevent the intermittent loss of habitat that occurs during and immediately following large-scale clearing for right-of-way vegetation management.

Additional acres of young forest habitat created by natural processes will also provide suitable habitat for American woodcock and chestnut-sided warbler for the near future. Wind throws or ice storms are examples of natural processes that can occasionally create openings for young forest habitat.

Strategies

Continue to:

- Coordinate as needed with the electric companies as they maintain their existing 107-acre right-of-ways for the transmission lines that traverse the refuge.
- Maintain the two current American woodcock demonstration plots, totaling 2 acres, near the Johnson Brook Trail by mowing or burning approximately every 15 years.
- Allow natural disturbances and natural successional processes to create a continuum of successional habitat, including a component of early successional conditions elsewhere on the unit.

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Work more actively with the electric companies to ensure best management practices for vegetation control are used to retain native shrubland community in the transmission line corridor through the Sunkhaze Meadows Unit.
- Over the life of the plan, allow natural processes to maintain or create a mixture of grassland, shrubland, and young forest habitats on the refuge unit.

Goal 2. Carlton Pond WPA Biological Management. Promote the environmental health of forest, open water, and emergent wetland habitat at Carlton Pond WPA to benefit waterfowl and sustain a diversity of wildlife including species of conservation concern.

Objective 2.1 Carlton Pond WPA: Open Water – Emergent Marsh

Manage the combined 783 acres of open water (295 acres), emergent marsh (455 acres), and the 34 acres of treed peat bog on the Carlton Pond WPA to maintain appropriate water levels for the nesting population of State-listed, endangered black terns. Emergent wetlands will be dominated by pickerel weed, cattail, bulrush, and wild rice with less than 5 percent invasive species cover to sustain breeding habitat for American black duck and other breeding waterfowl, and other migratory bird species of conservation concern, including American bittern, least bittern, and marsh wren.

Rationale

Service manages water levels in the WPA by removing or adding boards within a water control structure as needed. Monitoring the integrity of the earthen dam and the spillway are an important part of managing Carlton Pond WPA.

Nationwide, the Refuge System has acquired nearly 3,000 waterfowl production areas covering 668,000 acres nationwide. Carlton Pond WPA is the easternmost waterfowl production area in the nation; nearly 95 percent of WPA's are located in the prairie wetlands. While waterfowl production areas, easements, and national wildlife refuges account for less than 2 percent of the

landscape, they are responsible for producing nearly 23 percent of the Nation's waterfowl (USFWS 2007).

Carlton Pond WPA supports one of the largest breeding colonies of black terns in Maine, with approximately 24 pairs annually (Gilbert 1995). The black tern has experienced rangewide population declines for unknown reasons and is listed as endangered in Maine. The Maine population is detached from the core of the species range in the prairie-pothole region of the Great Plains. Black terns nest semi-colonially in large, emergent wetlands and feed their young both insects and fish. Terns select emergent wetlands that are at least 12 acres and prefer wetlands greater than 50 acres (Gilbert 1995). They build nests of sticks and reeds on floating mats of dead vegetation or small mud flats. Flooding and predation on eggs and chicks, not habitat availability, seem to be the limiting factors (McCollough et al. 2003). Therefore, maintaining a stable water level during the tern breeding season is essential to prevent flooding.

Carlton Pond WPA was established because of the high numbers of breeding waterfowl observed there. In particular, American black duck, wood duck, blue-winged teal, ring-necked duck, and common goldeneye are thought to be common. American black ducks prefer shallow, emergent wetlands of reeds, sedges, pondweed, and floating-leaved plants that are rich in invertebrates (Longcore et al. 2000). Maintaining water levels to benefit nesting black terns also supports habitat that benefits the American black duck as well as other species of waterfowl.

A population of nonnative, invasive purple loosestrife was found at Carlton Pond WPA in 1993. In 1995, the Service initiated a biological control program by releasing *Galerucella pussilla* beetles. Control efforts have continued since then, although not in every year. The beetles are most effective in large infestations of loosestrife. The Carlton Pond loosestrife population may be too small to be effectively controlled by the beetles, although it seems to have contained any spread.

Strategies

Continue to:

- Use the existing water control structure to manage water levels in Carlton Pond to benefit black terns and other native species, particularly during the black tern incubation period from May 25 to July 15.
- Maintain current water control structure and spillway including annual maintenance and certified inspection every 5 years. Keep emergency spillway clear at all times (e.g., cleaning out beaver debris) and keep dike free of woody vegetation.
- Contact Unity College and MDIFW to gather historical waterfowl survey information for Carlton Pond.
- Provide wood duck nesting boxes from existing supplies upon request, as long as volunteers continue to clean, maintain, and monitor use of the boxes.

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Initiate aquatic invasive plant prevention through monitoring, early detection and rapid response, and public outreach.

Over the 15-year life of this CCP and with the hiring of up to three full-time positions:

- Work cooperatively with landowners adjacent to the Carlton Pond WPA wetlands on maintaining a sufficient vegetated buffer (for example, leave existing trees, don't mow to the shore line) to prevent runoff of sediments and pollutants into Carlton Pond.
- Explore the establishment of a waterfowl banding program to collaborate with other Federal and State partners and to help track movements of priority species such as American black duck.
- Work with interested neighbors and partners to protect streams and riparian areas within the Carlton Pond WPA watershed, including working with area land trusts or other partners to explore the possibility of acquiring interests in some parcels adjacent to Carlton Pond's inlet if there is interest from willing sellers.
- Once the existing supply of nesting boxes is exhausted, phase out wood duck nesting boxes as they deteriorate, or remove the boxes if volunteers are no longer able to maintain them.

Objective 2.2 Carlton Pond WPA: Conifer and Northern Hardwood-Mixed Forest

Preserve 45 acres of conifer forest and 239 acres of northern hardwood-mixed forest on the Carlton Pond WPA to promote a self-sustaining, mature forest characteristic of the Atlantic northern forest, to provide a buffer for emergent wetlands, and to provide stopover habitat for a suite of migratory bird species of conservation concern in BCR 14, including bay-breasted warbler, Cape May warbler, northern parula, blackburnian warbler, and olive-sided flycatcher. Specifically:

- Forests should include trees greater than 70 years old, with some trees more than 100 years old.
- Forest canopies should be dominated by shade tolerant tree species, with a median DBH greater than 16 inches.
- Large logs should be present on the forest floor.
- Some trees with long (greater than 6 inches) lichen (*Usnea* spp.), and presence of *Collema* and *Leptogium* lichen species should also be present.

Rationale

The upland mixed forest at Carlton Pond WPA provides important habitat and water quality benefits to Carlton Pond by buffering and filtering potential effects from surrounding land uses that might be detrimental to water quality. The mature forest provides structural habitat components including large nest and roost trees for raptors and cavity trees for wood ducks, hooded mergansers, and songbirds. Migrating songbirds often use forested habitats located adjacent to water bodies such as Carlton Pond. American black ducks nest in the uplands surrounding the emergent wetlands.

Because the upland forest surrounding Carlton Pond WPA is relatively small, it does not require active habitat management, except for the monitoring and control of invasive plant species. In the mid-1970s, the State and the Service initiated a wood duck nest box program that was successful in helping cavity-nesting ducks rebuild their populations. Currently, the Service is moving away from using artificial nest boxes, with a shift toward maintaining habitat that contains natural nest cavities. See objective 1.4 for a more detailed discussion of habitat needs of migratory birds using these upland forests.

Carlton Pond WPA is still within a largely unfragmented region with large blocks of undeveloped open space remaining within the watershed. However, residential development, logging, and other uses may impact the integrity of the habitats and water quality on the WPA. The nearby Unity College and the Sebasticook Regional Land Trust are important potential partners in helping the Service work with interested landowners around the Carlton Pond WPA on land stewardship and land conservation.

Strategies

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Conduct invasive species inventory and monitoring to prevent new invasions.
- Remove any duck boxes that are in disrepair and over time remove remaining artificial nest boxes to allow a shift toward natural cavities.

Over the 15-year life of this CCP and with the hiring of at least three full-time positions:

- Work with neighbors and partners to protect forested areas within the Carlton Pond watershed, for example, provide technical expertise on best management practices for forest management.
- Work with area land trusts or other partners to explore the possibility of acquiring interests in some parcels adjacent to Carlton Pond's inlet if there is interest from willing sellers.

Goal 3. Benton and Sandy Stream Biological Management. Promote the environmental health of forest, grassland, and shrubland habitat at Benton and Sandy Stream Units to sustain a diversity of wildlife, including species of conservation concern.

Objective 3.1 Benton Unit: Grassland Habitat

Manage at least 92 acres on the Benton Unit as grassland and explore conversion of an additional 22 acres of conifer forest to grassland to provide nesting, migratory, and wintering habitat for birds of conservation concern such as bobolink, sedge wren, and American woodcock, by maintaining a diverse mix of species comprising at least 90 percent native grass and forb cover, less than 10 percent shrub cover.

Rationale

Historically, most of the Northeast was forested, except for a period following European settlement when much of the region was cleared for agriculture and subsequently grasslands and open fields became abundant. In pre-settlement times, permanent, large openings were uncommon, except for selected coastal areas. Scattered openings occurred along large river floodplains, around beaver flowages, in coastal heathlands and in other areas of regular disturbance. Large grasslands are now in decline and the region is becoming more forested (Rothbart and Capel 2006).

Many species of grassland birds require relatively large blocks of habitat for nesting areas. Some species, such as Henslow's sparrow, are not likely to be found in grassland patches of less than 75 acres. Other species will use smaller patch sizes, but grasslands of less than 25 acres generally

do not meet the requirements for most grassland nesting birds (Mitchell et al. 2000). Ochterski (2006) and others cite Mitchell et al. (2000) in noting that many hayfields are mowed twice a year (early summer and mid to late summer) for hay and hence are less suitable for ground nesting grassland dependent birds. Although there is uncertainty about the extent of grassland habitat and associated wildlife prior to European settlement, grasslands can provide a desirable contribution to habitat diversity (Jones and Vickery 1997). In addition, the uncertainties presented by climate change and the expected change in species' distributions make conservation of various habitat types, including grasslands, important safeguards to allow species to adjust their ranges and adapt to climate change.

The refuge maintains grasslands at the Benton Unit (see map 4.2) to provide: 1) nesting habitat for bobolink, 2) roosting habitat and areas for courtship displays for woodcock, and 3) migrating and wintering habitat for landbirds such as meadowlarks and sparrows. Maintaining grasslands in a specific area requires active management to prevent natural succession to shrubland and eventually to forest. Most of the grassland bird species (e.g., grasshopper, vesper, and savannah sparrows, and eastern meadowlark) that have declined in the region require 20 acres or more of contiguous grassland habitat (Jones and Vickery 1997). Small grasslands surrounded by forest or shrubland and isolated from each other are unlikely to provide quality nesting and feeding habitat for these birds; however, small forest openings do provide singing grounds for woodcock and foraging areas for a variety of wildlife, including foraging habitat for post-fledging and migrating mature forest birds. Mixed grasses 8 to 12 inches in height provide nesting and feeding habitat for bobolink, savannah sparrow, and other resident and migratory birds, as well as resting and feeding habitat for overwintering birds such as snow buntings, horned larks, and Lapland longspurs (Sibley 2003).

Grasslands usually require active management (e.g., mowing, prescribed burning) to prevent natural succession to shrubland and forest. Most of the grassland bird species (e.g., grasshopper, vesper, and savannah sparrows, and eastern meadowlark) that have declined in the region require 20 acres or more of contiguous grassland habitat (Jones and Vickery 1997). Small grasslands surrounded by forest or shrubland and isolated from each other are unlikely to provide quality nesting and feeding habitat for these birds; however, small forest openings provide singing grounds for woodcock and foraging areas for a variety of wildlife, including foraging habitat for post-fledging and migrating mature forest birds. Larger units (greater than 20 acres) of grassland are rare within the landscape surrounding the Benton Unit. Mixed grasses of variable species and height provide nesting and feeding habitat for bobolink, savannah sparrow, and other resident and migratory birds (Wiens 1969, Bollinger and Gavin 1992). Currently the Service relies on a local farmer, through a special use permit, to mow the grassland after July 15th. This is a cost-effective and efficient method for maintaining this habitat on a property that is a long distance from the refuge headquarters (see map 4.2).

Under this plan we will also evaluate and potentially expand the grassland area at the Benton Unit by 22 acres. This will entail converting 22 acres of forest to grassland. Currently, this forested area almost divides the unit's grasslands into two sections (see map 4.2). Our intent is to create one grassland area on the refuge over 100 acres. This larger grassland will provide more habitat for grassland species, higher quality habitat (by providing a larger area and less edge), and will support a wider variety of grassland species because of its larger size. Before converting this area to grassland we need to evaluate the soils and topography of this area, as well as the

logistics and costs of conversion and long-term maintenance, as these may not be conducive to establishing or maintaining it as grassland.

In addition, the Benton Unit grasslands provide an opportunity for environmental interpretation of the importance of grassland habitat and a demonstration area for other landowners, including farmers, on how to modify mowing regimes to benefit wildlife.

Strategies

Over the 15-year life of this CCP:

- Within 5 years, work with Unity College to study presence and abundance of bird species using the Benton Unit grasslands. Use this information to inform decisions about habitat management at the Benton Unit.
- Annually mow 72 acres of the existing grasslands after July 15th through a special use permit to maintain the habitat and protect ground nesting birds. Reevaluate mowing timing restrictions and change as needed when warranted for species protection.
- Allow the 3 acres of grassland in the northern property boundary to succeed to mature forest.
- Use prescribed burning to maintain 20 acres of existing grassland, which is too rocky to mow.
- Conduct invasive species inventory and monitoring to prevent new invasions as resources allow.

With the hiring of at least three full-time positions, we will:

- Evaluate soils and topography and convert if feasible 22 acres of conifer forest within the central portion of the unit to grassland to create a larger and more contiguous grassland habitat.
- If we determine these acres are conducive to grassland habitat and resources are available, we will convert them. Because of the topography, we will likely maintain these acres as grassland through prescribed burning.

Objective 3.2 Benton Unit: Sedge Meadow and Open Marsh

Maintain 13 acres of sedge meadow dominated by sedges and grasses averaging 3.5 feet tall, including 2.4 acres of emergent marsh-open water dominated by cattail and a mix of sedge species at the Benton Unit to sustain the quality and natural function of the freshwater wetlands as breeding and migratory habitat for species of conservation concern such as sedge wren, rails, and other wetland-dependent wildlife, and as potential foraging areas for bitterns.

Rationale

The sedge wren, a State-listed endangered species, reaches its northeastern limit in Maine. The sedge wren breeds in freshwater meadows of sedges and grasses, shallow sedge marshes, and in the moist edges of freshwater wetlands. Sedge wrens prefer areas with sedges and grasses averaging 3.5 feet tall, scattered shrubs, with an absence of standing water (McCollough et al. 2003). The species is considered nomadic, so absence from an area does not necessarily indicate poor habitat (NHFG 2005). A sedge wren was recorded for the Benton Unit when it was established in 1990, but has not been documented there since. Sedge wrens can be difficult to identify as they closely resemble other wren species (Herkert et al. 2001). Even though they have

not been confirmed since 1990, management has continued to maintain habitat suitable for this species. The sedge wren will use small patches (less than 20 acres) of wet sedge meadow in the midst of a large grassland, as occurs at Benton. Burning and mowing of wet meadows can aid in maintaining suitable habitat but should be implemented after the breeding season ends on August 31.

Shallow, freshwater wetlands with an abundance of tall emergent vegetation interspersed with open water are important for bitterns and rails. The 1.9 acres of restored wetlands at the Benton Unit offer foraging habitat for these wading birds and are breeding habitat for other common wetland birds including tree swallows and red-winged blackbirds (see map 4.2). The cattails, while unsuitable for sedge wrens, are ideal for bitterns. Both American bittern and least bittern are species of concern in BCR 14, in the State, and for the Service. The small, emergent marsh wetlands at Benton are more likely to function as alternative foraging sites for bitterns; typically, these secretive marsh birds breed in larger wetlands (greater than 10 acres) (NHFG 2005).

This habitat also may benefit other species such as amphibians and reptiles. Unfortunately, at this time, we do not have inventory records of these and other species groups. Under this plan, we will pursue such inventories through partnerships with agencies, organizations, or academic institutions.

Strategies

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Evaluate, and modify if needed, the mowing regime around the sedge meadow and freshwater wetlands to enhance wetland conditions for sedge wren, bitterns, and other wetland-dependent bird species.
- Explore partnership opportunities to inventory use of habitat by reptiles, amphibians, and priority birds of conservation concern, including sedge wren.
- Continue to allow natural process to maintain the sedge meadow habitat.

Objective 3.3 Benton Unit: Northern Hardwoods-Mixed Forest and Conifer Forest

Manage 155 acres of northern hardwood-mixed forest and 52 acres of conifer forest on the Benton Unit to promote a self-sustaining, mature forest characteristic of the Atlantic northern forest, to benefit a suite of species of conservation concern in BCR 14 including northern parula, blackburnian warbler, black-throated blue warbler, and wood thrush. Specifically:

- Forests should include trees greater than 70 years old, with some trees more than 100 years old.
- Forest canopies should be dominated by shade tolerant species with an average DBH greater than 16 inches.
- Large logs should be present on the forest floor.

Rationale

Same as objective 1.4, plus:

The northern hardwood-mixed forest and conifer forest at Benton Unit comprise a little over half of this refuge unit. While in itself, this unit contains a small amount of forest, it is bordered to the north by a large expanse of nearly 400 acres of contiguous northern mixed hardwood and conifer

forests. Similar to the Sunkhaze Meadows Unit, this larger expanse of forests supports overwintering habitat for white-tailed deer (i.e., a deer yard). A portion of this deer yard extends into the northern portions of the Benton Unit.

Strategies

- Over the 15-year life of this CCP, allow 3 acres of grassland in the northern property boundary to naturally convert to forest.

With the hiring of at least three full-time positions:

- Conduct a forest health and condition assessment, as well as stand exams, to determine the current condition of the forest, its species, and its structural characteristics. Use this information to determine if any active forest management is needed to promote mature mixed conifer-hardwood forest.
- Explore partnership opportunities (e.g., with Unity College) to inventory use of forest habitat by reptiles, amphibians, and priority birds of conservation concern.

Objective 3.4 Sandy Stream Unit: Shrubland Habitat

Manage 37 acres of shrubland habitat dominated by alder species with some gray dogwood and red maple on the Sandy Stream Unit to provide nesting and migratory habitat for birds of conservation concern such as American woodcock.

Rationale

The loss and degradation of naturally maintained shrublands has been extensive throughout New England and beyond. Shrubland-associated birds consistently rank near the top of lists of species showing population declines. Of 40 bird species associated with shrubland habitats, 22 are undergoing significant population declines in eastern North America. Shrubland communities are habitat patches with woody plants typically less than 10 feet tall with scattered open patches of grasses and forbs. Patches dominated by shrub clones (e.g., alder and dogwood) are relatively stable and can last up to 40 years with little management (Tefft 2006). Vegetation structure, microhabitat conditions, and landscape context are the most important habitat features for shrub-dependent birds, rather than specific plant species (Dettmers 2003). Other priority bird species will also benefit from the management objective to maintain native shrublands, particularly during fall migration, including American woodcock, willow flycatcher, eastern towhee, and Canada warbler.

Coastal states have the primary responsibility for most of the native shrubland habitat in the region (Dettmers 2003, Litvaitis 2003); therefore, restoration and maintenance of naturally occurring shrublands is recommended as a priority for coastal states. Managing small patches (less than 25 acres) as shrubland habitat can be more effective for many of the shrubland breeding birds than managing such relatively small patches for other habitat types such as grassland or forest because of the relatively low patch size sensitivity exhibited by many shrubland birds compared to some of the grassland and forest birds.

Given the small size of the Sandy Stream Unit, managing for shrubland habitat is expected to provide the most benefit for priority species of conservation concern. The current condition and site capability lends itself to maintaining shrubs and small trees including speckled alder, gray

birch, willows, and hawthorn, among others. The site is also relatively free of invasive plant species.

Under this plan, we will maintain most of the existing shrubland habitat. We will also work with the local snowmobiling club that maintains the snowmobile trail on Sandy Stream Unit to relocate the trail closer to Prairie Road to reduce fragmentation of the shrub habitat (see map 4.3).

Strategies

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Work with the snowmobile club to relocate the snowmobile trail so it is adjacent to Prairie Road to provide a more contiguous habitat unit.
- Work with the snowmobile club to coordinate snowmobile trail maintenance with refuge's shrubland management to minimize disturbance.

Over the 15-year life of this CCP:

- Use vegetative treatments such as by prescribed burning or mowing every 10 years, or as needed, to maintain 37 acres of shrubland habitat and to help control invasive plants.

Objective 3.5 Sandy Stream Unit: Forested Riparian Habitat

Expand the existing forested riparian buffer to at least 90 feet along Sandy Stream to protect the water quality and biological integrity that sustains native brook trout, rare freshwater mussels, wood turtle, other aquatic organisms, and breeding and migrating birds.

Rationale

While we do not own any interests in Sandy Stream itself, the Service, through its management of the Sandy Stream Unit, helps maintain water quality important to downstream aquatic organisms including the rare mussels. Two State-listed, threatened freshwater mussels, the tidewater mucket and yellow lampmussel, occur in Sandy Stream. Both mussel species are declining rangewide, and in Maine the populations are fragmented and restricted to discrete areas within three mid-coast drainages. Freshwater mussels are particularly vulnerable and sensitive to habitat changes and environmental contaminants, and have a high risk for extirpation when habitat is degraded. Changes to hydrology, sedimentation, invasive species, water pollution, degradation of riparian areas, and loss of fish hosts are some of the threats to freshwater mussels (MDIFW 2005). The Benton and Sandy Stream Units are both within the Unity Wetlands focus area identified in the Maine Comprehensive Wildlife Conservation Strategy (MDIFW 2005); the primary conservation strategy identified for this focus area was to maintain or improve water quality.

The size and quality of the riparian buffer is critical to protecting the water quality of the adjacent waterways and for providing wildlife habitat. The existing riparian buffer of 25 feet along some stretches of the Sandy Stream Unit is not optimal for protecting water quality and providing riparian habitat for nesting and foraging birds. Forested buffers of at least 90 feet proposed for Sandy Stream (see map 4.3) will help protect water quality which is critical to invertebrates and freshwater mussels (Kiffney et al. 2003). It will also improve shade for the river which will benefit brook trout, wood turtles, and other aquatic species. Over time, the

expanded riparian forest will offer additional natural cavities for nesting ducks (such as wood ducks and mergansers), roosting bats, and resting places for other wildlife (Hawes and Smith 2005, Bryan 2007).

Strategies

- Over the 15-year life of this CCP, expand the riparian forest along Sandy Stream to at least 90 feet by ceasing brush cutting and allowing natural succession to develop a mature riparian forest.

Goal 4. Sunkhaze Meadows Public Use. Engage visitors, students, and nearby residents in the Refuge System's six priority public uses, as well as other compatible public uses, to enhance public understanding, enjoyment, and environmental stewardship of the wetlands, woods, wildlife, and cultural resources of the Sunkhaze Meadows Unit.

Objective 4.1 Wildlife Observation and Photography – Sunkhaze Meadows Unit
Provide visitors with opportunities for wildlife observation and photography along four existing walking trails, a new trail, the ITS snowmobile trail (in winter), and the existing boat access site at the Sunkhaze Meadows Unit to connect visitors with nature and inspire stewardship in their everyday lives.

Rationale
Visitors will continue to have opportunities to access the Sunkhaze Meadows Unit for wildlife observation and photography. Providing high quality opportunities for wildlife observation and photography on the refuge promotes visitor appreciation and support for the refuge and the Refuge System, while also benefitting the local economy.

Under this plan, opportunities for wildlife observation and photography will be enhanced, as outlined in the strategies below. This CCP will continue to allow access along 6 miles of existing trails (Johnson Brook, Carter Meadow, Ash Landing, and Oak Point) and along the 3.2-mile-long McLaughlin Road. We will improve access by creating a new connector trail along Carter Meadow Road (see map 4.4).

The North and South Buzzy Brook Trails combined contain nearly 4.4 miles of trail requiring maintenance. Under this plan, we will close the North and South Buzzy Brook Trails because they appear to be less used and are already largely inaccessible because of fallen trees and overhanging vegetation. This will allow refuge staff to focus resources on maintaining the remaining four trails as well as developing additional facilities and programs. Access on the north and western portions of the refuge will still be provided via McLaughlin Road.

This plan proposes some new facilities to improve visitor experience and safety (see map 4.4). A new trail will be created, eliminating the need for visitors to walk down Carter Meadow Road to access Carter Meadow Trail. This new trail will improve the visitor experience by being relocated off of the current gravel road. Two new gravel parking lots will be developed as well. The first will be located near the entrance of Carter Meadow Road off of County Road. The other will be located off of County Road as well, near the Oak Point trailhead. These added parking areas will improve access opportunities to these areas by creating local parking availability. They

also will help improve visitor safety. Currently, visitors must park in the existing parking lot north of the Oak Point Trail and walk along County Road to access either of these areas. By creating new parking areas, we will prevent visitors from needing to walk along the road to access these trails.

Boating is probably the best way to observe the refuge's wildlife and habitats at certain times of year. Currently, boat access to Sunkhaze Stream and its tributaries on the refuge is limited. Under this plan, we will partner with others to create additional access points to the stream and, if feasible, one or more tributaries. Due to extensive wetlands and other important habitats, refuge lands do not offer good opportunities to develop boat access, so we plan to work with willing landowners to establish boat access on lands and waters near or adjacent to the refuge. We will explore opportunities to develop boat access points along Sunkhaze Stream near its mouth as well as upstream near the current Ash Landing access point. In addition, navigating Sunkhaze Stream itself can be disorienting, particularly in spring when the stream is flooded. The lack of easily distinguishable landmarks can make it easy for those unfamiliar with the stream and its tributaries to become lost. Commercially guided tours of the refuge could expand opportunities for visitors to explore the refuge safely.

We will also work to better orient, inform, and guide the visiting public, and help create a more fulfilling wildlife observation and photography experience through a variety of means, including additional updating of the refuge's Web site, refuge brochure, and interpretive panels.

Strategies

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Improve the refuge's Web site to encourage visitation by adding trail maps, bird lists, and recent observations.
- Close North and South Buzzy Brook Trails due to maintenance difficulty.
- Explore feasibility of adding a trail from the Carter Meadow parking lot that will allow access to Spruce Loop and Oak Point Trails without walking on County Road.

Over the 15-year life of this CCP and with the hiring of at least three full-time positions:

- Improve directional trail signs to better access and identify trailheads.
- Develop a new trail from the entrance of Carter Meadow Road to the existing Carter Meadow trailhead.
- Develop two gravel parking areas: one at the entrance of Carter Meadow Road and the other near the Oak Point trailhead.
- Replace boardwalks along Johnson Brook Trail.
- Expand wildlife observation opportunities by exploring the potential for commercial guided canoe and kayak trips along Sunkhaze Stream.
- Work with willing landowners to establish boat access on lands and waters near or adjacent to the refuge, including exploring opportunities to develop boat access points along Sunkhaze Stream near its mouth as well as upstream, and if feasible, on tributaries.

Objective 4.2 Hunting

Annually, allow access for hunting of big game, upland game, and migratory game birds in accordance with State and refuge regulations and consistent with sound biological principles to create opportunities for connecting visitors with nature by providing participants with reasonable harvest opportunities, uncrowded conditions, and minimal conflicts with other users.

Rationale

Hunting is one of the six priority public uses to receive enhanced consideration on national wildlife refuges according to the 1997 Refuge Improvement Act. Hunting is also an historic, traditional, and popular activity on the refuge and in the Refuge System. Providing wildlife-dependent recreational opportunities like hunting helps foster an appreciation for wildlife and the habitats that sustain them. At Sunkhaze Meadows Unit, hunting is a public use that draws a number of visitors to the refuge.

To the extent practicable, refuge hunting regulations coincide with State hunting regulations. The Sunkhaze Meadows Unit is currently open according to State hunting seasons except for the coyote and bear seasons. Sunkhaze Meadows Unit is open to coyote and bear hunting, but refuge seasons are shorter than State seasons. Currently, Maine State regulations for coyote hunting allow daytime hunting all year and night hunting from October 1 to August 31. The refuge's regulations allow daytime and nighttime hunting for coyotes between October 1 and March 31. The refuge's bear hunting season starts October 1, and lasts through the end of the State season. The State's 2013 bear hunting season ends November 1. These shortened seasons are intended to limit potential disturbance to nesting raptors and ground nesting birds in the spring and summer, and migrating birds in the spring and fall (for additional discussion see "Expanding the Refuge and WPA Coyote Season" under "Actions Considered but Eliminated from Further Study"). This shortened season is also intended to minimize potential conflicts with other users during August and September, when there are more visitors to the refuge.

According to State regulations, anyone who hunts with a firearm during any open firearm season on deer is required to wear two articles of solid-colored hunter orange clothing which is in good and serviceable condition and which is visible from all sides. One article must be a hat. The other must cover a major portion of the torso, such as a jacket, vest, coat, or poncho containing at least 50 percent of hunter orange in color. To minimize confusion for hunters, the refuge has recently updated its hunter orange requirements to coincide with State regulations.

In addition, under this plan we propose improvements to the refuge Web site to better inform hunters regarding refuge-specific regulations.

Strategies

- Continue to keep the refuge open to hunting according to current Federal, State, and refuge-specific regulations.
- Within 1 year of CCP approval, update and maintain the refuge's Web site with current, refuge-specific, hunting regulations.

Objective 4.3 Fishing

Annually provide anglers with access to fishing opportunities at Sunkhaze Stream and its tributaries at the Sunkhaze Meadows Unit to create opportunities for connecting visitors with nature.

Rationale

Fishing is one of the six priority public uses to receive enhanced consideration on national wildlife refuges, according to the 1997 Refuge Improvement Act. Fishing is also a historic, traditional, and popular activity in central Maine and in the Refuge System. At Sunkhaze Meadows Unit, fishing is a public use that draws visitors to the refuge. Fishing opportunities are available in 5 miles of Sunkhaze Stream and another 16 miles of tributary streams that include Buzzy, Little Buzzy, Baker, Dudley, and Johnson Brooks, and Birch and Little Birch Streams (see map 4.4). Most of these streams are accessed for trout fishing from road crossings surrounding the perimeter of the unit. Fishing interior portions of Sunkhaze Meadows Unit via boat or canoe is less frequent due to the difficulty of boat or canoe launch access.

Under this plan, we will update the refuge Web site with current fishing regulations and information to better inform anglers of fishing opportunities at the refuge. As described previously, we will work to improve boating access to the refuge, which will enhance fishing opportunities since anglers frequently fish from boats on refuge waters. As discussed under objective 4.1, we will work with willing landowners to develop additional boat access areas. Also discussed under objective 4.1, navigating Sunkhaze Stream itself can be disorienting, particularly in spring when the stream is flooded. The potential for commercially guided services of Sunkhaze Stream and its tributaries could expand opportunities for visitors to explore the refuge safely.

Strategies

Continue to:

- Offer fishing opportunities and access on refuge lands.
- Allow boat access to Sunkhaze Stream.

Within 5 years of CCP and with the hiring of at least one full-time position:

- Improve signs, brochures, and the Web site related to fishing opportunities on the refuge.

Over the 15-year life of the CCP and with the hiring of at least three full-time position:

- Expand fishing opportunities by exploring commercial guided services along Sunkhaze Stream.
- Work with willing landowners to establish boat access on lands and waters near or adjacent to the refuge, including exploring opportunities to develop boat access points along Sunkhaze Stream near its mouth as well as upstream, and if feasible, on tributaries.

Objective 4.4 Environmental Education and Interpretation

Over the life of the plan, we will improve environmental education and interpretation at the refuge by developing and implementing Service-led environmental education programs, providing additional support to existing, volunteer-led programs (i.e., Friends of Sunkhaze

Meadows), and working with new partners to promote understanding of the refuge and the role of the Refuge System.

Rationale

Environmental education and nature interpretation are identified in the Refuge Improvement Act of 1997 as priority public uses. They serve as valuable tools in the protection of our Nation's wildlife and habitat resources. Educating people about wildlife conservation fosters an appreciation of the important role the refuge plays in support of these efforts and motivates individuals to make responsible environmental choices in the future.

Environmental education in the Refuge System incorporates onsite, offsite, and distance-learning materials, activities, programs, and products that address the audience's course of study, the mission of the Refuge System, and the management purposes of the refuge. The goal of environmental education is to promote an awareness of the basic ecological foundations for the interrelationships between human activities and natural systems. Through curriculum-based environmental education, onsite and offsite, refuge staff and partners hope to motivate students and other persons interested in learning the role of management in maintaining healthy ecosystems and conserving our fish and wildlife resources.

Interpretation is an educational activity aimed at revealing relationships, examining systems, and exploring how the natural world and human activities intertwine. It typically includes educational programming that does not fit within a curriculum-based education program. One of its goals is to stimulate additional interest and positive action. Interpretation is both educational and recreational in nature. That is, participants voluntarily become involved in interpretive activities because they enjoy them, and in the process, they learn about the complex issues confronting fish and wildlife resource managers.

Under this plan, we will expand upon our current, volunteer-led, environmental education and interpretation programs. Local schools are incorporating wildlife and wetland topics into their curriculums to meet science-based standards of learning and help students understand scientific concepts, principles, and theories pertaining to their physical setting and living environment. The refuge can provide educational materials as well as an outdoor laboratory to augment the teachers' existing curriculum and tie into learning standards. With the addition of staff, we propose developing relationships with local schools to provide and promote the use of Sunkhaze Meadows Unit for environmental education programming. Over the 15-year life of the CCP, we will develop and conduct a series of Service-led environmental education and interpretation programs as well as continuing to support the ongoing efforts of the Friends of Sunkhaze Meadows.

We will work closely with partners such as the town of Milford, the Penobscot Indian Nation, and others to develop regional cultural and eco-tourism opportunities to increase refuge visitation. In doing so, we will support these partners in achieving their cultural resource and economic development goals, while encouraging visitation to the Sunkhaze Meadows Unit and increasing appreciation of and support for the refuge and the Refuge System.

With the addition of staff and potential increase in visitation, we will update existing interpretive displays, signs, and materials.

Over the 15 year life of the CCP, we will work with the Penobscot Indian Nation to develop interpretive materials to better inform refuge visitors about the significance of the lands and waters comprising Sunkhaze Meadows Unit to Penobscot Indian Nation history and culture. Through these partnerships we intend to improve the public's understanding of the role of the Refuge System.

Strategies

Continue to:

- Allow local high school and college instructors and classes to access Sunkhaze Meadows Unit for environmental education purposes upon request.
- Rely on the Friends of Sunkhaze Meadows NWR to promote and conduct approximately one environmental interpretive program each month.
- Allow partners to conduct education and interpretive programs on refuge lands upon request.
- Maintain existing signs and displays as resources allow.

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Update the existing signs on the unit, develop at least one additional interpretive display, and update existing general brochure.
- Develop relationships with at least two local schools to provide at least one environmental education program or teacher training each year.
- Work with the Town of Milford, the Penobscot Indian Nation, and other partners to develop at least one program (e.g., presentation) and one outreach material (e.g., brochure) to encourage regional, cultural, and ecological tourism, and increase refuge visitation.

Over the 15-year life of this CCP and with the hiring of at least three full-time positions:

- Work with the Penobscot Indian Nation, town of Milford, Friends, and others to develop interpretive materials (brochures, signs, Web site) to educate the public about the refuge's cultural resources.
- Conduct an average of four or more interpretive programs each month across all refuge units and Carlton Pond WPA, led by Service staff.
- Explore opportunities to create a collaborative visitor contact station with space included for refuge staff, collaborative interpretive exhibits, Friends group office, and bookstore with opportunities to market Tribal and locally produced merchandise.

Goal 5. Carlton Pond WPA Public Use. Engage visitors, students, and nearby residents in the Refuge System's six priority public uses, as well as other compatible public uses, to enhance public understanding, enjoyment, and environmental stewardship of the wetlands, woods, and wildlife at Carlton Pond WPA.

Objective 5.1 Wildlife Observation and Photography, Hunting, Fishing, Environmental Education and Interpretation

Allow visitors at Carlton Pond WPA to participate in wildlife observation and photography, hunting, and fishing to create opportunities for connecting visitors with nature.

Rationale

See objectives 4.1, 4.2, 4.3, and 4.4, for discussion of the importance of hunting, fishing, wildlife observation and photography, and environmental education and interpretation to the Refuge System.

Under this plan, with the addition of staff, we propose developing relationships with local organizations, academic institutions, and schools to provide and promote the use of Carlton Pond WPA for environmental education and interpretive programming. Over the 15-year life of the CCP, we will also begin conducting Service-led environmental education and interpretation programs.

Strategies

Continue to:

- Allow local high school and college instructors to access Carlton Pond WPA for environmental education purposes upon request.
- Allow partners to conduct education and interpretive programs on WPA lands upon request.
- Maintain existing signs as resources allow.
- Keep the refuge open to hunting according to Federal, State, and refuge-specific regulations.
- Allow up to two field trial events for hunting dogs each year at Carlton Pond WPA if requested.

Within 5 years of CCP approval and with the hiring of at least one full-time position:

- Develop at least one partnership (e.g., with Unity College, the Sebasticook Land Trust) to promote environmental education, interpretation, and public use at Carlton Pond WPA.
- Develop relationships with at least one local school to provide at least one environmental education program or teacher training.

Over the 15-year life of this CCP and with the hiring of at least three full-time positions:

- Maintain and update as needed existing signs and develop at least one brochure for Carlton Pond WPA.
- Maintain a few wood duck boxes at Carlton Pond WPA for interpretive purposes and develop an interpretative display or brochure.

- Conduct an average of four interpretive programs (onsite or offsite) each month across all refuge units and Carlton Pond WPA, led by Service staff.

Goal 6. Benton and Sandy Stream Units Public Use. Engage visitors, students, and nearby residents in the Refuge System's six priority public uses, as well as other compatible public uses, to enhance public understanding, enjoyment, and environmental stewardship of the shrublands, woods, grasslands, and wildlife at the Benton and Sandy Stream Units.

Objective 6.1 Wildlife Observation and Photography, Hunting, Fishing, Environmental Education and Interpretation

Provide visitors opportunities for wildlife observation and photography, hunting, and fishing at the Benton and Sandy Stream Units to create opportunities for connecting visitors with nature.

Rationale

See objectives 4.1, 4.2, 4.3, and 4.4, for discussion of the importance of hunting, fishing, wildlife observation and photography, and environmental education and interpretation to the Refuge System.

We will continue to allow local snowmobile clubs to maintain existing snowmobile trails under special use permits at the Benton and at the Sandy Stream Units, which provide for other public use access throughout the year. However, we will collaborate with those organizations to relocate the snowmobile trail at Sandy Stream Unit so it will be closer to Prairie Road, as described in objective 3.4, to reduce habitat fragmentation and maximize the riparian buffer width along Sandy Stream itself.

With the addition of staff, we propose developing relationships with local organizations, academic institutions, and schools to provide and promote the use of Sandy Stream Unit for environmental education and interpretive programming. We will also create a pedestrian connector trail at Benton Unit to allow access for wildlife observation and photography from the parking lot, and will open the snowmobile trail to pedestrian traffic during the growing season (see map 4.5).

Strategies

Continue to:

- Allow local high school and college instructors to access these units for environmental education purposes upon request.
- Maintain the gravel parking area at Benton Unit as resources allow.
- Keep the refuge open to hunting according to Federal, State, and refuge-specific regulations.

Over the 15-year life of this CCP:

- Collaborate with snowmobile clubs to relocate the snowmobile trail on Sandy Stream Unit closer to the road to provide a more contiguous habitat unit.

- With the hiring of at least one full-time position, develop at least one partnership (e.g., with Unity College, the Sebasticook Land Trust) to promote environmental education, interpretation, and public use at Benton and Sandy Stream Units.
- Develop interpretive display and programs (at least one for each unit) to interpret the benefits of grassland management at Benton Unit and riparian buffer management at Sandy Stream Unit.
- Create a 0.25-mile long pedestrian connector trail between the parking lot and existing snowmobile trail at the Benton Unit to allow pedestrian access to the snowmobile trail when not in use by snowmobiles.
- Explore the feasibility of and interest in including Benton Unit in a regional trail system upon request.

Goal 7. Partnership Coordination. Communicate and collaborate with local communities, Federal and State agencies, local and Tribal representatives, and other organizations throughout Maine and the region to further the purposes of the refuge and the mission of the National Wildlife Refuge System.

Objective 7.1 Refuge Friends Group
Support regular interpretive programming and events sponsored by the Friends of Sunkhaze Meadows at the Sunkhaze Meadows Unit by allowing access to refuge facilities, maintaining facilities, and staff involvement.

Rationale
Active Friends organizations are important contributors to refuge management across the Refuge System. The importance of the Friends of Sunkhaze Meadows NWR is all the more crucial given the absence of onsite staff for Sunkhaze Meadows NWR and Carlton Pond WPA. It is primarily through the dedication of these volunteers that environmental education and interpretive programming about the refuge and WPA are available to visitors. These volunteers also act as the eyes and ears of the refuge in the absence of permanent staff. Observant volunteers from the Friends of Sunkhaze Meadows identified purple loosestrife in portions of the Sunkhaze Meadows Unit in 2012. They reported this to refuge staff, and provided assistance in implementing control efforts later that year. The Service will continue to partner with the Friends to support their efforts to the extent possible given limited staff time and resources. With the proposed addition of staff, the Service will increase its coordination and support to the Friends organization to support and build the membership that helps us achieve our management goals.

With the proposed addition of staff and establishment of a refuge office facility, we will seek to provide space for the Friends to use as well. This will help improve coordination with Service staff as well as provide a centralized location for the Friends to use for program development and organizational needs.

Strategies
Over the 15-year life of this CCP, pending additional staff :

- Increase staff coordination and support the Friends organization through organizing volunteer activities, developing special projects, obtaining grant funding, and providing information and presentations.

- Support the long-term sustainability of the Friends organization through mentoring and training programs, as well as by providing assistance in obtaining capacity building grants for the group.
- Provide office space for the Friends organization in the new refuge visitor contact station and administrative offices, if feasible.

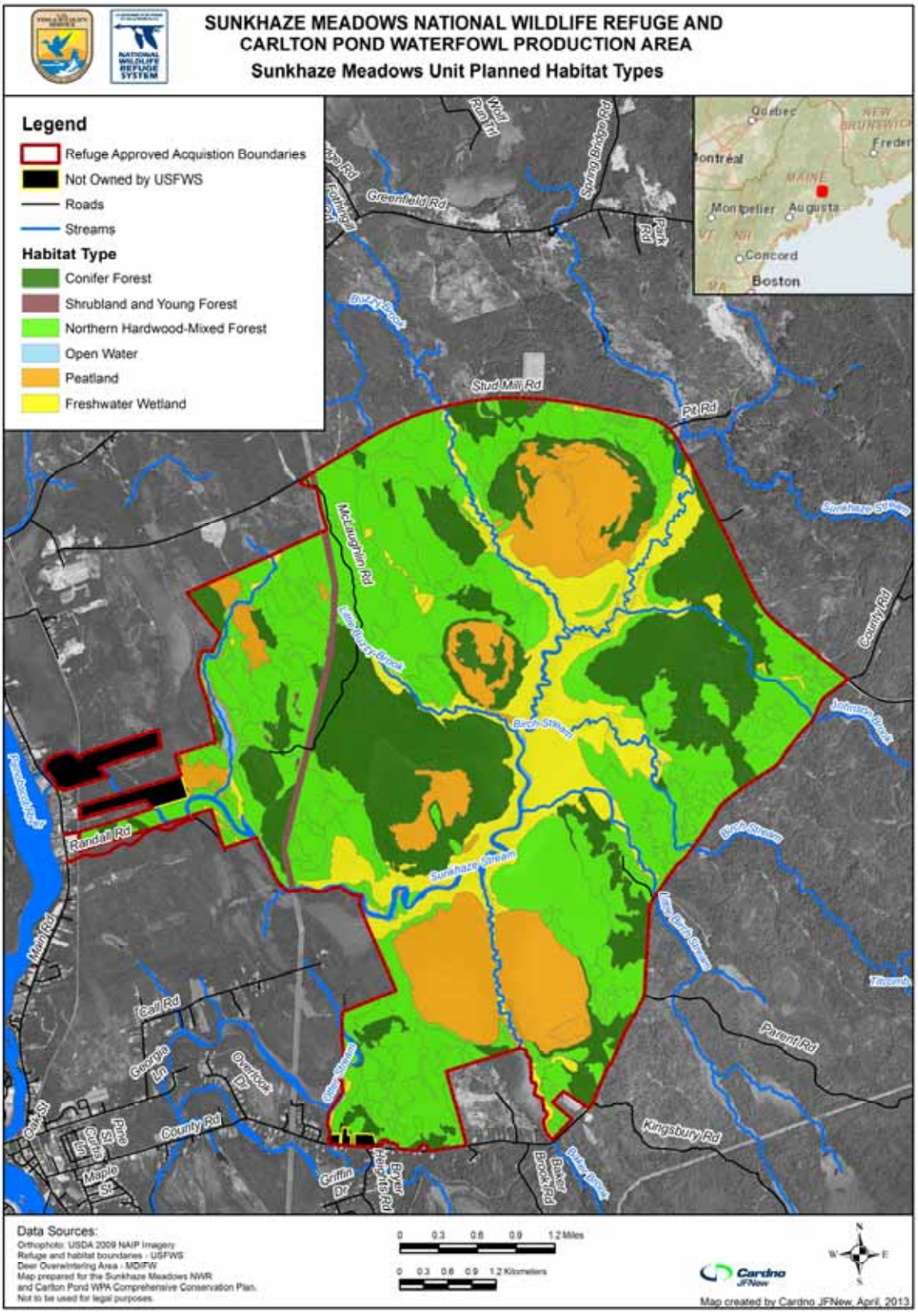
Objective 7.2 Agency, Tribal, Academic, and Other Partnerships
Work with State agencies, Tribal partners, schools, and others to develop interpretive programs and research projects at Sunkhaze Meadows NWR and Carlton Pond WPA.

Rationale
Similar to objective 7.1, the role of partnerships is important to achieving the management objectives outlined for Sunkhaze Meadows NWR and Carlton Pond WPA. The Service currently collaborates with State agencies, Tribal partners, universities, schools, and other organizations as opportunities arise. Under this plan, with the proposed addition of staff, we will increase our collaboration with partners by proactively seeking cooperation in achieving mutual management and public use objectives.

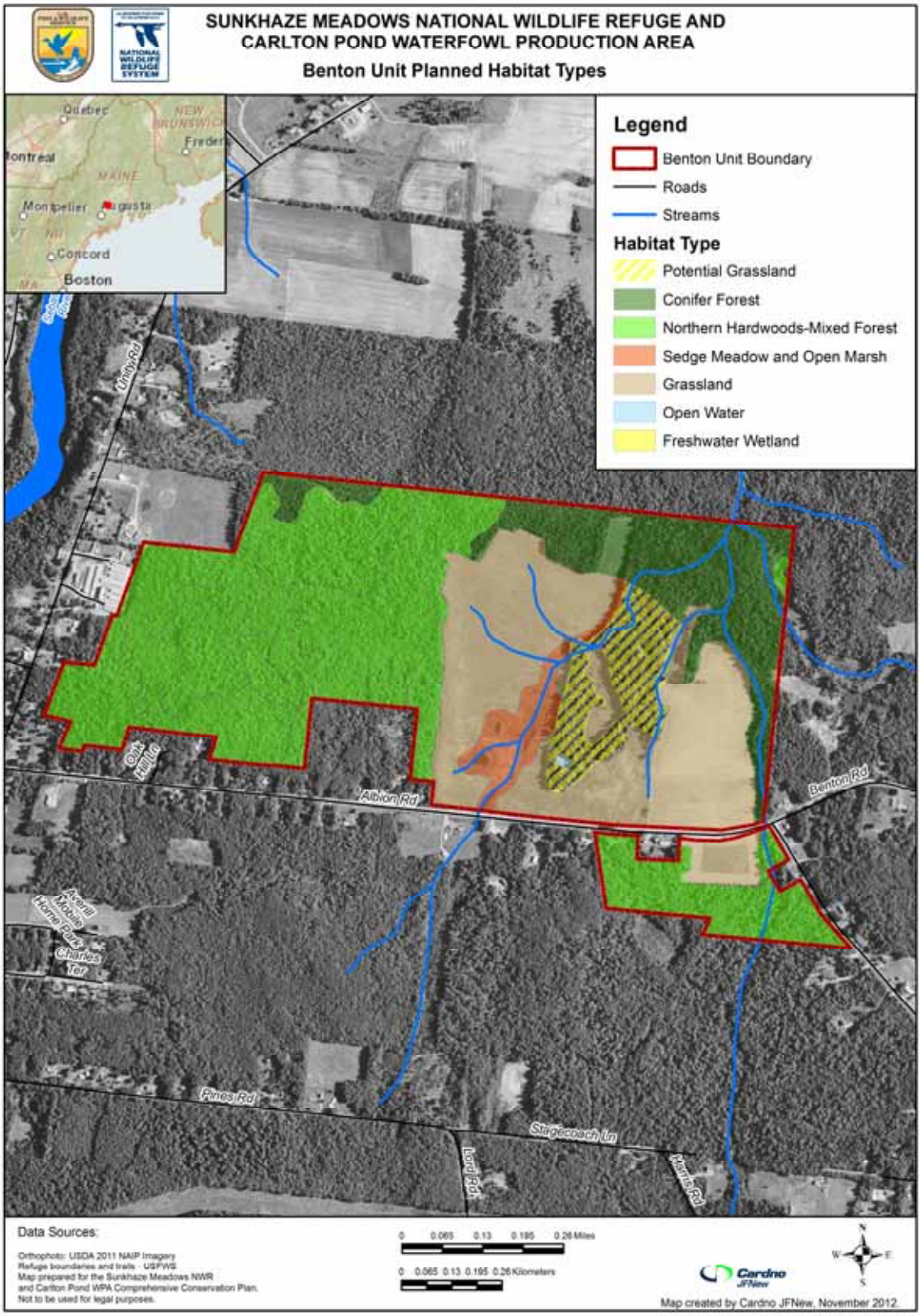
Strategies
Over the 15-year life of this CCP, with additional staff:

- Identify research and monitoring projects and needs at each refuge unit to foster partnerships with universities and other partners.
- Establish an annual coordination meeting among Moosehorn NWR, Sunkhaze Meadows NWR, and members of the Penobscot Indian Nation and other Tribes as warranted to collaborate on natural resource and public use management.
- Work with Tribes to identify and quantify existing ash populations when completing other forest inventory work to help determine if sustainable harvest is feasible for Tribal cultural uses.
- Work with partners to ensure consistent refuge and Refuge System messaging in partner-sponsored environmental education and interpretive programming.
- Work with the Penobscot Indian Nation to explore opportunities for developing materials and programming interpreting cultural resources on the refuge.
- Explore partnerships with Unity College, Sebasticook Land Trust, and other partners for assistance in managing and interpreting Benton, Sandy Stream, and Carlton Pond WPA, and conservation within the watershed.
- Explore partnerships with the town of Milford, Penobscot Indian Nation, and others as part of local and regional tourism efforts to promote the Sunkhaze Meadows Unit and the Refuge System mission.

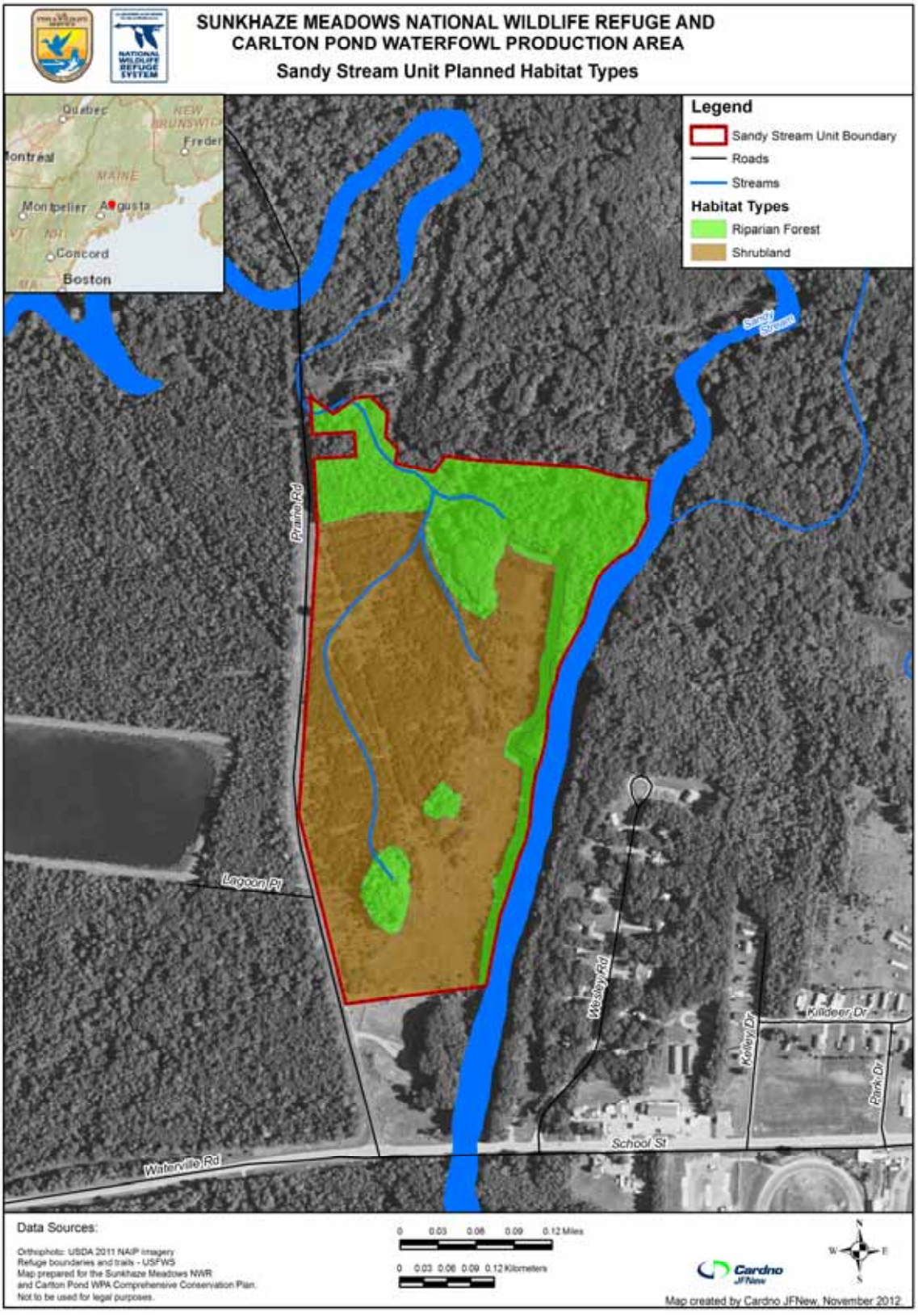
Map 4.1. Projected habitats for the Sunkhaze Meadows Unit of Sunkhaze Meadows National Wildlife Refuge.



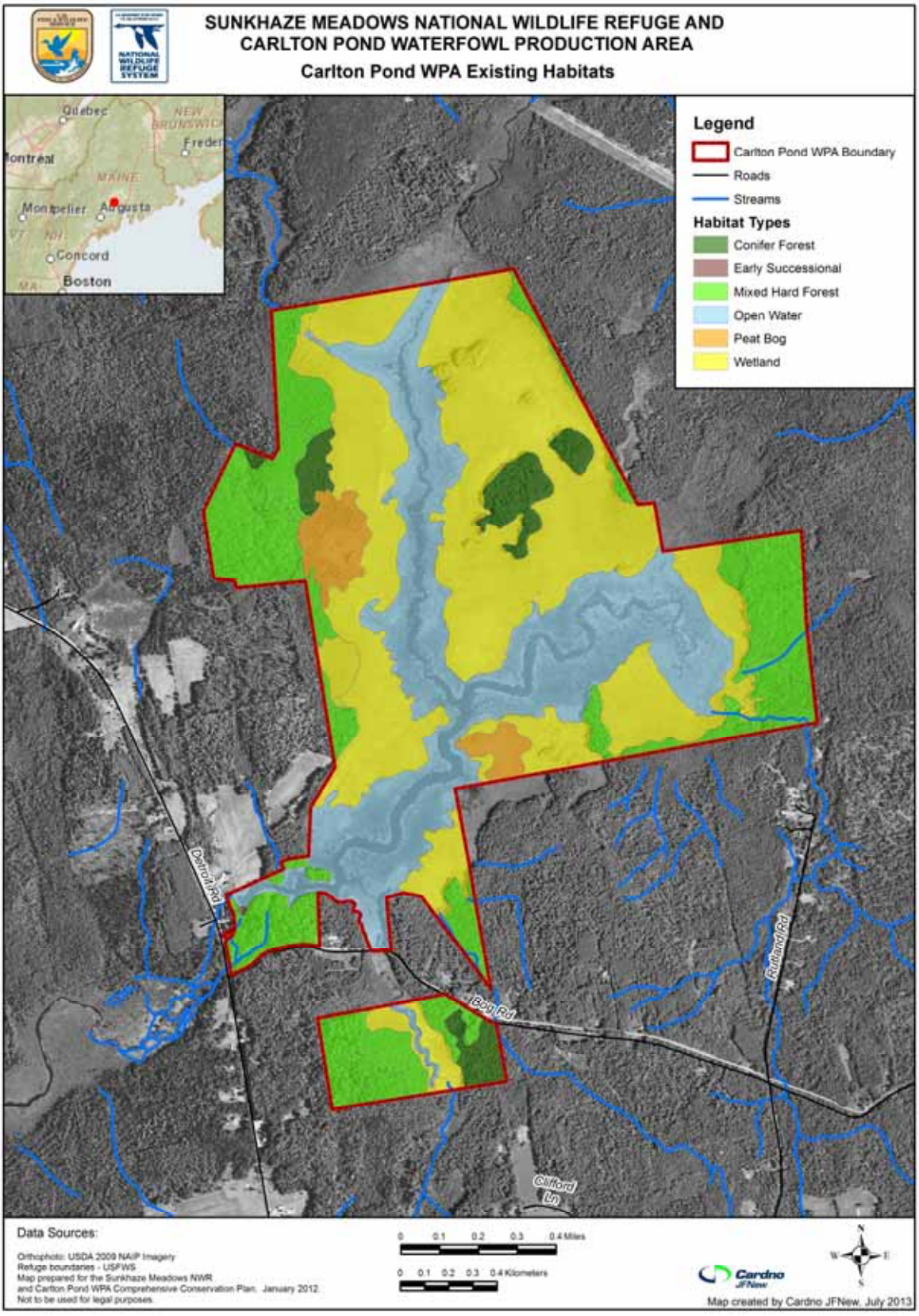
Map 4.2. Projected habitats for the Benton Unit of the Sunkhaze Meadows National Wildlife Refuge.



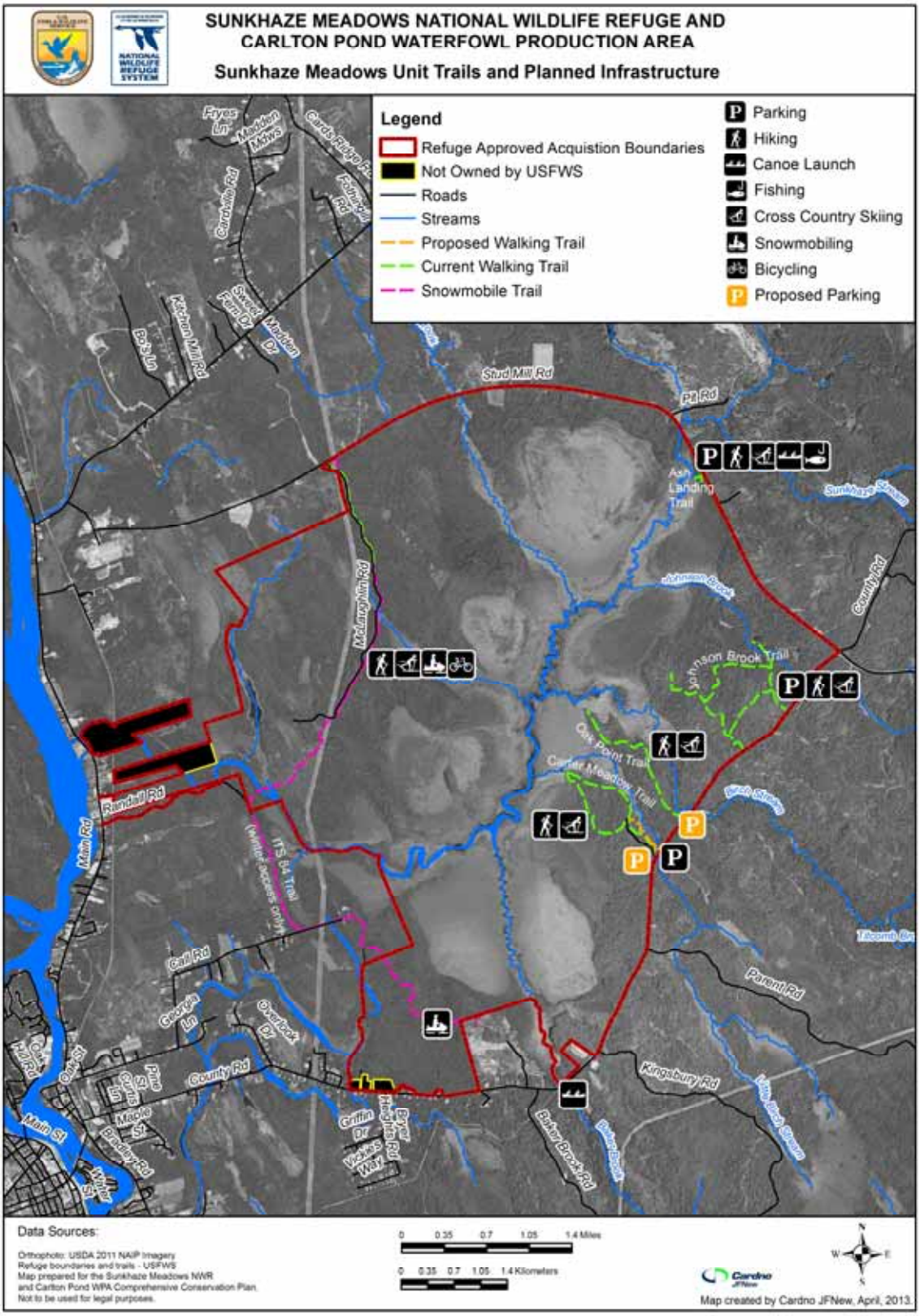
Map 4.3. Projected habitats for the Sandy Stream Unit of the Sunkhaze Meadows National Wildlife Refuge.



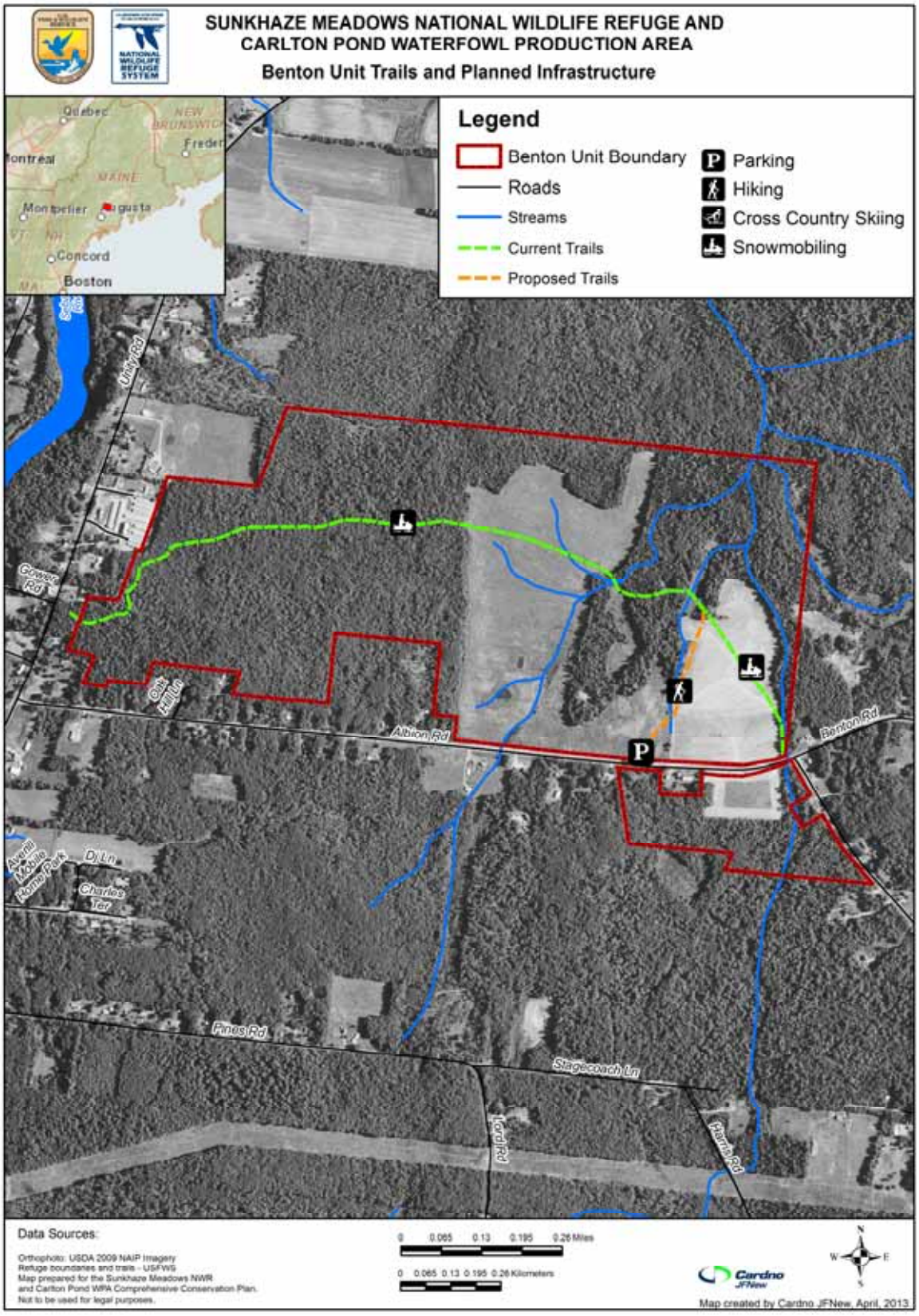
Map 4.4. Habitats for Carlton Pond Waterfowl Production Area (no projected changes).



Map 4.5. Current and planned infrastructure for the Sunkhaze Meadows Unit of the Sunkhaze Meadows National Wildlife Refuge.



Map 4.6. Current and planned infrastructure for the Benton Unit of Sunkhaze Meadows National Wildlife Refuge.



Map 4.7. Planned infrastructure for the Sandy Stream Unit of Sunkhaze Meadows National Wildlife Refuge.