



Assabet River National Wildlife Refuge

Final Comprehensive Conservation Plan

January 2005





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

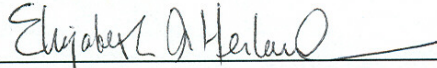
The U.S. Fish and Wildlife Service is the principle federal agency for conserving, protecting, and enhancing fish and wildlife in their habitats for the continuing benefit of the American people. The Service manages the 96-million acre National Wildlife Refuge System comprised of 544 national wildlife refuges and thousands of waterfowl production areas. It also operates 65 national fish hatcheries and 78 ecological services field stations. The agency enforces federal wildlife laws, manages migratory bird populations, restores significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

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

Cover Photo: Assabet River NWR © Marijke Holtrop

Comprehensive Conservation Plan Approval for Assabet River National Wildlife Refuge

Submitted by:

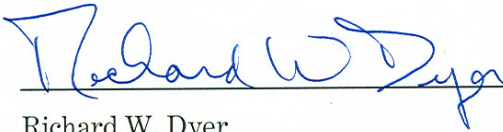


Elizabeth A. Herland
Project Leader,
Eastern Massachusetts National
Wildlife Refuge Complex

12/7/04

Date

Approved by:

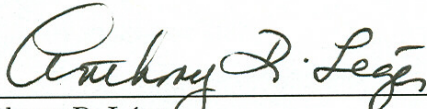


Richard W. Dyer
Refuge Supervisor, North
National Wildlife Refuge System

12/8/04

Date

Approved by:



Anthony D. Léger
Northeast Regional Chief,
National Wildlife Refuge System

12/8/04

Date

Final Approval:



Marvin E. Moriarty
Regional Director, Region 5
U.S. Fish and Wildlife Service

1/5/05

Date

Finding of No Significant Impact
Assabet River, Great Meadows, and Oxbow National Wildlife Refuges
Comprehensive Conservation Plans

The Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) of July 2003 for Assabet River, Great Meadows, and Oxbow National Wildlife Refuges (NWRs) evaluated three management alternatives, carefully considering their impacts on the environment, and their potential contribution to the mission of the National Wildlife Refuge System, and each refuge's purposes and goals. A brief summary of the three alternatives follows.

Alternative A: This was the No Action Alternative in the Draft CCP/EA required by the Council of Environmental Quality's regulations on implementing the National Environmental Policy Act. Under this alternative, there would be no change from our current resource management programs on refuge lands. The refuges continue programs they currently have in place. No new efforts are undertaken, and land acquisition occurs only for those parcels already within the approved refuge boundaries.

Alternative B: This alternative was the Service's Proposed Action in the Draft CCP/EA. Land acquisition occurs only within the refuge boundaries. This alternative emphasizes inventorying and monitoring refuge resources. It includes increased opportunities for habitat management. This alternative also offers more wildlife observation, photography, environmental education, and interpretation opportunities as well as new hunting and fishing opportunities on all three refuges. Under this alternative dog walking is eliminated as an activity on the refuges.

Alternative C: Alternative C is similar to Alternative A, but places emphasis on a less intrusive management style. Inventory and monitoring of refuge resources would occur, but would be limited. The refuges would support similar programs as existing now, but not expand habitat management programs as Alternative B does. This alternative is also distinguished from others with less expansion of the priority public use opportunities and active management programs.

The draft CCP/EA was distributed for a 45 day public review and comment period from July 20th to September 3rd, 2003. After consideration of all public comments, I determined that this Environmental Assessment was sufficient to support my findings.

After careful review of the proposed management actions, and based on the analysis provided in the EA and the comments received during the review period, I have selected Alternative B (the Service's Proposed Action in the Draft CCP/EA) for implementation, with the following modifications:

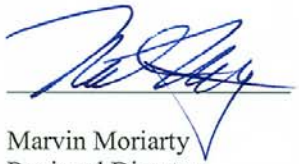
- Alternative B proposed continuing to allow jogging on Great Meadows and Oxbow NWRs. We have completed a Compatibility Determination (CD) which

concludes that jogging is compatible with refuge purposes. However, a study of the impacts of jogging on wildlife will be initiated and results evaluated to evaluate site specific impacts to wildlife. The CD will be reviewed and any appropriate changes will be made using the site specific data in 5 years.

- Alternative B proposed to eliminate all picnicking from the refuges. We have clarified our rules, such that no picnic tables will be provided nor will large gatherings or events involving food be permitted. Eating snacks on refuge benches and trails is allowed.
- Alternative B proposed a variety of hunting opportunities on all 3 refuges. We proposed creating hunting opportunities on Assabet River and Great Meadows NWRs and expanding hunting opportunities on Oxbow NWR. We have modified our hunting proposal:
 - We modified our original hunting proposal based upon additional analysis of state mandated safety zones, our ability to effectively administer the hunt program, and to balance the needs of the different wildlife-dependent recreationists.
 - We clarified that the waterfowl hunting areas along the Concord and Sudbury Rivers at Great Meadows and the Nashua River at Oxbow areas include the main stems of the rivers as well as adjacent wetlands and pools.
 - We adjusted the proposed waterfowl hunting areas to remove areas near concentrations of houses, playing fields, and high numbers of additional users.
 - The total acreage that we are proposing for waterfowl hunting is 1,192 acres.
 - We revised the deer hunting program to archery hunting only in areas of specific safety concern.
- We have revised the proposed fee program to be consistent with other Region 5 refuges and to encourage purchase of the “local” annual pass. Fees would be required at Assabet River, Oxbow (south of Route 2), and the Concord impoundments of Great Meadows. Visitors would be able to use a duck stamp in lieu of the refuge access fee. All access fees are per car or per group for pedestrians.
- We have not modified our proposal to eliminate dog-walking on Great Meadows and Oxbow NWRs. Assabet River NWR is not yet open to the public. When it opens, dog-walking will not be allowed.

I have selected Alternative B, with the modifications noted above, because it helps fulfill the mission of the National Wildlife Refuge System; best achieves each refuge's purposes, vision, and goals; maintains and, where appropriate, restores the ecological integrity of both refuges; addresses the significant issues identified during the planning process; and is consistent with principles of sound fish and wildlife management.

I find that the implementation of modified Alternative B will not have a significant impact on the quality of the human environment in accordance with Section 102 (2) (c) of the National Environmental Policy Act. It adheres to all legal mandates and Service policies. As such, I have concluded that an Environmental Impact Statement is not required, and this Finding of No Significant Impact is appropriate and warranted.



Marvin Moriarty
Regional Director
U.S. Fish and Wildlife Service
Hadley, Massachusetts

1-5-05

Date

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Chapter 1: Introduction and Background

This Final Comprehensive Conservation Plan (CCP) has been prepared for the Assabet River National Wildlife Refuge (NWR), which is one of eight refuges of the Eastern Massachusetts NWR Complex (Complex) (see Map 1-1). Concurrently, we are releasing the Final CCPs for Great Meadows (Concord and Sudbury divisions), and Oxbow NWRs.

We will prepare a separate CCP and Environmental Impact Statement (CCP/EIS) for Monomoy and Nomans Land Island NWRs beginning later in 2004. We propose to begin the CCP process for Massasoit in 2005 and Mashpee and Nantucket NWRs in 2006.

This CCP is the culmination of a planning process that formally began in January 1999. Numerous meetings with the public, the State, and conservation partners were held to identify and evaluate management alternatives. A draft CCP and Environmental Assessment (CCP/EA) was distributed in July 2003 for public review and comment. This CCP presents the management goals, objectives, and strategies that we believe will best achieve our vision for the refuge, contribute to the National Wildlife Refuge System (Refuge System) Mission, achieve refuge purposes and legal mandates, support regional conservation priorities, and serve the American public.

Refuge Overview



Puffer Pond at Assabet NWR: Staff photo

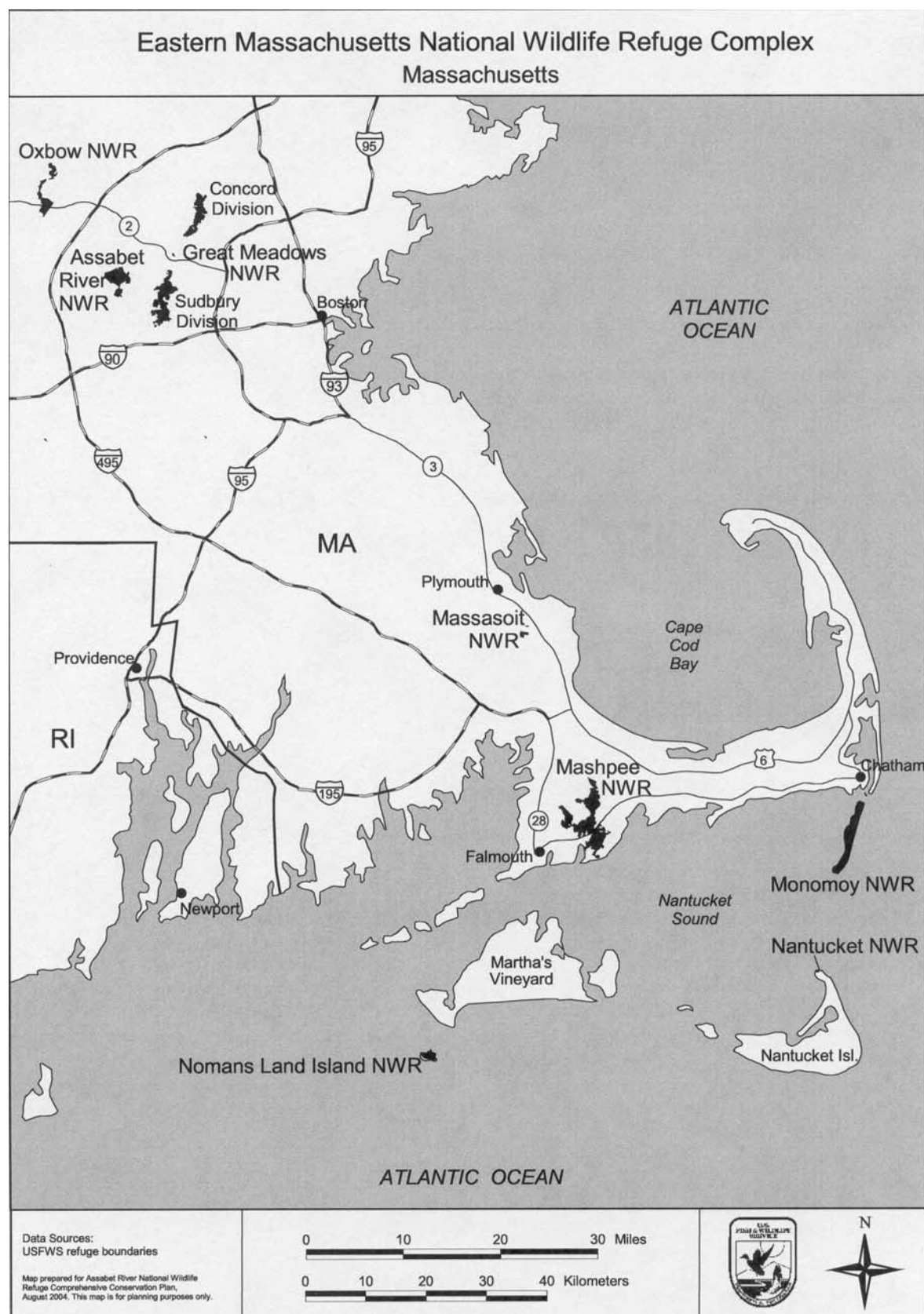
Formerly known as the Sudbury Training Annex, Assabet River NWR is the most recent addition to the Complex, created in the fall of 2000, when Fort Devens Army base transferred 2,230 acres to the U.S. Fish and Wildlife Service (Service). This transfer was made in accordance with the Defense Base Closure and Realignment Act of 1990, with the purpose of having “particular value in carrying out the national migratory bird management program.” All acres within the approved Refuge boundary are acquired. The large wetland complex and the contiguous forested areas are important feeding and breeding areas for migratory birds. Under Army administration, the area was not open to general public use. Because of this, public access remains a high priority for local community members.

Purpose and Need for a CCP

The purpose of a CCP is to provide managers and other interested partners guidance and direction for each refuge over the next 15 years, thus achieving refuge purposes and contributing to the mission of the Refuge System. The plan identifies what role the refuge plays, consistent with

Chapter 1: Introduction and Background

Map 1-1: Eastern Massachusetts National Wildlife Refuge Complex

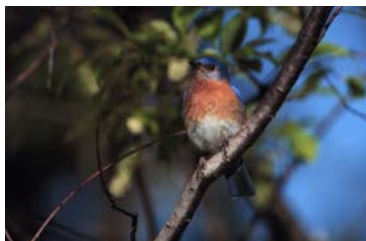


sound principles of fish and wildlife conservation, in the protection, enhancement and restoration of trust resources.

This plan is also needed to:

- provide a clear statement of desired future conditions for habitat, wildlife, visitors and facilities;
- provide refuge neighbors, visitors, and partners with a clear understanding of the reasons for management actions;
- ensure management reflects the policies and goals of the Refuge System and legal mandates;
- ensure the compatibility of current and future uses;
- review current boundaries of the refuges, and evaluate the need to revise boundaries to better achieve refuge purposes;
- provide long-term continuity and direction for refuge and Complex management; and,
- provide a basis for staffing and operations, maintenance, and the development of budget requests.

Currently, there is no management plan in place for Assabet River NWR that establishes priorities or provides consistent direction for managing fish, wildlife, habitats, and public uses on the refuge. This plan will help to resolve issues related to control of nuisance and invasive species, public uses in conflict with wildlife needs, lack of opportunities for wildlife dependent recreation, and the needs of our federal trust wildlife species.



Eastern Bluebird: Photo by Bruce Flaig

The National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act; Public Law 105-57) requires that all NWRs have a CCP in place by 2012 to help fulfill the new mission of the Refuge System. The Refuge Improvement Act states that wildlife conservation is the priority of the Refuge System's lands, and that the biological integrity, diversity, and environmental health of refuge lands shall be maintained. Additionally, the Refuge Improvement Act identifies six wildlife-dependent recreational uses that will receive priority consideration over other recreational uses of the refuge: wildlife observation and photography, hunting, fishing, environmental education, and interpretation.

U.S. Fish and Wildlife Service Mission

The Refuge System is managed by the Service, under the Department of the Interior. The mission of the Service is:

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

Chapter 1: Introduction and Background

The Service manages NWRs, waterfowl protection areas, and National Fish Hatcheries. By law, Congress entrusts the following federal trust resources to the Service for conservation and protection: migratory birds and fish, endangered species, interjurisdictional fish, and certain marine mammals. The Service also enforces federal wildlife laws and international treaties on importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

Refuge System Mission

The Refuge System is the world's largest collection of lands and waters set aside specifically for the conservation of wildlife and ecosystem protection. The Refuge System consists of 544 national wildlife refuges that provide

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

important habitat for native plants and many species of mammals, birds, fish, and threatened and endangered species, encompassing over 95 million acres. Refuges offer a wide variety of recreational opportunities, and many have visitor centers, wildlife trails, and environmental education programs. Nationwide, over 34 million visitors annually hunt, fish, observe and photograph wildlife, or participate in interpretive activities on national wildlife refuges.

In 1997, the Refuge Improvement Act established a unifying mission for the refuge system, a new process for determining compatible public uses, and the requirement to prepare a CCP for each refuge. The new law states that the refuge system must focus on wildlife conservation. It further states that the National mission, coupled with the purpose(s) for which each refuge was established, will provide the principal management direction for each refuge.

Laws

While the Refuge System Mission and each refuge's purpose provide the foundation for management, national wildlife refuges are also governed by other federal laws, executive orders, treaties, interstate compacts, and regulations pertaining to the conservation and protection of natural and cultural resources (see Appendix A for a more complete list of guiding laws).



Winter at Assabet River NWR: Staff

A primary law affecting refuge management is the National Wildlife Refuge System Administration Act of 1966 (Administration Act) which authorizes the Secretary of the Interior to permit any use of a refuge “...whenever it is determined that such uses are compatible with the major purposes for which such areas were established.” The Administration Act was amended by the Refuge Improvement Act. It is also the key legislation on managing public uses, and protecting the Refuge System from incompatible or harmful human

activities to ensure that Americans can enjoy Refuge System lands and waters.

Additionally, it is Service policy to address how each refuge, with an approved CCP, can help achieve the goals of the national Wilderness Preservation System. Thus, concurrent with the CCP process, we have incorporated a summary of a wilderness assessment into this document (see Wilderness Assessment section in Chapter 2).



Wood Duck: Photo by Bruce Flaig

The Refuge Recreation Act of 1962 requires that any recreational use of refuge lands be compatible with the primary purposes for which a refuge was established and not inconsistent with other previously authorized operations.

The National Historic Preservation Act of 1966 provides for the management of historic and archaeological resources that occur on any refuge. Other legislation, such as the Endangered Species Act, the North American Wetlands Conservation Act, the Wilderness Act of 1964 and particularly the National Environmental Policy Act (NEPA) all provide guidance for the conservation of fish and wildlife and their habitats.

National and Regional Conservation Plans and Initiatives Guiding this CCP

Gulf of Maine - Ecosystem Priorities

The Service has 52 ecosystem teams across the country. The Assabet River NWR is located in the Gulf of Maine ecosystem (see Map 1-2). The ecosystem priorities that are applicable to the refuge are:

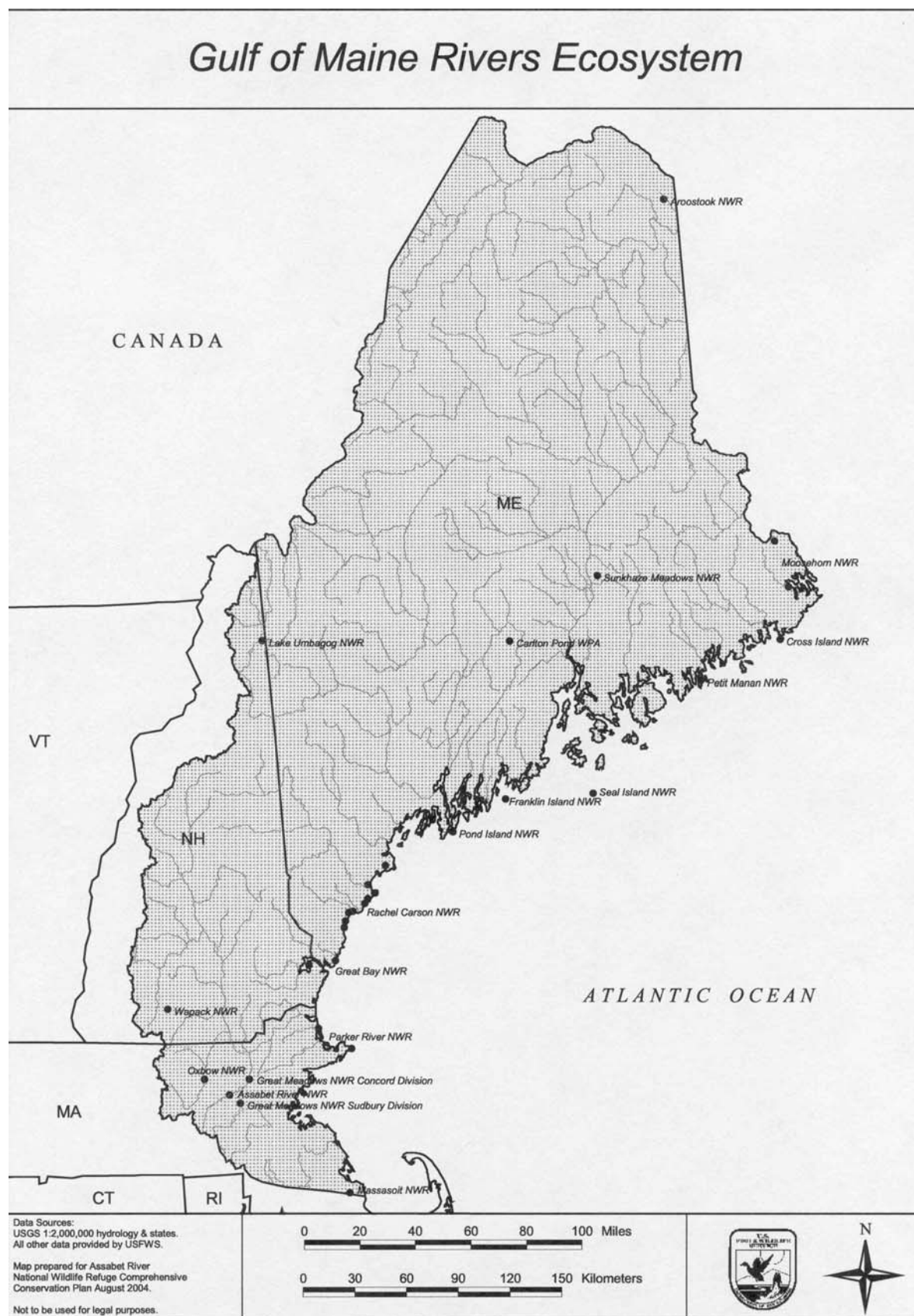
- Protect, enhance, and restore populations of migratory bird species of special concern and their habitats.
- Manage service lands to protect, enhance and restore habitats to maintain biodiversity.

North American Waterfowl Management Plan

The North American Waterfowl Management Plan (NAWMP) documents the strategy between the United States, Canada and Mexico to restore waterfowl populations through habitat protection, restoration, and enhancement. Implementation of the plan is at the regional level. Ten regional habitat “joint ventures” are partnerships involving federal, state, provincial, tribal nations, local businesses, conservation organizations, and individual citizens. Units of the Complex are contained within the Atlantic Coast Joint Venture.

The Atlantic Coast Joint Venture Program identifies seven focus areas in Massachusetts. One of these focus areas includes the inland rivers of the Blackstone, Nashua, and the Sudbury-Assabet-Concord Rivers. The

Map 1-2: Gulf of Maine Ecosystem



Assabet River NWR is part of this focus area, with nationally significant wetlands that support migrating waterfowl. The Program is developing a focus area report that identifies important waterfowl resources, threats, and conservation recommendations.

A draft updated NAWMP document is at: <http://birdhabitat.fws.gov/NAWMP/2003nawmpdraft.htm>. In the Implementation Framework section of this document species priorities are listed for each region. Table 1-1 includes species identified in the NAWMP that occur at Assabet River NWR.

Table 1-1: NAWMP Species Occurring at Assabet River NWR

Species	Continental Priority	Breeding Importance	Breeding Need	Nonbreeding Importance	Nonbreeding Need
Mallard	High	Mod. Low	Moderate	Mod. High	High
Wood Duck	Moderate	Mod. Low	Mod. Low	Mod. Low	Mod. Low

Partners in Flight Bird Conservation Plans

Partners in Flight (PIF) was initiated in 1990 as a voluntary, international coalition of agencies, organizations, institutions, industries, and other citizens dedicated to landbird conservation. The foundation for PIF's long-term strategy for bird conservation is a series of scientifically based bird conservation plans. The goal of each PIF bird conservation plan is to ensure long-term maintenance of healthy populations of native landbirds. These plans use information on bird population trends, species' distributions, and the vulnerability of the species and their habitats to threats, to rank the conservation priority of birds occurring within a particular physiographic area.

The PIF approach differs from many existing federal and state-level listing processes in that it (1) is voluntary and non-regulatory, and (2) focuses proactively on relatively common species in areas where conservation actions can be most effective, rather than ocal emphasis on rare and peripheral populations. A Landbird Conservation Plan for the southern New England physiographic area was completed in 2000, which includes all of eastern Massachusetts. This plan identifies 72 priority breeding bird species, 8 priority winter species, and 7 major habitat types as priorities for conservation in this area. Of the priority species for this physiographic area, at least 29 of the priority breeding species have been recorded as occurring on the refuge and 1 of the 8 wintering species have been recorded as wintering on the refuge. In the plan, focal species are selected for each habitat type and used in developing population and habitat objectives.



Great Blue Heron with fish: Photo by Bruce Flaig

Implementation strategies and management guidelines for achieving these objectives are also included for each habitat type. Priority habitats for southern New England include maritime marshes, beaches/dunes, mature forest, early successional

Chapter 1: Introduction and Background

scrub/pine barrens, freshwater wetlands, and grasslands. The list of priority species, objectives, and conservation actions recommended in the southern New England Bird Conservation Plan will help direct landbird management on the refuge.

The North Atlantic Regional Shorebird Plan (NARSP) identifies 38 priority shorebird species based upon a national scoring system that assesses population trends, relative abundance, threats and distribution patterns. The Service has recorded 3 of these species as occurring on the refuge. The NARSP builds upon the information in the U.S. Shorebird Conservation Plan (USSCP). The USSCP is a partnership involving organizations throughout the United States committed to the conservation of shorebirds. At a regional scale, the goal of the USSCP is to ensure that adequate quantity and quality of habitat is identified and maintained to support the different shorebirds that breed in, winter in, and migrate through each region. In August 2004, the USSCP was revised based upon the latest population and habitat information available. The revised list included 7 highly imperiled shorebird taxa and 23 taxa of high concern. The refuge supports 1 species of shorebird of high concern.

Additionally, the Service has attempted to assess and integrate all the information above and compile a list of Birds of Conservation Concern for Bird Conservation Region 30, which contains the refuge. There are a total of 32 species listed, 7 of these have been recorded as occurring on the refuge.

Table 1-2: Bird Species of Concern Occurring on Assabet NWR

Species	PIF		BCR 30	NARSP	USSCP
	Priority Breeding	Wintering	Conservation Concerns	Priority Shorebird	High Concern
Blue-winged Warbler	●		●		
Wood Thrush	●		●		
Prairie Warbler	●		●		
Baltimore Oriole	●		●		
Scarlet Tanager	●				
American Woodcock	●			●	●
Golden-winged Warbler	●		●		
Rose-breasted Grosbeak	●				
Chimney Swift	●				
Eastern Wood-pewee	●				
Black-and-white Warbler	●				
Hairy Woodpecker	●				
Eastern Towhee	●				
Purple Finch	●				
Canada Warbler	●		●		
Blackburnian Warbler	●				

Species	PIF		BCR 30	NARSP	USSCP
	Priority Breeding	Wintering	Conservation Concerns	Priority Shorebird	High Concern
Bobolink	●				
Whip-poor-will	●		●		
Northern Parula	●				
Yellow-breasted Chat	●				
Red-shouldered Hawk	●				
Northern Harrier	●				
Vesper Sparrow	●				
Sharp-shinned Hawk	●				
Barred Owl	●				
Cooper's Hawk	●				
Osprey	●				
Savannah Sparrow	●	●			
Great Blue Heron	●				
Common Snipe				●	
Killdeer				●	

Regional Wetlands Concept Plan- Emergency Wetlands Resources Act

In 1986, Congress enacted the Emergency Wetlands Resources Act to promote the conservation of our nation's wetlands. This act requires identification of the location and types of wetlands, and which lands should be targeted for state and federal land acquisition efforts. In 1990, the Northeast Regional Office of the Service completed a Regional Wetlands Concept Plan to identify wetlands in the region. The Regional Plan identifies a total of 850 wetland sites and complexes in the region. 1,800 acres of wetlands associated with the Sudbury, Assabet and Concord Rivers were identified as being regionally valuable for wildlife, fisheries, and recreation.

Our Irreplaceable Heritage - Protecting Biodiversity in Massachusetts, 1998



Volunteer cleanup at Assabet NWR: Staff Photo

This report recommends that the state develop a biodiversity protection strategy that outlines how all native biodiversity will be conserved. It also identifies and describes eight types of natural communities that may require immediate conservation attention because of their potential vulnerability and large number of rare species they contain. Seven of the eight communities listed in the report occur within the Complex boundary.

Existing Partnerships

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

Chapter 1: Introduction and Background

the following partners:

- Ecological Services, New England Field Office (Service)
- Friends of the Assabet River NWR
- Massachusetts Department of Conservation and Recreation, Division of State Parks and Recreation
- Massachusetts Department of Fish and Game (DFG), Division of Fisheries and Wildlife (MassWildlife)
- New England Wildflower Society
- Organization for the Assabet River (OAR)
- Stow Conservation Trust
- SuAsCo Watershed Community Council
- Sudbury Foundation
- Sudbury Valley Trustees (SVT)

The Friends of the Assabet River NWR provide considerable time and effort toward accomplishment of refuge and Service goals. They participate in environmental education and outreach, land protection, biological surveys, habitat management, and fund raising projects. During fiscal year 2003, the Friends of Assabet River NWR contributed a total of 3,206 volunteer hours to the refuge. Without their assistance, much of the work necessary to open the refuge would not be done yet.

Chapter 2: The Comprehensive Conservation Planning Process

Given the mandate in the Refuge Improvement Act to develop a CCP for each national wildlife refuge, the Complex began the planning process in 1998. We started by forming a core planning team of refuge staff and regional office planners. We placed a Notice of Intent (NOI) to prepare an EIS in the January 1999 Federal Register to officially kick-off our planning effort for all eight of the Complex refuges.

First, we collected information on our biological and habitat resources. While in the process of collecting information, we initiated the public scoping and involvement part of the process. We held meetings with each town's board of selectmen and state and federal agencies. Many of these partners provided information on natural resources and public uses on refuges in the Complex. In February of 1999 we held open houses in each town to provide an opportunity for public comment on different issues

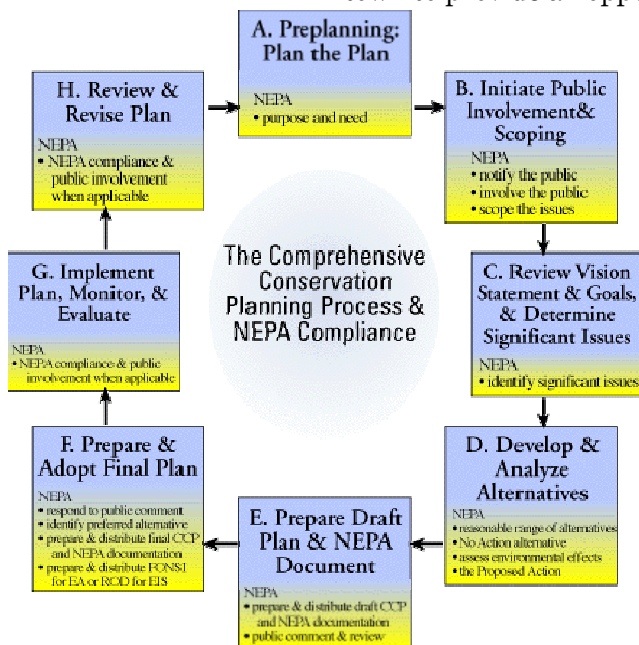
including current and future management strategies, land protection and public uses. We were pleased with the participation at many of our meetings, which ranged from 30 people to over 100.

We recognized that attending our open houses will be difficult for many and designed an issues workbook to encourage additional comment. Over 8,000 people representing a variety of interests received workbooks. Workbooks were also available at open houses and at the refuge headquarters. We received over 660 responses.

Using the information collected from our partners and through public comment we identified significant issues to be addressed in the plan. In August of 1999, we distributed a planning update to everyone on our mailing list describing the key

issues identified for each refuge. Once key issues were determined and refined, we developed alternative strategies to resolve each one. We derived the strategies from public comment, follow-up contacts with partners and refuge staff. After a reasonable range of alternatives was identified, we evaluated the environmental consequences of each alternative.

In February of 2001 we recognized that producing a CCP/EIS for the entire Complex would be far too cumbersome to be efficient. At that time, we published an NOI to prepare a CCP/EA for five of the refuges in the Complex, Assabet River, Great Meadows, Oxbow, Mashpee and Massasoit



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NWRs. Additional issues and a need for more information prompted us to later split Mashpee and Massasoit NWRs from the draft as well.

The Service solicited comments on the draft CCP/EA for Great Meadows, Assabet River, and Oxbow NWRs from July 20 to September 3, 2003. We contracted with the U.S. Forest Service's Content Analysis Team (CAT) to compile the nearly 2,000 comments that we received. The CAT developed a summary report of comments (Appendix B) as well as a database of individual comments. We utilized the original comments received, CAT report and comment database to develop a list of comments that required responses. Editorial suggestions and notes of concurrence with or opposition to certain proposals were noted and included in the decision making process, but do not receive formal responses. We have included our responses to requests for additional information or clarification, provisions of additional information, and specific concerns as Appendix C. We have made changes to the CCP where appropriate.



Blue Iris: Photo by Marijke Holtrop

The final product of the process is three stand-alone CCPs, one for each refuge. Implementation of the CCPs can occur once the Finding of (No) Significant Impact (FONSI) is signed.

Each year, we will evaluate our accomplishments under the CCPs. Monitoring or new information may indicate the need to change our strategies. The collection of additional data at Assabet River NWR will likely require modification and specification of the wildlife and habitat management strategies. We will modify the CCP documents and associated management activities as needed, following the procedures outlined in Service policy and NEPA requirements. The CCPs will be fully revised every 15 years or sooner if necessary.

Wilderness Assessment

The planning team conducted a Wilderness Assessment, as required by Refuge Planning Policy, to determine if any lands and waters in fee title ownership were suitable to be proposed for designation as a Wilderness Area. During the inventory stage, we determined that the Assabet River NWR does not fulfill the eligibility requirements for a Wilderness Study Area as defined by the Wilderness Act. The refuge and its surrounding area have been altered in some way by man, with the imprint of man's work generally noticeable. The refuge does not have 5,000 contiguous acres, and is not of sufficient size as to make practicable its preservation and use in an unimpaired condition. Furthermore, permanent roads are contained within the refuge. Therefore, suitability of the refuge for Wilderness Designation is not analyzed further in this document.

Issues, Concerns, and Opportunities

Issues, concerns, and opportunities were brought to the attention of the refuge planning team through early planning discussions with local governments, state, and federal representatives, and through the public scoping process. We received comments from the public both verbally at open houses and in writing, through Issues Workbooks and individual letters. In addition issues were identified by the Service and from comments received on the Draft CCP/EA. Many issues that are very important to the public often fall outside the scope of the decision to be made within this planning process. In some instances, the Service cannot resolve issues some people have communicated to us. We have considered all issues throughout our planning process, and have developed plans that attempt to address the important issues where possible.

Habitat and Wildlife Management

Many people were interested in our management programs. The refuge has begun additional surveys and inventories to collect baseline information. Our efforts at the refuge will help us develop a Habitat Management Plan (HMP) which will provide a detailed description of our goals and objectives for habitat management on the refuge.

Individuals and groups expressed a great deal of interest in how we manage migratory birds and upland habitats on the refuge. The public is concerned about what will happen with fencing that currently surrounds the refuge and how it impacts wildlife movement. The fencing was not removed when the property was transferred to the Service.

Control of Invasive, Injurious, and Overabundant Plant and Animal Species

Invasive species, including Japanese knotweed (*Polygonum cuspidatum*), black locust (*Robinia pseudo-acacia*), and spotted knapweed (*Centaurea maculosa*) and are a concern at the refuge. These species limit the productivity of wildlife habitat. Management to control invasive species was mentioned as a watershed-wide priority to some conservation associations. We continue our efforts to control known invasives on the refuge.

Hunting

Requests were made at public meetings and through written comments both to allow and not to allow deer hunting on the refuge. We received a petition requesting consideration of bow hunting at Assabet River NWR. There were suggestions to provide lawful hunting opportunities on the refuge to control deer populations and deter poaching. Cooperation with

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local towns and hunting groups was a suggestion. Others opposed hunting of any kind on the refuge.



Trailmarker: Photo by Karla Thompson

Management of Public Use and Access

The Complex Headquarters and visitor contact station is located in Sudbury, MA. The need for environmental educational programs in local schools as well as additional interpretive opportunities where the public can learn about the refuge was also raised.

We do not have a consistent process for collecting and documenting visitation at the refuge. The refuge will be opened in phases beginning in the fall of 2004. Trespass has been occurring at the refuge.

Resource Protection and Visitor Safety

Many people voiced concern for additional protection for cultural and historical resources. Other concerns included the need to control poaching, trespassing and other refuge regulations violations. We need to address use of existing structures, if possible, and determine where a number of buildings need to be removed. To date, 18 buildings have been removed from the refuge. There is still a large amount of material to be removed from the refuge, including razor wire, and holes to be filled.

Infrastructure and Operations and Maintenance

We heard from some people that the Complex doesn't have the resources and staff needed to support programs and maintenance of the refuge. A new biological position was added to the Complex in 2004 and additional positions have been identified to be filled as funding allows.

Issues and Concerns Considered Outside the Scope of This Plan

Some external threats to the refuges such as water quality and contamination were identified by the public.

Poor water quality in the Concord, Sudbury and Assabet Rivers prompted concern among citizens. The Concord and Sudbury Rivers both are reported to have high levels of contamination, and the Assabet River suffers from excessive nutrient loading. In these watersheds, the Service is currently involved in watershed-wide efforts and partnerships to review and reduce impacts to the communities and to refuge resources. Service contaminants specialists represent wildlife interests in contaminants cleanup efforts that directly affect refuge lands, such as lands transferred to the Service or rivers that flow into the refuges, and refuge staff

participates in advisory committees that comment on permits and plans that affect water quality.

Some Towns wish to develop water supply wells on refuge property.

Some towns requested access for the purpose of drilling water supply wells. Wells have been shown to draw down the surrounding water table. A 1994 study by the Massachusetts Office of Water Resources identified that “wells can have a significant impact on nearby (surface) water bodies and may affect specific biological resources.” Concerns were raised by the public during CCP scoping that disturbance to wildlife, and other impacts due to the wells, or access to the wells, could occur.



Hazards at Assabet NWR: Staff photo

Chemical control of mosquitoes on National Wildlife Refuges nationwide is being evaluated by the Service.

The Service has developed a draft national mosquito policy for refuge managers to apply when determining how and when mosquito populations may be managed on lands administered within the Refuge System. The draft science-based policy indicates that mosquito populations will essentially be allowed to function unimpeded as part of the wetland ecosystem. Mosquito populations may be reduced in certain circumstances. We work with state and local public health departments and mosquito abatement agencies to monitor and if necessary contain mosquito-borne diseases. Mosquito spraying to control larval mosquitoes on Assabet River NWR has not occurred. The decision to restrict mosquito control on the refuge is consistent with the current draft policy. Any future Service policy will be applied to Assabet River NWR.

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Chapter 3: Refuge and Resource Descriptions

Geographic/Ecosystem Setting

Assabet River NWR, formerly referred to as the U.S. Army's Fort Devens Sudbury Training Annex, is a 2,230-acre parcel of land located approximately 20 miles west of Boston, and 4 miles west of the Complex headquarters. It is located in portions of the towns of Hudson, Maynard, Stow and Sudbury and covers approximately 3.5 square miles. The Assabet River NWR consists of two separate pieces of land. The larger northern section is just north of Hudson Road. The southern section is located to the south of Hudson Road.



Assabet River NWR: Staff photo

The land, centered in a developed area, has been protected by the Army for the last 58 years. That protection has allowed the maturation of extensive, structurally diverse wetland habitats, whose ecological integrity is enhanced by its surrounding upland forests and grasslands. The refuge provides significant habitat for migrating and resident wildlife. Along with providing habitat to numerous species considered threatened or endangered by the state of Massachusetts, the refuge also includes several rare wetland types and a number of vernal pools, which are considered to be habitats of special concern.

More specifically, approximately 70 percent of the refuge land is forested with white pine (*Pinus strobus*) and mixed hardwoods dominating. Approximately 22 percent is considered wetland habitat, including a remnant Atlantic white cedar swamp, 6 dwarf-shrub bogs, 2 minerotrophic peatland bogs, a collection of vernal pools and historical cranberry bogs, and grass and shrubland habitats in the remaining areas.

Socio-economic Setting

The Refuge Revenue Sharing Act of June 15, 1935, as amended, provides annual payments to taxing authorities, based on acreage and value of refuge lands located within their jurisdiction. Money for these payments comes from the sale of oil and gas leases, timber sales, grazing fees, the sale of other Refuge System resources, and from Congressional appropriations. The Congressional appropriations are intended to make up the difference between the net receipts from the Refuge Revenue Sharing Fund and the total amount due to local taxing authorities. The actual Refuge Revenue Sharing Payment does vary from year to year, because Congress may or may not appropriate sufficient funds to make full payment.

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The Refuge Revenue Sharing Payments are based on one of three different formulas, whichever results in the highest payment to the local taxing authority. In Massachusetts, the payments are based on three-quarters of one percent of the appraised market value. The purchase price of a property is considered its market value until the property is reappraised. The Service reappraises the value of refuge lands every five years, and the appraisals are based on the land's "highest and best use". On wetlands and formerly farmland-assessed properties, the full entitlement Refuge Revenue Sharing Payments sometimes exceed the real estate tax. In other cases, Refuge Revenue Sharing payments may be less than the local real estate tax.

Table 3-1: Revenue Sharing Payments to Towns within Assabet River NWR

Year	Hudson	Maynard	Stow	Sudbury*
2003	\$775	\$13,823	\$19,112	\$35,474
2002	\$806	\$14,382	\$19,885	\$36,909
2001	\$863	\$15,395	\$21,286	\$39,510
2000	\$846	\$15,083	\$20,854	\$33,393

*Refuge revenue sharing payments for Sudbury include payments for lands in Great Meadows NWR.

The fact that refuges put little demand on the infrastructure of a municipality, must be considered in assessing the financial impact on the municipality. For example, there is no extra demand placed on the school system or utilities; and little demand on roads, police and fire protection, etc. However, visitation to the refuge often benefits local businesses. The refuge controls uses only on the properties it owns.

Refuge Resources

Climate

Assabet River NWR experiences moderately cold, moist winters and warm, damp summers with an annual mean precipitation of 44 inches per year. Precipitation is fairly well distributed throughout the year. The driest months are July and October, with mean precipitation of 3.3 inches, and the wettest months are March and November with mean precipitation of 4.7 inches. Winter precipitation is usually in the form of snow and ice storms. Due to its proximity to the Atlantic Ocean, the refuge experiences the influence of tropical storms and hurricanes and their associated gusty winds and torrential rains. July is the warmest month, with an average temperature of 72 degrees Fahrenheit (U.S. Army 1995).

Topography

The refuge is located near the western boundary of the seaboard lowlands of the New England-maritime province, and is dominated by broad flat plains with elevations of 190-200 feet above mean sea level (msl). Overall,



Forested Wetland: Photo By Emily Holick

elevations on the refuge range from approximately 170 to 321 feet above msl (U.S. Army 1995). Hills are located across the refuge, but predominate across the northern boundary and the central area of the northern portion of the property. In general terms, the topographic features on the refuge may be described as being approximately: 81 percent lowlands, 16 percent hills and 3 percent open water (U.S. Army 1980).

Geology

The Wisconsin stage glaciation has shaped the landform of the refuge, and the northeast in general. Eight surface depositional types are found on the refuge, and six of these are from glacial action: kames, kame terraces, kame fields, outwash plains, ground moraines and drumlins. The remaining two sediment deposits are alluvium swamps. Glacial tills are compact, unsorted mixtures of clay, silt, sand, gravel and boulders. The hilly portions of the refuge tend to be till, with the flatter areas being glacial outwash. The tills may reach thicknesses of up to 40 feet in moraine areas, and up to 80 feet in drumlins. Alluvium is generally fine gravel, and the swamps are predominately sand, silt and organic matter. Kames are irregularly shaped mounds of poorly sorted sands and gravels. Kame fields are simply described as areas of closely spaced kames. Kame terraces were formed by glacial meltwater depositing suspended matter between ice sheets. Vose Hill and the hill immediately south of Tuttle Hill are mapped as drumlins, glacially formed accumulations of till indicating by their orientation the direction of ice flow (USGS 1956). A million-year old river valley underlies Lake Boon, White Pond and the southern portion of the refuge (U.S. Army 1995).



Diverse habitats fill Assabet NWR such as this area near Taylor Brook: Photo by Marijke Holtrop

The deeper lying bedrock is igneous and metamorphic rock of the Precambrian and Paleozoic ages. Depth to bedrock across the refuge is generally in the range of 40 to 100 feet below the ground surface. Primary formations found on the refuge include the Precambrian Marlboro schist; the Devonian age Salem and Dedham granodiorites; the carboniferous Nashoba gneiss; and, the Gospel Hill gneiss. Bedrock outcrops occur in several irregularly distributed areas across the refuge (U.S. Army 1995).

Soils

Soils across the refuge are comprised of a diverse range of types reflecting varied glacial and alluvial depositional processes. The U.S. Department of Agriculture, Natural Resources Conservation Service soil maps indicate the more common soils include those of the Carver, Windsor, Merrimac, Paxton, Deerfield, Montauk, and Charlton-Hollis series in the uplands; and, the Swansea and Freetown series in wetlands (USDA 1995).

The Carver soil series consists of nearly level to steep, deep (5+ feet), excessively drained soils on glacial outwash plain, terraces, and deltas. They are very friable or loose loamy coarse sands, with very rapid

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permeability. They tend to be droughty, with severe concern for seedling survival and slight concern for erosion in well managed forest cover.

Windsor soils are found in nearly level to very steep conditions; are up to 5+ feet deep; excessively drained soils on glacial outwash plains, terraces, deltas and escarpments. They formed in sandy glacial outwash, and have a very friable or loose loamy sand or loamy fine sand surface soil. They have rapid permeability and tend to be droughty, but concern for seedling mortality is listed as being slight.

Merrimac soils occur in level to steep slopes; are up to 5+ feet deep; and, are excessively drained soils found on glacial outwash plains, terraces, and kames. They formed in water-sorted, sandy glacial material, and are friable, fine sandy loams and sandy loams in the surface. They are moderately rapid in permeability, with few limitations for most uses, and moderate risk for seedling mortality.

Paxton soils are deep (5+ feet), well drained soils found on glacial drumlins. They formed in compact glacial till. These soils are friable fine sandy loams, with a very stony surface. They have slow or very slow permeability and moderate risk for seedling mortality.

The Deerfield series are deep, well drained, loamy fine sand soils. They are found on glacial outwash plains, terraces, and deltas. These soils may have a seasonal high water table at 18 to 36 inches and moderate seedling mortality risk.

Montauk soils are well drained and found on drumlins. They formed in compact glacial tills, and are friable, fine sandy loams, with moderately rapid permeability. Montauk soils are stony to extremely stony, with a slight seedling mortality risk.

The Charton-Hollis-rock outcrop complex soils are well drained, with (on average) approximately 10% bedrock outcrops.

The Swansea and Freetown series are very poorly drained wetland soils. They formed in depressions and flat areas of glacial outwash plains and terraces, and may be 50 inches to many feet of black, highly decomposed organic material over sandy mineral materials. They have a water table that is at or near the surface most of the year (USDA 1995).

Hydrology

Most of the northern section and westernmost parts of the southern section of Assabet River NWR fall within the Assabet River drainage basin. The majority of the northern portion of the refuge drains northward through Taylor Brook and its tributaries, including Honey Brook. Two small, intermittent streams also flow from the northern/northwest portion of the

refuge into the Assabet River. The central and eastern areas of the southern portion of the refuge are within the Sudbury River drainage basin. Marlboro Brook drains from the southeastern portion of this section of the refuge into Hop Brook, a tributary of the Sudbury River, just above Stearns Millpond. The western portions of this section of the refuge drain toward White Pond, which has no surface outlet, but is thought to drain underground to Lake Boon and thence to the Assabet River (U.S. Army 1995).



Taylor Brook: Photo by Marijke Holtrop

The water table under much of the refuge is shallow, as indicated by the extensive swamps, bogs, and water-holes found on the property. Groundwater discharge is thought to be supplying much of the flow occurring through the outwash plains underlying the lowlands of the site (U.S. Army 1995). The poorly drained lowlands soils have supported the establishment of extensive and diverse wetland habitats, which include forested and shrub-dominated wetlands, bogs, emergent wetlands, open-water bodies in the form of several lakes and ponds, an abandoned cranberry bog, and scattered seasonally-flooded vernal pools (USFWS 1995).

Air Quality

The Massachusetts annual air quality report for 1999 (MADEP, 2000), and the U.S. Environmental Protection Agency's (USEPA) air quality planning and standards web page (EPA, 2001), contain the most recent data available for air quality in this area. The nearest data appear to be limited to those from monitoring sites in the City of Worcester and the Town of Stow. The Stow monitoring site has been located on the Assabet River NWR since 1999, and prior to that time was located nearby on the Great Meadows NWR in Sudbury.

The pollutants for which state-wide data are available are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), sulfur dioxide (SO_2) and particulate matter (both 2.5 microns (PM_{2.5}) and 10 microns (PM₁₀)).

The National Ambient Air Quality Standards (NAAQS) determined by USEPA set the concentration limits that determine the attainment status for each criteria pollutant. Massachusetts does not attain the public health standard for two pollutants – ozone (O_3) for the entire state and CO in a few cities (MADEP 2000), including parts of Worcester and Middlesex counties within which the refuge is located (USEPA 2001).

There are two ozone standards based on two different averaging times, 1-hour and 8-hour. In 1999, there were 85 exceedances of the 8-hour standard occurring on 22 days, and 5 exceedances of the 1-hour standard occurring on 4 days on a state-wide basis. The 12-year trends for ozone readings in

the state have been generally decreasing toward better quality since 1988. Massachusetts has made significant progress in attaining the CO standard by implementing air pollution control programs. The last violation of the CO NAAQS occurred in Boston in 1986. The Boston metropolitan area was redesignated to attainment of the CO federal air quality standard by the USEPA in 1996. Lowell, Springfield, Waltham, and Worcester remain in non-attainment of the CO standard. MADEP is currently preparing a request to the USEPA to redesignate these areas to attainment for CO because monitoring data has been below the standard for many years. The redesignation request, which includes technical support and a maintenance plan, will be subject to public review and comment prior to being submitted to the USEPA.

In recent years there has been concern regarding the aerial deposition of mercury from atmospheric sources outside the northeast region (see for example Sweet and Prestbo 1999). Researchers have speculated that this may be the source of mercury levels found in some species and age-classes of fish in New England above the 1 part per million standard established by the U.S. Food and Drug Administration (USFDA) (see discussion in the water quality section below).

The annual average concentration of lead in the air decreased substantially since 1985 from more than 300 ug/m³ to less than 0.05 ug/m³ (the annual average NAAQS for lead is 1.5 ug/m³). Massachusetts is well below the standard. This result is attributed to the use of unleaded gasoline in motor vehicles, which are the primary source of airborne lead emissions (MADEP 2000). While air quality concentrations of lead have dramatically decreased, there may still be concern regarding residual lead levels in soils along heavily traveled roadways deposited prior to the change to unleaded gasoline usage.

Water Quality

The waters of the Assabet River have been designated as Class B, warm water fisheries by the Commonwealth of Massachusetts. Class B waters are defined as being suitable for “protection and propagation of fish, other aquatic life, for wildlife, and for primary and secondary contact recreation” (MADEP 1998). All sections of the Assabet River are included in the MADEP 303(d) list of waters as failing to meet the Class B standards, primarily due to elevated levels of phosphorus and nitrogen, and low dissolved oxygen concentrations (OAR 2000). The source of nutrient input is thought to be associated with discharges from seven municipal wastewater treatment facilities, storm water runoff from lawns and agricultural lands and releases from nutrients previously settled in the sediments of the river bottom (OAR 2000). Environmental consulting firms working for the Army have conducted four studies of contaminants in surface water, sediment and fish of Puffer Pond since the mid-1980s.

Summaries of these studies (taken from U.S. Army 1995) are presented below:

Dames & Moore – 1984

In 1984 Dames & Moore (D&M) collected background samples of surface water and sediment (D&M 1986). One of the samples was collected upstream of Puffer Pond, and one of them was collected downstream. Phenols were detected in upstream surface water, and polycyclic aromatic hydrocarbons (PAHs) were detected in downstream sediment. D&M reported that the observed PAH compounds may have resulted from widespread distribution of coal ash at the installation. D&M conducted an



Reflections: Photo by Emily Holick

expanded second round of surface water and sediment sampling, to better define the pattern of contaminant distribution. On the basis of the second-round sampling results, D&M concluded that “no significant contamination sources exist in the Puffer Pond area” (D&M 1986, p. 2-32).

U.S. Army Environmental Hygiene Agency – 1991

The potential presence of contaminants in and around Puffer Pond led the Fort Devens preventive medicine service to request a study of the pond by the U.S. Army Environmental Hygiene Agency (AEHA), “to determine if there is contamination that will compromise the health of people fishing in Puffer Pond” (AEHA 1991). AEHA conducted its study of Puffer Pond in April of 1991. They collected surface water and sediment samples at four locations in the pond, and fish at one location. Sixteen fish were collected, only one of which was from the predator trophic level (a large pickerel). The fish were filleted, and the samples were analyzed for metals, pesticides, and polychlorinated biphenyls (PCBs). The surface water and sediment samples were also analyzed. In the surface water samples, cadmium, lead, silver, and zinc exceeded USEPA water quality criteria for the protection of aquatic life. In sediment, the concentrations of all metals were “extremely low compared to sediments from other Army installations around the country and background soil concentrations in the eastern united states” (AEHA 1991, p. 5). The mercury concentration (1.2 ug/g) in the pickerel sample exceeded the USFDA action level (1.0 ug/g). All other analytes in all fish samples were within safe levels for human consumption. AEHA (1991, p. 6) concluded that: (a) “no contamination was detected from past practices”; (b) exceedence of the USFDA action level by mercury in one fish sample may not be representative of the fish population in Puffer Pond; and, (c) that more fish should be sampled before releasing a health advisory. AEHA recommended that the additional fish sampling be conducted as part of investigations then being planned by the U.S. Army Toxic and Hazardous Materials Administration (USATHAMA). As a result

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of the AEHA findings, Fort Devens issued a catch-and-release advisory for Puffer Pond.

OHM Corporation - 1992

OHM Corporation (OHM) prepared a work plan (August 1992) for a Puffer Pond fish study to be conducted under contract to USATHAMA. The work plan incorporated a discussion of the methods and results of an ecological survey of Puffer Pond fish conducted by OHM in the spring of 1992. Using hook and line, on April 24 OHM caught and released 23 largemouth bass, and on May 1 OHM caught and released three pickerel, three largemouth bass, two black crappie, and two yellow perch. OHM visually inspected the fish, looked for swimming eccentricities, and observed nesting patterns along the shoreline. They found no deformities, behavioral problems, or other indications of stress or disease. OHM concluded that Puffer Pond contained a diverse and balanced fish population with no overt signs of stress.

OHM's work plan expanded the goals of the Puffer Pond fish studies to address ecological risks as well as human health risks. The plan was to make comparisons to background ponds, using fish data from the Service, the MADEP, and the published literature. OHM presented criteria for selecting background data from the identified sources.

The field program was conducted in October 1992. OHM collected fish using a shrimp trawl instead of seines, because of flood conditions and because of cold water and air temperatures. The flood conditions prevented OHM from collecting largemouth bass or any other top predator species. Black crappies were collected, and they were used to represent the predator trophic level. Fish background data provided to OHM were rejected as insufficient or inappropriate, on the basis of the selection criteria established in the work plan. OHM concluded from its quantitative human health and ecological risk assessments that the observed conditions do not pose a risk to human receptors (OHM April 1994, p. 5-9) and that the concentrations of analytes observed in the fish tissue "do not appear to be affecting the ecological health of Puffer Pond" (OHM 1992, p. 6-5).

Ecology and Environment - 1993

E&E conducted a bioaccumulation study at Puffer Pond to evaluate the extent of fish contamination and to fill data gaps in previous investigations. Sampling of surface water, sediment, and fish was conducted in Puffer Pond and in a background pond in November, 1993. Ministers Pond, located northeast of the junction of Routes 117 and 62 near the center of Stow, was selected as the background pond to use for comparing Puffer Pond sampling results. It generally met the following criteria:

- no or minimal potential site-related impacts;

- a central Massachusetts location; and
- morphology, pH, alkalinity, trophic status, and watershed characteristics similar to Puffer Pond.

Surface water and sediment sample pairs were collected at six locations in each pond. Fish samples were collected at four locations in each pond, using gill nets, angling, and electroshocking. Chain pickerel were sampled as predators, yellow perch as foragers, and bullheads as bottom feeders. During actual sampling, four bullheads were the only bottom feeders collected in Ministers Pond. In the predator and bottom feeding levels, fillet concentrations were used to calculate human health risks, and whole fish concentrations were used to determine ecological risks. In the forager level, only whole fish samples were analyzed.

In water samples from Puffer Pond, arsenic, cadmium, and lead were detected at concentrations above the screening values. Concentrations of those metals were below the screening values in all of the background pond surface water samples. However, the maximum lead concentration in the Puffer Pond samples was only slightly higher than the maximum concentration detected in the background pond.

In sediment samples, arsenic concentrations exceeded the screening value in all Puffer Pond samples, whereas only one of the background samples exceeded the arsenic screening value. Concentrations of cadmium, lead, silver, and the pesticides DDD and DDE exceeded the respective screening values at approximately the same frequencies in samples from both ponds.



Beaver activity: Photo by Marijke Holtrop

Mercury was not detected in surface water or sediment from either pond at concentrations above the laboratory method detection limits (0.2 ug/l and 0.1 ug/g, respectively). Although mercury was not detected in surface water or sediment, it was detected in 14 of 24 fish from Puffer Pond and in 17 of 19 fish from Ministers Pond. Mercury exceeded the USFDA action level (1.0 mg/kg) in only one fish (a yellow perch from Puffer Pond), at a concentration of 1.12 mg/kg. Concentrations of mercury, arsenic, chromium, and lead in Puffer Pond fish samples “were not statistically different from local background conditions” (E&E 1994).

E&E concluded that potential human health risks associated with eating fish from Puffer Pond are negligible and that potential ecological and human health risks are no greater than those posed by Ministers Pond or other similar ponds in the area. Despite low environmental concentrations, mercury is bioavailable to aquatic organisms. The fish are a primary food source for piscivorous wildlife and “may result in allowing the contaminants to magnify in the food chain as they are generally consumed whole” (E&E 1994).

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Other Contaminant Issues

The USEPA designated the Fort Devens Sudbury Training Annex as a national priorities list (NPL) superfund site in 1990 based on environmental studies that had been conducted by the Army. Under USEPA and MADEP oversight, the Army completed investigations and, where necessary, clean-up actions at 73 locations that were identified through record searches, interviews with past and current employees and field sampling results as being potentially contaminated. Facility-wide investigations of groundwater hydrology and quality, background soil contaminant concentrations and surface water and sediment quality were conducted. In addition, a site-wide investigation of potential arsenic contamination in soil, water, sediment, plants and soil invertebrates was completed (USEPA 2000).

The 73 specific sites investigated included individual, abandoned empty drums, disturbed ground and vegetation, underground fuel storage tanks, demolition grounds, solvent and waste dumps, test clothing burial areas, refuse dumps, old gravel pits, chemical disposal sites, etc. The U.S. Army's master environmental plan, revised and reissued in December 1995 provided a status report of Army actions on these sites (U.S. Army 1995). The USEPA issued a final close out report for the 73 sites at the Fort Devens Sudbury Training Annex in September 2000 (USEPA 2000). Of the 73 sites investigated on the Fort Devens Training Annex, USEPA and MADEP determined:

- 18 were classified no contamination found;
- 11 were classified no contamination found following an enhanced area reconnaissance;
- 9 were classified as posing no risk to humans or wildlife following preliminary risk assessments;
- 5 were classified as having no contamination found following a full risk assessment;
- 12 were classified as posing no risk to humans or wildlife following a full risk assessment;
- 16 sites were subjected to removal actions, with confirmatory sampling indicating there was no residual risk to humans or wildlife;
- 1 site was considered to be free of risk to humans and wildlife, but an additional set of testing results were to be evaluated for confirmation; and,
- 1 site (A7) was classified as no further action following construction of a full, lined and capped landfill at the site. Long-term monitoring by the Army for groundwater quality, landfill cap integrity and site fencing condition is required at site A7.

The USEPA final close out report is available at the refuge headquarters in Sudbury. Formal de-listing of the property from the national priority list has occurred.

The Service accepted the transfer of the Sudbury Training Annex subject to our complying with certain long-term institutional controls. These institutional controls were established by the Army and USEPA in consultation with MADEP and the Service. They restrict the Service from conducting any actions that will impair the integrity of the landfill cap, liner, topography, etc. at site A7, and from allowing the construction of residences within 50 feet of the center line of the former World War II era railroad beds and the former internal Army fence line/firebreak along what the Army called the Patrol Road.

According to the bioaccumulation study at Puffer Pond, mercury, zinc and DDT degradation products are present in fish tissue from Puffer Pond; however, the levels were generally below available regional and national background fish tissue levels. This report concluded that the site-related human health and ecological risks associated with the use of Puffer Pond are not likely to be greater than those associated with the use of any other local pond. Puffer Pond is listed in the Massachusetts Department of Public Health freshwater fish consumption advisory list for mercury hazard. The advisory states that “the general public should not consume any fish from this water body.”

Physical Safety Hazards

Assabet River NWR has been closed to the public due to a number of unmitigated safety hazards. These include:

- at least 33 open, hand-dug farm wells that pre-date the Army,
- some concertina wire,
- some smooth communication wire in the woods.



Open wells, like this one, are being secured: Photo by Marijke Holtrop

Most of the concertina wire, the large utility pole physical fitness obstacle course and fencing have all been removed by or with help from the Friends of the Assabet River NWR. We do not need to remove the bunkers as they are covered with vegetation and have blended into the habitat.

Biological Resources

Vegetation and Habitat Types

Service biologists completed a survey and evaluation of the habitat of portions of what then was still the Fort Devens Sudbury Training Annex in 1992 (USFWS 1995). Short duration site visits, wetland mapping produced by the Service's national wetland inventory team, forest cover mapping



Grasses: Photo by Emily Ann Hollick

completed by the Fort Devens Natural Resource Management Office (NRMO), aerial photographs and other existing data were used in the evaluation. The focus of this evaluation was the eastern portion of the property north of Hudson Road.

The report notes that aerial photos, extensive stone walls, successional second-growth forests, old cranberry bogs and discussions with knowledgeable people all document the fairly extensive farming history of the land prior to the Army's acquisition in the early 1940's. The presence of diverse wetland and upland habitat of high value to wildlife species was noted. Others have suggested that the diversity of habitat found on the refuge is due to the presence of highly varied topography, soils, drainage patterns, and the Army's ownership and management of the property over a 50 year time span.

Although only portions of what is now the refuge were evaluated, the report found 476 acres of wetland habitat. North of Hudson Road, approximately 291 acres (67%) were forested or mixed forested/shrub cover; 29 acres (7%) were shrub dominated; 41 acres (9%) were shrub/emergent herbaceous cover; 62 acres (14%) were open water ponds; and 14 acres (3%) were former cranberry bogs. The report indicated the portion of the property south of Hudson Road contained approximately 39 acres of wetlands (~9% of the area).

Approximately 87% of these wetlands were forested and the remainder was shrub-dominated wetland habitat.

The forested wetlands are dominated by red maple (*Acer rubrum*) with black ash (*Fraxinus niger*), swamp white oak (*Quercus bicolor*), and some eastern hemlock (*Tsuga canadensis*) and white pine present. Understory shrubs included sweet pepperbush (*Clethra alnifolia*), swamp azalea (*Rhododendron viscosum*), european buckthorn (*Rhamnus frangula*), winterberry (*Ilex verticillata*), and maleberry (*Lyonia ligustrina*). At least one remnant Atlantic white cedar (*Chamaecyparis thyoides*) wetland was

also noted. Shrub-dominated wetlands were characterized as including speckled alder (*Alnus serrulata*), silky dogwood (*Cornus amomum*), gray stemmed dogwood (*Cornus racemosa*), elderberry (*Sambucus canadensis*) and black chokeberry (*Aronia melanocarpa*), buttonbush (*Cephalanthus occidentalis*), meadowsweet (*Spiraea latifolia*), steeplebush (*Spiraea tomentosa*), and others. Emergent wetland type vegetation included broadleaf cattail (*Typha latifolia* L.), sedges (*Abildgaardia*), blue-joint grass (*Hemarthria*), boneset (*Tamaulipa*), joe-pye-weed (*Eupatorium*), purple loosestrife, pickerel weed (*Pontederia cordata* L.), arrowhead (*Sagittaria* L.), smartweed (*Polygonum*), spike rush (*Eleocharis* R. Br.), waterlily (*Nymphaea*), and many submergent plants.

Though historically much of the area was logged for agriculture, a majority of the upland areas within the refuge have succeeded back to forest. Mixed white pine and oak hardwoods dominate. Common hard woods included red maple, white oak (*Quercus alba*), red oak (*Quercus rubra*), quaking aspen (*Populus tremuloides*). Other frequently encountered species included birches, beeches, American elm (*Ulmus americana*), black cherry (*Prunus serotina* var. *serotina*), and shagbark hickory (*Carya ovata* var. *ovata*). The understory was commonly mixes of sassafras (*Sassafras albidum*), blueberries and dogwoods. The cleared fields that were once utilized as agricultural land are now in successional transition into forests. These meadows, shrub thickets and immature forests have the potential to provide food and cover to many species of migratory birds and other wildlife. Approximately 70% of the portions of the Army property surveyed were in forest at the time (USFWS 1995).

The former ammunition bunkers that were once employed as storage facilities have become well revegetated. The bunkers, measuring



Sunset with geese: Photo by Paul Olsen

approximately 75 feet long and 40 feet wide, are surrounded by dry, sandy, disturbed soils, which had good growth of cherry, white pine, oak, aspen, sweetfern, sedges, mosses and other plant species.

Approximately 3% of the Army lands included in the survey were primarily in native and introduced grasses, including approximately 30 acres at the Army Taylor Drop Zone.

The Service's evaluation summarized the National Wetland Inventory (NWI) mapping based on 1975-77 aerial photography, and an earlier forest cover type mapping done for the NRMO by Leupold Forestry Service using 1980 aerial photography. B.H. Keith Associates of Conway, NH prepared a wetland cover type map for all of the Sudbury Training Annex for the NRMO in April, 1983 using 1980 aerial photography. However, the wetland

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classification scheme used by B.H. Keith does not conform to the NWI classifications, and it was not used for the Service's evaluation. See Table 3-2 for the 1,647 acres the Service evaluated. In 1991, Aneptek Corporation completed an inventory of wildlife species and their habitats on portions of the Army's Sudbury Training Annex, which were in use by the Army's Natick Research, Development and Engineering Center, Natick, MA (Aneptek 1991). The Aneptek evaluation included the areas around the Army family housing on Bruen Road and the Taylor Drop Zone on the northern portion of what is now the refuge. The family housing area abuts the portion of the refuge located south of Hudson Road. Detailed inventories of the plant and animal communities found in these two areas are provided in the Aneptek report. Where species observations made at the Taylor Drop Zone have not been superseded by more recent or more encompassing evaluations, Aneptek's records are included in the Service's developing species lists for the Assabet River NWR (Appendix D).

Table 3-2: Cover Types and Acreage at Assabet River NWR

Cover Type	Acreage	Percent
White Pine	191	12
White Pine – Hardwoods	123	7
White Pine – Oak	561	34
Oak Hardwoods	73	4
Mixed Oak	159	10
Cherry Hardwoods	11	<1
Red Maple – Ash	37	2
Grasses – Forbs	54	3
Developed	1	<1
Wetlands	437	27

In 1992, Dr. David Hunt completed a very thorough survey of the plant communities found on the portions of the training annex located north of Hudson Road for the NRMO (Hunt, 1992). Habitats spanning the full range of elevations, slopes, and combination of the diverse mix of 34 soil types found on the area were surveyed. A total of 667 species (in 681 taxa) were identified with certainty; 72.4% of these were native plant species and 21.6% were characterized as being introduced. For the remaining 6% (41), Dr. Hunt believed 37 should be considered native and 4 introduced. Although not found during this survey, Hunt indicated an additional 99 plant species were likely to occur on what is now the northern portion of the refuge (USFWS 1995).

High plant diversity found on the property was attributed to the broad range of soil types and the mix of introduced species. Several dwarf shrub bogs, open canopied minerotrophic peatlands and areas of exposed sand, an Atlantic white cedar swamp, and a small sandybottom kettlehole pond were found to contain exceptionally high plant diversity.

A total of 8 rare plant species were documented on the property, including a state-listed endangered species (se), a state threatened species (st), two species listed by the state as being of special concern (sc), and three state watch list (wl) species and are shown in Table 3-3. Special concern species, a lady's tresses (*Spiranthes vernalis*) listed in the Aneptek report as occurring on the property, was not found by Hunt. Hunt found the more common lady tresses (*S. cernua*) within the same location as the Aneptek record, and believed the earlier identification may have been incorrect. Included in the species found by Hunt were an additional 34 species (26 native and 6 introduced), which he characterized as being uncommon in eastern Massachusetts.

Table 3-3: Rare Plant Species at Assabet River NWR

Common name	Scientific name	Status ¹
Midland Sedge	<i>Carex mesochorea</i>	SE
Few Fruited Sedge	<i>Carex oligosperma</i>	ST
New England Blazing Star	<i>Liatris borealis</i>	SC
Philadelphia Panic Grass	<i>Panicum philadelphicum</i> <i>var. philidelphicum</i>	SC
Small Beggar-Ticks	<i>Bidens discoidea</i>	WL
Lacegrass	<i>Eragrostis capillaries</i>	WL
Northern Starwort	<i>Stellaria clycantha</i>	WL

¹ SE – state-listed endangered, ST – state-listed threatened, SC – state-listed species of special concern, WL – state watch list

Vernal pools

Vernal pools are a priority habitat type within the state of Massachusetts. Several vernal pools have been identified on the Assabet River NWR (Dineen 2001). Additional surveys to locate vernal pools were initiated in



Vernal Pool: Photo by Rob Vincent

the spring of 2001. Vernal pools are temporary freshwater depressions which hold spring rains and snowmelt waters, and then typically dry out during late summer. Vernal pools are critical breeding habitat for amphibian and invertebrate species due to the lack of predatory fish. The vernal pools of Assabet River NWR are confirmed breeding habitat for the blue-spotted salamander (*Ambystoma laterale*), which is a state species of special concern, and spotted turtles (*Clemmys guttata*), have also been observed on the refuge (Meyer and Montemerlo, 1995).

Invasive or Overabundant Species

Hunt found that the number of exotic plant species was lower than expected, in part due to the undisturbed nature of the former Sudbury Training Annex. However, Hunt identified 19 species on the property that are included in a listing of “nonnative, invasive and potentially invasive plants in New England” prepared by Dr. Leslie J. Mehrhoff of the University of Connecticut (UConn 2000). No surveys have been

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completed to determine the extent of occurrence for any of these species on the refuge (see Table 3-4).

Table 3-4: Invasive Species at Assabet River NWR

Scientific name	Common name
<i>Acer platanoides</i>	Norway Maple
<i>Cyananthus nigrum</i> (L.) Pers.	Black Swallowwort
<i>Berberis thunbergii</i> DC	Japanese Barberry
<i>Catalpa speciosa</i> (Warder ex Barney) Warder ex Engelm	Catawba Tree
<i>Myosotis scorpioides</i> L.	True Forget-Me-Not
<i>Lonicera X bella</i> Zabel	Bella Honeysuckle
<i>Lonicera japonica</i> Thunb.	Japanese Honeysuckle
<i>Lonicera morrowii</i> Gray	Morrow Honeysuckle
<i>Celastrus orbiculata</i> Thunb.	Asiatic Bittersweet
<i>Phragmites australis</i> (Cav.) Trin. Ex Steud. (= <i>P. communis</i>)	Spotted Knapweed
<i>Iris pseudacorus</i> L.	Yellow Iris
<i>Robinia pseudo-acacia</i> L. var. <i>pseudo-acacia</i>	Black Locust
<i>Polygonum cuspidatum</i> Siebold & Zuccar	Japanese Knotweed
<i>Rumex acetosella</i> L.	Sheep Sorrel
<i>Lysimachia nummularia</i> L.	Moneywort
<i>Rhamnus frangula</i> L.	European Buckthorn
<i>Rosa multiflora</i> Thunb.	Multiflora Rose
<i>Ailanthus altissima</i> (Mill.)	Swingle Tree-of-Heaven

Wildlife Resources

Migratory Birds

Comprehensive surveys for wintering, breeding, and migrating birds have not yet been completed on the refuge. However, refuge staff initiated breeding American woodcock (*Scolopax minor*), breeding land-bird, and breeding marsh bird surveys in 2000. The latter two surveys are following protocols of Service region-wide studies. The American woodcock surveys also follow standardized protocols, but it is not currently a part of a region-wide study.



Canada Geese: Photo by Paul Buckley

The Service Region 5 Landbird Breeding Survey conducted on Assabet River NWR is similar to the national breeding bird survey in which singing males are seen or heard at designated points along a route that traverses the refuge during the breeding season (May-July). This survey was initiated in the spring of 2000 and resulted in an initial species list of breeding land birds. The landbird survey is designed to continue for at least 5 years, at which time the data will be

analyzed to determine the frequency at which the subsequent surveys need to be conducted to accurately monitor refuge populations.

The Service Region 5 Marshbird Callback Survey was conducted at the Assabet River NWR for the first time in 2000. This survey follows a national protocol which will assist with the monitoring of marshbirds throughout the nation. The Marshbird Callback Survey specifically targets the secretive birds of wetlands that are generally missed during landbird surveys.

In addition, several other series of migratory bird inventories have been conducted on the refuge. Aneptek surveyed the areas at and around the Army's Capehart family housing area and the Taylor Drop Zone two to three times per week in June and July, 1991. They identified a total of 54 species using the mix of habitat at the drop zone. Ron Lockwood, a volunteer master birder, has conducted extensive observations on the refuge since 1999. The refuge supports four state-listed species (Table 3-5). Additionally, an occasional federally-threatened bald eagle is sighted flying over the refuge. Additional observations are continuing. For a complete list of migratory birds see Appendix D.

Table 3-5: State-listed Bird Species at Assabet River NWR

Scientific name	Common name	Status ¹	Reference
<i>Accipiter striatus</i>	Sharp-shinned Hawk	SC	Lockwood, 1999
<i>Accipiter cooperii</i>	Cooper's Hawk	SC	Lockwood, 1999
<i>Dendroica striata</i>	Blackpoll Warbler	SC	Lockwood, 1999
<i>Parula americana</i>	Northern Parula	ST	Lockwood, 1999 & 20000

¹ SE – state-listed endangered, ST – state-listed threatened, SC – state-listed species of special concern, WL – state watch list

Mammals

Comprehensive surveys for mammal species have not yet been conducted on the refuge. However, two surveys have been completed on portions of the refuge. Aneptek (1991) inventoried the Taylor Drop Zone and nearby habitat, identifying mammals by sight, vocalization, track and scat through the months of June and July, 1991. A number of pitfall traps and two overnight 15-set Sherman trap transects across a variety of habitats at the Drop Zone were also run. A total of 14 mammalian species were recorded from this portion of what is now the refuge. Thomas (1992) surveyed small mammal species at seven locations on the Sudbury Training Annex from April 14 to December 10, 1992. Meyer and Montemerlo, 1995, recorded mammals from the portion of the former Sudbury Training Annex south of Hudson Road in June and July, 1995. Additional observations have been recorded by refuge personnel over the years. Twenty five mammalian species have been recorded on the refuge to date (Appendix D).

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Species concentrated within the early successional open-land areas include northern short-tailed shrews (*Blarina brevicauda*), meadow voles (*Microtus pennsylvanicus*), and meadow jumping mice (*Zapus hudsonius*). Forested lands are likely to support such species as eastern gray squirrels (*Sciurus carolinensis*), red squirrels (*Tamiasciurus hudsonicus*), white-



Beaver activity at Assabet River NWR: Photo by Marijke Holtrop

footed mice (*Peromyscus leucopus*), southern red-backed voles (*Clethrionomys gapperi*), porcupine (*Erethizon dorsatum*) and fisher (*Martes pennanti*). Other species that occupy a variety of habitat types include whitetailed deer (*Odocoileus virginianus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), eastern cottontail (*Sylvilagus floridanus*), woodchuck (*Marmota monax*), eastern chipmunk (*Tamias striatus*), striped skunk (*Mephitis mephitis*), several species of moles and bats. Other species present include flying squirrels (*Glaucomys volens*), bobcat (*Lynx rufus*), beaver (*Castor canadensis*), moose (*Alces alces*) and mink (*Mustela vison*).

In December, 2002, The Friends of the Assabet River NWR received a grant from Sudbury Foundation for training 17 team members with researcher Sue Morse of Keeping Track VT. The Assabet Keeping Track (AKT) received training in identifying track and sign of nine focal species and in establishing and running a baseline wildlife monitoring program on the Assabet River NWR.

The focal species of the AKT program are black bear (*Ursus americanus*), bobcat (*Lynx rufus*), fisher, mink, red and grey fox (*Urocyon cinereoargenteus*), moose, river otter (*Lutra canadensis*) and porcupine. Keeping Track VT's protocol was followed by starting with a thorough reconnaissance of the refuge resulting in four established transects for the collection of data. Data collection follows specific guidelines and includes photographing tracks and signs when they are found. Each transect is approximately 60' wide and 2 miles long. The AKT team walks each transect four times a year corresponding to the various seasons of the year, with the first transect taking place in the spring of 2004.

AKT provides data to the Service and Keeping Track VT where data from all Keeping Track teams is collected and analyzed. AKT has documented the presence of bobcat, fisher, mink, otter and red fox on the refuge with sightings of bear and moose in the area. AKT maintains a website (www.pbase.com/akt) with photos of monitoring activities.

Reptiles and Amphibians

Comprehensive surveys of amphibians and reptiles have not yet been completed at the refuge. However, the refuge staff initiated an annual call-count survey for anuran species (frogs and toads) in 2000. The survey is part of a standardized study being conducted on several refuges in the Service's northeast region. The survey is planned to continue to detect population changes. Aneptek (1991) inventoried amphibians and reptiles within the habitats surrounding the former Taylor Drop Zone during June and July of that year. Three reptilian and seven amphibian species were recorded during their surveys. In addition, Meyer and Montemerlo (1995) surveyed the portion of the refuge south of Hudson Road for amphibian and reptilian species in June and July of that year.



Painted Turtle: Photo by David Flint

A complete listing of species recorded to date is included in Appendix D. One state-listed amphibian, the blue spotted salamander (*Ambystoma laterale*), and three state-listed reptilian species, one of which is state threatened, have been reported from the refuge to date. Table 3-6 identifies these state-listed species.

Table 3-6: State-listed Amphibians and Reptiles at Assabet River NWR

Scientific Name	Common Name	Status ¹
<i>Ambystoma laterale</i>	Blue Spotted Salamander	SC
<i>Clemmys guttata</i>	Spotted Turtle	SC
<i>Terrapene carolina</i>	Eastern Box Turtle	SC
<i>Emys blandingii</i>	Blanding's Turtle	ST

¹ SE – state-listed endangered, ST – state-listed threatened, SC – state-listed species of special concern, WL – state watch list

Fisheries

The aquatic resources at Assabet River NWR include the Assabet River, Taylor Brook, Puffer Pond, Willis Pond, Cutting Pond and several other smaller ponds. Approximately one mile of the Assabet River parallels the northwestern boundary of the refuge, although there is a strip of privately owned land between the refuge boundary and the river's edge. Elizabeth Brook is the largest tributary of the Assabet River (Stow 1997), and flows into the Assabet on the opposite bank from the refuge.

The Assabet is characterized by a warmwater fishery in the section below and above the stretch along the refuge. According to a Massachusetts Division of Fisheries and Wildlife survey done in July 1997, water temperatures of the Assabet River in the towns of Maynard, Stow and Acton ranged from 25° to 27.2° C. Bottom type consisted of gravel, rubble and boulder with some silt and sand in the pools. Gamefish species captured during the State of Massachusetts 1997 survey included largemouth bass

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(*Micropterus salmonoides*) and chain pickerel (*Esox niger*). Other fish documented included yellow perch (*Perca flavescens*), pumpkinseed (*Lepomis gibbosus*), bluegill (*Lepomis macrochirus*), redbreast sunfish (*Lepomis auritus*), black crappie (*Pomoxis nigromaculatus*), white sucker (*Catostomus commersoni*), golden shiner (*Notemigonus crysoleucas*), fallfish (*Semotilus corporalis*), creek chubsucker (*Erimyzon oblongus*), yellow and brown bullhead (*Ictalurus nebulosus*) and American eel (*Anquilla rostrata*). See Appendix D for a complete listing of fish species. Fishing in the Assabet River is regulated by the State of Massachusetts fish and wildlife laws.

The Massachusetts Department of Public Health Fish Consumption Advisory for this river is the statewide advisory “for pregnant women not to consume fish caught in freshwater due to elevated levels of mercury in fish flesh” (MDFW 1999).

Puffer Pond is a natural pond, most likely of glacial origin. It is approximately 30 acres (OHM 1994), and lies wholly within the refuge boundary. The northern end of the pond is bounded by a scrub/shrub emergent wetland, with the remainder undeveloped and forested. It is a warmwater pond with a maximum depth of approximately 2.5 to 3 meters (OHM 1994). Taylor Brook is the outlet of Puffer Pond and flows into the Assabet River. Aquatic vegetation consists of yellow water lily (*Nuphor varigatum*), coontail (*Ceratophyllum spp.*), anacharis (*Elodea spp.*) and cattails (*Typha latifolia*). The pond bottom consists of sandy/silt muck containing coarse organic particulate matter along the shoreline, grading to a more silty muck towards the central, deeper portions of the pond (OHM 1994).

Fish species found in Puffer Pond include chain pickerel, yellow perch, brown bullhead, largemouth bass, golden shiner, black crappie, and bluegill (OHM 1994). A listing of fish species found in the Assabet River and on the refuge is provided in Appendix D. All the fish caught during the 1994 bioaccumulation study generally appeared in good health and were relatively abundant due to the high quality habitat found in the pond. Relatively large numbers of forage fish were found in Puffer Pond (OHM 1994).

A portion of the northern shoreline of Willis Pond is on the refuge boundary. Willis Pond is approximately 68 acres (Ackerman 1989). It is shallow, averaging around five feet deep. Fish species found in Willis Pond include sunfish (*Enneacanthus obesus*), largemouth bass, rock bass (*Ambloplites rupestris*), yellow perch and chain pickerel (Cutting 2000). There is a report of smallmouth bass (*Micropterus dolomieu*) being caught from Willis Pond (Ackerman 1989).

Cutting Pond is privately owned; however, its western edge borders the Assabet River NWR. It is less than twenty acres, and averages

approximately three feet deep, although there are some springs in the pond (Cutting 2000). Cutting Pond is man-made, and has had no public access. Approval was given to purchase land around the pond at the April 2004 Sudbury Town meeting, and public access will be provided in the future. Yellow perch, largemouth bass, chain pickerel, and sunfish inhabit the pond according to the current owner, Mr. John Cutting.

Invertebrates

Comprehensive surveys for invertebrate species across the entire refuge have not yet been conducted. Aneptek (1991) surveyed the Taylor Drop Zone and its surrounding habitat in June and July of that year for invertebrate species. One hundred and ten taxa of annelids, mollusks, crustaceans, arthropods, and insects were found. Identification was made to the family and, in some cases, to the genus level.



Monarch Butterfly: Photo by
Veronique Schejtman

Mello and Peters (1992) completed a survey of the lepidoptera in portions of what is now the northern portion of Assabet River NWR. Efforts were concentrated in the areas bordering Willis Pond and along Puffer Road, and included both deciduous upland habitat and the edges of a small wet meadow draining into Taylor Brook. Eighty five species of moths were recorded. No state-listed species were documented. The fact that night-light traps were not used and cool weather encountered during the survey period may have reduced the number of species observed (Mello and Peters 1992). Additional surveys were recommended, particularly within the Atlantic white cedar swamp area.

Threatened and Endangered Species

With the exception of occasional (most likely wintering) bald eagles, no federally listed threatened or endangered species are currently known from the Assabet River NWR. A small number of New England blazing stars (a federal candidate species in 1992) were recorded in 1992, but were not found by the New England Wildflower Society during a 1999 re-survey for the Massachusetts Natural Heritage and Endangered Species Program (NHESP).

Although surveys of the refuge are far from complete, 8 state-listed plant species, 4 state-listed birds, and 4 state-listed amphibian and reptilian species have been recorded to date (see Tables 3-3, 3-5 and 3-6).

Special Designations

Assabet River NWR is included in the Sudbury-Assabet-Concord (SuAsCo) inland river priority for protection focus area under the NAWMP. The refuge area is also included within the Emergency Wetlands Resources Act of 1986 and is included in the USEPA's priority wetlands of New England

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listing (1987). The refuge is identified as being high biodiversity focus areas in the SuAsCo watershed biodiversity protection and stewardship plan (Clark 2000).

Assabet River NWR has been designated as a Massachusetts Important Bird Area (IBA) for its rare and unique habitat communities, including Atlantic white cedar swamp, a kettlehole pond, several dwarf shrub bogs, open canopy minerotrophic peatlands, and other sand communities. IBAs provide essential habitat for at least one or more species of breeding, wintering or migrating birds. The primary goals of the program are listed below.

- “To identify, nominate and designate key sites that contribute to the preservation of significant bird populations or communities.
 - To provide information that will help land managers evaluate areas for habitat management or land acquisition.
 - To activate public and private participation in bird conservation efforts.
 - To provide education and community outreach opportunities.”
- (<http://www.massaudubon.org/birds-&-beyond/iba/iba-intro.html>)

Cultural Resources

Prehistoric Period

The refuge is located within the southern Merrimack River Basin. The earliest settlement/land use patterns in this basin during the Paleoindian period were most likely a widely spaced network of site locations within a very large territory. By 7,500 to 6,000 years ago (Middle Archaic) populations were beginning to restrict settlement activities that appear to correspond with the boundaries of the larger drainages within the Merrimack Basin (Gallagher et. al. 1986). Perhaps due to an increase in population, or changes in natural resource distribution, a maximum concentration of settlement patterns within defined territories occurred between about 4,500 and 3,000 years ago (Late Archaic). A general period of environmental stress that affected the entire region occurred after 3,000 years ago (Terminal Archaic and Early Woodland), had a profound affect on land use activities during that time. A noticeable restructuring of earlier settlement patterns during the period of 3,000 to 2,000 B.P. (Before present), is due to this event. Interior, upland environments appear to be less populated, perhaps because people may have been utilizing coastal resources more intensely (Gallagher et. al. 1986).

Toward the end of the prehistoric period, it appears that interior river drainages and some upland settings were a vital part of settlement patterns by 1,600 to 1,000 years ago (Woodland Period). A return to well defined river basin territories and the final episode of the prehistoric period seems to have taken place, although settlement patterns within interior section of the Merrimack Basin remain unclear (Gallagher et. al. 1986). The move

back into the interior sections may be the result of introduction of agriculture and the suitability of the inland soil to sustain the new subsistence mode.

Within the Assabet River NWR, there are a variety of environmental zones that represent areas of both high and low natural resource potential. Puffer Pond and the complex of streams and wetlands associated with it is the most clear general zone of high natural resource potential (Hudson 1889; Ritchie 1980; Hoffman 1983). This pond, along with Willis Pond, is one of the few natural lakes or ponds in the western portion of the town of Sudbury (Gallagher et. al. 1986). It is directly connected to the Assabet River by Taylor brook. Large areas of marsh and wooded wetlands, extending the entire length of Taylor Brook from the outlet at the north end of Puffer Pond to the confluence with the Assabet River, would have been excellent habitat for a variety of waterfowl, fur-bearing mammals, and other species exploited by Native Americans.

The central portion of the refuge contains several large areas of wooded wetlands covering several hundred acres. These wetlands will have provided seasonally concentrated natural resources suitable to winter camps for humans. One prehistoric site has been located in the central wetland portion of the refuge, and with further testing, several more will likely be found.

The elevated, rocky hills within the refuge will have provided another type of environment for humans to utilize. This area will have sustained deciduous forest which will have provided habitat for deer, bear, raccoon and bobcat, as well as acorns, chestnuts and hickory nuts. Five prehistoric sites have been identified through limited archaeological testing (Gallagher et. al. 1986). Most likely more sites located in this environment representing all the major time periods within Native American history will be identified. Assabet River NWR offers a wide variety of environmental zones ideal for Native American settlement throughout history. This area was a cultural focus of the Merrimack River Basin. The limited archaeological studies completed, have revealed prehistoric archaeological sites in all of the various refuge environments (Gallagher et. al. 1986). The refuge should be considered highly sensitive for such cultural resources. The refuge has the potential to contribute information that is significant in understanding Native American settlement patterns and environmental uses for this region of Massachusetts.

Historic Period

Europeans began to settle the refuge area around 1650. In the beginning, there were conflicts with the existing Native American groups. These groups had been decimated by diseases and were beginning to become concentrated in Christian Indian settlements. All English settlements were affected by King Philip's War in 1675, but after the War, with Native

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American nations losing political strength, the English were able to develop and settle the refuge area (Gallagher et. al. 1986).

The people that settled in the refuge area primarily were involved with farming activities. The community was mostly self sufficient and provided goods, such as grain, to Boston, which served as a core town for this region. By 1750, the settlement pattern of the refuge area was influenced by increasing development. The towns that lie within the refuge supplied Boston with timber and agricultural products. After the Revolutionary War, trade networks expanded on an international scale, local centers began to acquire more economic strength (Gallagher et. al. 1986).

During the 19th century, mills developed which provided economic opportunities for immigrants. One of the largest mills in the area was American Woolen Company. This company became the largest wool manufacturer in the region until the end of World War I. Agriculture was also still thriving in this region (Gallagher et. al. 1986).

Within the boundaries of the refuge, many farms and residences were built since the early 19th century. Some, such as the Rice/Vose Tavern and Puffer House, were 17th and 18th century in origin. The number of structures remained stable throughout the 19th century, with a settlement pattern oriented toward the few roadways that traversed the refuge. These roadways linked the homes to local and regional cores, and served as the sole transportation network in the peripheral economic zone of the region. Land use within the refuge was almost exclusively agricultural and pastoral, with some tracts of woodland. By the early 20th century, many of the older farms were acquired and new houses were constructed by Finnish immigrants until 1942, when the military acquired the property (Gallagher et. al. 1986).



Wild Mushroom: Photo by Marijke Holtrop

With the help of Paul Boothroyd of the Maynard Historical Commission, the Service has been able to acquire information about some of the structures once located on the refuge. One of the most historically significant structures is the Rice/Vose Tavern which was constructed in the early 17th century. During the Revolutionary War, Captain Joshua Perry of Portsmouth, New Hampshire and his wagon train of ammunition and supplies, stayed at the tavern on the way to New York State. The tavern also served as the community meeting hall. It was in full operation until 1815. The Army dismantled the tavern at an unknown date, but the foundation remains (Boothroyd, personal communication).

Several of the houses that were located on the refuge in the earlier part of the 20th century that were demolished by the Army, were associated with farming activities. The Hill Farm consisted of two homes that were demolished by the Army. More research is needed to establish when the homes were built; however, the homestead encompassed about 109 acres.

The Lent Farm, located along Honey Brook was associated with a saw mill and a summer camp. This property contained about 92 acres. The Sarvela Farm, also known as the Haynes Place, earlier belonged to a Puffer and was known as an old farm. This farm, located both in Stow and Maynard, contained about 43 acres (Boothroyd personal communication).

The two major roads going through the refuge, Puffer Road and New Lancaster Road, date back to early colonial times and predate the Great Road. Also, there are two cranberry bogs, one belonging to the Luarila and the other the Huikari farms. The bogs are associated with 19th century agriculture and landscape use (Boothroyd personal communication).

The Paananen Farm, originally owned by the Hendrickson Family, contains the foundation remains of the barn, silo and two wells. The Olila farm was close to Puffer Road. Early Colonial history suggests that there may be small pox graves south of the Rice Tavern on this property. The Matson Farm was on the corner of Davis Lane. The Matson's are said to have worked at Maynard Mills. The Nelson Farm was a dairy farm with a mill house, greenhouse, and was a very old farm; in the 1850's it was a girls' private boarding school run by Miss Hannah Blanchard Wood, youngest daughter of Dr. Jonathan Wood. At that time, the farm was owned by her sister married to Henry Brooks (Boothroyd, personal communication).

Assabet River NWR provides a good opportunity to analyze early American farmsteads. Because the military allowed the land to regenerate after they acquired the property, soils have remained intact in areas that were not disturbed by military training. There are both prehistoric and historic resources that have the potential to add to our understanding of human history in this area. Further research is necessary to understand a comprehensive history of the refuge. The refuge has the potential to yield significant information about land use history and cultural landscapes for this part of Massachusetts because of the proximity to Boston and lack of modern development.

Before the military acquired the refuge area, lots were also beginning to be developed as vacation homes next to Puffer Pond. Many of these lots were not yet developed at the time of the purchase. While occupied by the military, the land was used in several ways which included the construction of weapons storage areas, an elaborate railroad construction to transport ammunition between the weapons bunkers and Boston, weapons training areas, chemical testing areas, and other military activities. At times, portions of the Sudbury Annex (the refuge property) were leased out to private companies to develop items that will be useful to the military. The military also allowed the land to regenerate itself from pasture and farm land (Gallagher et. al. 1986). Most of the old farmstead houses were demolished by the military and the most of the fields were allowed to revert through natural succession to forest.

Chapter 3: Refuge and Resource Descriptions

The Army's historic uses of the land area formerly known as the Sudbury Training Annex have been researched by the U.S. Army Environmental Center, and its contractors (U.S. Army 1995). The information was collected through various record searches, interviews, and map reviews. A summary of that information is presented in this section; a fuller description of the Army's land-use history is provided in the U.S. Army's 1995 Draft Master Environmental Plan, Fort Devens Sudbury Training Annex, Middlesex County, Massachusetts (prepared by ABB Environmental Service, Inc., Portland, ME for the U.S. Army Environmental Center, Aberdeen, MD. December, 1995.)

Prior to the formal formation of the Annex as a military facility in 1942, the land was privately owned and primarily used as farmland. According to a Goldberg Zoino and Associates (GZA) report some of the land "was owned by industrial companies (such as the Diamond Match Company or Maynard Woolen Mills)." The Annex itself consisted of land falling within the boundaries of the towns of Sudbury, Maynard, Marlboro, Hudson and Stow (GZA 1991).

The Annex became government property in 1942, when a formal petition was filed by the United States to acquire the land by eminent domain (District Court of United States for District of Massachusetts, Misc. Civil no. 6507, March 25, 1942). The location was selected for strategic reasons -- it was well out of range of naval guns - and for its close proximity to four active railroad lines. On August 16, 1942, the area was designated Boston Backup Storage Facility under the Commanding General of Boston Port of Embarkation. Transfer of the then 3,100-acre property occurred on November 10, 1942 (U.S. Army 1995).



One of the U.S. Army's buildings at the refuge:
Photo by Marijke Holtrop

The Annex was originally used to store surplus ammunition for the war effort. It was named the Maynard Ammunition Backup Storage Point (MABSP). Initially, the Annex served as part of the Boston Port of Embarkation system, and was specifically tied to Castle Island Port, the loading point for ammunition being transported overseas. When ships were not available for loading, or a surplus of ammunition had been received, ordnance will be stored at the MABSP. Provision for the safe storage of ordnance was ensured by the construction of 50 earth-covered concrete bunkers located around the central section of the Annex. Railroad spurs were developed to provide access between bunkers and the existing main railroad lines (U.S. Army 1995).

In 1946, the facility became part of Watertown Arsenal and was referred to as Watertown Arsenal (Maynard). The facility was apparently used as a storage depot until 1950, when it was transferred to the first Army and became a subinstallation of Fort Devens from 1950 to 1952 for storage and training. In 1952, the facility was again transferred from Fort Devens

management to the Chief of Ordnance, renamed the Maynard Ordnance Test Station (MOTS) and maintained that name through at least 1957. The principal use of the Annex from 1952 to 1957 was for ordnance research and development activities (U.S. Army 1995).

In 1958, control of the Annex was transferred to the Quartermaster Research and Engineering Center at Natick; and while troop training activities continued, the Annex was now also available for field testing of experiments developed by the laboratories at Natick. Other agencies and operators also were granted permission to use the Annex for a variety of activities, primarily related to materials testing and personnel training. The Capehart Family Housing Area was established by Natick Laboratories in 1962 for its employees. The designation for the Quartermaster Research and Engineering Center was changed to Natick Laboratories in 1962 and to United States Army Natick Research and Development Command (NARADCOM) in 1976, but the same group maintained overall control of the Annex until 1982 (U.S. Army 1995).

Custody of the entire Annex was transferred back to Fort Devens in 1982. (Fort Devens is located some 15 miles to the northwest of the Annex). Until the end of 1994, the mission of Fort Devens was to command and train its assigned duty units and to support the U.S. Army Security Agency Training Center and School, U.S. Army Reserves, Massachusetts National Guard, Reserve Officer Training Programs, and Air Defense sites in New England. The Annex was used primarily for personnel training activities for active duty Army units, for the Army Reserve, as well as for the Army and Air National Guard troops.

The Base Closure and Realignment Act of 1990 (Public Law 101-510), and the subsequent decisions by the BRAC-1991 Commission and Congress required the closure and realignment of Fort Devens. The Army realignment action created the Devens Reserve Forces Training Area for



Volunteers removing the former obstacle course:
Photo by Marijke Holtrop

use by Army Reserve and National Guard forces. The Sudbury Training Annex remained under the management of the Devens Reserve Forces Training Area while environmental investigations and remediation were being completed. On September 28, 2000, management of approximately 2,230 acres of the property transferred to the Service for the formation of the Assabet River NWR. At the time of the transfer of management to the Service, the Sudbury Training Annex, exclusive of the Capehart Family Housing area under the control of the Natick Research and Development Center, was approximately 2,305 acres in size. The Army at the Devens Reserve Forces Training

Chapter 3: Refuge and Resource Descriptions

Center retained administrative responsibility for approximately 75.67 acres, of which 71.5 +/- acres are planned to be transferred to the Federal Emergency Management Agency and 4.15 +/- acres to the U.S. Air Force.

Socio-economic Resources

The group of towns in which the refuge is located is known as the Metro West section of greater metropolitan Boston.

Population and Demographic Conditions

Population trends vary considerably among the neighboring cities and towns of Maynard, Sudbury, Hudson and Stow (U.S. Census Bureau 2001). Overall population levels in the four towns increased from 47,244 to 51,289 (an 8.6% percent increase) between 1990 and 2000. The majority of this increase occurred in Sudbury. The population of Sudbury increased from 14,358 to 16,841 (a 17.3% increase). Maynard's population increased from 10,325 to 10,433 (1%), Stow's increased from 5,328 to 5,902 (10.8%), and Hudson's increased from 17,233 to 18,113 (5.1%) (U.S. Census 2001).

The Boston-Worcester-Lawrence metropolitan area population increased by 363,697 people or 6.7% to a total of 5,819,100 in 2000. The greater Worcester metropolitan area grew by 33,005 people (nearly a 7% increase) to a population of 511,389 in the year 2000 (U.S. Census 2001). A more detailed set of the most recent available U.S. Census (1990) demographic descriptors for Hudson, Maynard and Sudbury is provided at the U.S. Census bureau's web site for the Census 2000 data: <http://factfinder.census.gov> (comparable data for Stow was not available).

Adjacent Communities and Land Uses

Stow, Maynard, Hudson and Sudbury have zoned the refuge what is the equivalent of open-space/conservation. With the exception of the Massachusetts Fire Fighter Training Academy and a nursery, land use surrounding the refuge is nearly entirely low-density residential.

Chapter 4: Management Direction

The Service manages fish and wildlife habitats considering the needs of all resources in decision-making. A requirement of the Refuge Improvement Act is to maintain the ecological health, diversity, and integrity of refuges. The refuge is a vital link in the overall function of the ecosystem. To offset the historic and continuing loss of riparian and forested floodplain habitats within the ecosystem, the refuge helps to provide a biological "safety net" for migratory non-game birds and waterfowl, threatened and endangered species, and other species of concern.

The vision and goals of the refuge translate the stated refuge purpose into management direction. To the extent practicable, each goal is supported by objectives with strategies needed to accomplish them. Objectives are intended to be accomplished within 15 years, although actual implementation may vary as a result of available funding and staff.

Refuge Complex Vision

The Complex will contribute to the mission of the Refuge System and support ecosystem-wide priority wildlife and natural communities. Management will maximize the diversity and abundance of fish and wildlife with emphasis on threatened and endangered species, migratory birds, and aquatic resources. The Complex will have a well-funded and community-supported acquisition program which contributes to wildlife conservation. The refuges will be well known nationally and appreciated in their communities. They will be seen as active partners in their communities, school systems, and environmental organizations which will result in high levels of support for the refuges. The refuges will be a showcase for sound wildlife management techniques and will offer top-quality, compatible, wildlife dependent recreational activities. Refuges open to the public will provide staffed visitor contact facilities that are clean, attractive, and accessible, with effective environmental education and interpretation.

Refuge Complex Goals

The following goals were developed for the Complex to support the mission of the Refuge System and the Gulf of Maine Ecosystem Priorities. These goals provide a general management direction for the refuges. Not all of the goals are applicable to all eight of the Complex refuges. Each of the goals is followed by the management strategies that will help refuge staff to meet the appropriate goals.

Goal 1: Recover threatened and endangered species of the Complex.

There are no known federally listed threatened or endangered species at Assabet River NWR. A number of the strategies and objectives that are

listed under Goal 2 will benefit state listed species. If ongoing monitoring and surveys determine the presence of federally listed species, we will take any and all appropriate actions.

Goal 2: Protect and enhance habitats that support self-sustaining populations of federal trust species and wildlife diversity.

Objective 1: Collect and evaluate relevant baseline habitat and wildlife data to ensure future decisions are based on sound science.

We are currently managing lands for wetland species, forest dwellers and those species requiring grassland, wetland and old field habitat. However, due to the relatively small land base we have, it is important for us to consider how we can best contribute to the overall picture of trust species of the Atlantic flyway. The Northeast Region of the Refuge System is



Mallard with ducklings: Photo by Joseph Rhatigan

currently working on a region-wide strategic plan to establish management goals for refuges which address landscape concerns and needs. We are currently gathering data to better understand the role of these refuges for these species and will begin additional surveying, monitoring and researching of our lands. This information is essential for determining our management focus. Using this information and guidance from the regional strategic plan, we will draft an HMP for the refuge which will outline the direction and details of refuge management. The HMP will include information required under the Service's Biological Integrity, Diversity, and Environmental Health Policy, including discussion of historic conditions and restoration of those conditions if possible (see <http://policy.fws.gov/601fw3.html> to view this policy).

In addition to current management activities, increased staff and funding resources associated with our management will enable us to take a number of actions that will lead to the completion of two key step-down plans under this CCP: the HMP and a Habitat and Wildlife Inventory and Monitoring Plan (HWIMP).

Strategy 1: Continue to participate in several region-wide and Service-wide surveys and studies, including information on frogs, shorebirds, marsh birds, and American woodcock. Breeding bird surveys and participation in the national frog deformity project will continue as staff and funding allow.

Strategy 2: Update and expand current wildlife inventories to close data gaps related, in part, to seasonality of use, habitat-type preferences, and, where practicable, estimates of population numbers. We will survey and inventory both the Service's trust resources (migratory birds and federally listed threatened and endangered species) and resident wildlife, including state listed threatened and endangered species. We expect to accomplish

these concurrently; however, if necessary, surveys and inventories related to the Service's trust resources may receive priority.

Strategy 3: Monitor water quality. We will rely on partners such as OAR and SVT to conduct this monitoring. We will participate in the SuAsCo Watershed Community Council and other venues and participate in the regulatory process to ensure that permits and projects are approved that will improve water quality.



Frog: Photo by Hanxing Yu

Strategy 4: Within 3 years, conduct a thorough survey on plants of the refuge. We will obtain aerial photography to develop a cover type map and ground truth the information in the field. The cover type map will show locations and acres for each habitat type. In addition, we will record locations of federally endangered and threatened species, other priority species, and invasive species

using a global positioning system, and identified on the cover type map. We will update the map every ten years.

Strategy 5: Within 5 years, conduct a comprehensive survey of invertebrates in the spring and summer, noting federal and state endangered and threatened species. We will use “sticky” sticks (paint stirrers dipped in Tanglefoot Insect Trap Coating and placed horizontally on and vertically in the substrate) to sample ground-based invertebrates throughout the refuge. We will utilize collecting nets to sample winged invertebrates.

Strategy 6: Within 5 years, survey amphibians and reptiles using a combination of pitfall traps, fyke nets, and audio cues. We will survey aquatic turtles using fyke nets during the summer and fall. We will sample terrestrial turtles, snakes, and amphibians using pitfall traps.

Strategy 7: Within 5 years we will census migrating raptors, and neotropical migrants for two seasons. We will conduct raptor surveys throughout the fall, using methods developed by the Hawk Migration Association of North America. We will work with local birders and organizations to determine the best method for censussing neotropical migrants.

Strategy 8: Within 10 years, sample freshwater fish throughout the river and ponds on the refuge using passive and active capture gear and electrofishing. Passive gear includes, but is not limited to, gill nets, trammel nets, and fyke nets. Active gear includes, but is not limited to, seines, nets, and hooks. Depending on the diversity and abundance of fish that are found in the ponds, we may initiate mark/recapture studies.

Strategy 9: Within 10 years, survey small mammals using small live box traps, snap traps, and pitfall traps. We will arrange traps in a grid throughout the refuge and trapping will be done during the spring, summer, or fall. If any threatened or endangered species are found, we may initiate mark/recapture studies to develop a population estimate.

Objective 2: Manage aquatic and upland habitat to maintain habitat and species diversity.

We will determine resources of concern, including focus species or species-groups and their habitat needs. Focus species and habitats are most likely to be selected based on a combination of factors such as: endangerment (federal and state-listed species); priority, national and regional Service plans (such as the NAWMP, the PIF, etc); Service policies/regulations such as those related to HMPs and maintenance of ecological integrity; the purpose for which the refuge was established (its value for the conservation of migratory bird species); current/historical species and habitat presence; and recommendations from MassWildlife or other partners.



Wetland habitat: Photo by John Grabill

Strategy 1: Continue with the status quo of our old field, grassland, upland and wetland habitat management, until our management plans are completed. Some areas that are currently being mowed may eventually be allowed to revert to forest or may be managed as early successional habitat. Until final decisions are made about each parcel, based on the HMP, current management techniques will be allowed to continue.

Strategy 2: Within 3 years, develop a long-range HMP. We will include information for all habitats and species on the refuge, with a focus on resources of regional and national concern (based on regional and Service plans). We will provide quantitative and measurable objectives and strategies for habitat management to enhance resources of concern.

Strategy 3: Within 5 years, complete a HWIMP. We will include an on-going monitoring component designed to measure progress toward those objectives outlined in the HMP, and to allow mid-course corrections or alterations as they may be needed. We will develop any additional step-down plans that may be required, depending on specific habitat management techniques or practices that may be recommended in the plans including chemical, mechanical or fire. We will develop protocol in this plan to be statistically sound and peer reviewed.

Strategy 4: Continue to seek opportunities to develop cooperative management agreements with neighboring conservation organizations and individuals. We will work with our conservation partners and, where our

mission, goals, and objectives are compatible, will work together to implement habitat management and biodiversity strategies.

Objective 3: Limit the spread of invasive and overabundant species and minimize habitat degradation.

Strategy 1: Document presence, acreage, and location of invasive and overabundant species in conjunction with vegetation surveys and development of a cover type map. We will take baseline measurements of key condition indices such as density, height, and percent cover.

Strategy 2: Develop an Integrated Pest Management Plan (IPMP), which will provide a full range of potential and alternative mechanical, biological and chemical control strategies. We will include a monitoring program as a part of the plan, which will consist of plot sampling, estimates of cover, and



Japanese Knotweed: Photo by Marijke Holtrop

responses of wildlife and other plants. We will use the IPMP in concert with habitat monitoring to assess progress and the effectiveness of different techniques, and identify additional problem species. We will research alternative methods of controlling certain species as appropriate, based on monitoring results. Control strategies will be species specific and may employ biological vectors, mechanical methods (hand pulling), fire, or herbicides. We will use the least intrusive, but most effective control practice. As previously discussed, use of herbicides would require action specific step down plans, and in some situations proposed control methodologies may also require wetland permitting review and approval.

Strategy 3: We will also participate in appropriate, experimental invasive species control research programs. These programs must be reviewed and approved by Service regional or national biological staff and the Department of the Interior's wildlife research arm, the Biological Resources Division, now located within the U.S. Geologic Survey, before any research is initiated.

Strategy 4: Control invasive and overabundant animal species using the most effective means available. There are currently identified problems related to overabundant or invasive animal species on the refuge. Beaver have occasionally caused localized flooding of refuge trails and maintenance roads and are raising water levels, which is affecting a well on the refuge. Control of such situations includes manually clearing culverts, installing grates on culverts and water-control structures, and installing beaver deceivers in dams or on culverts. Devices range from a simple PVC pipe inserted into dams to reduce water levels, to fencing constructed in a semicircle around a culvert with drain pipes inserted through the fence. If more serious threats to habitat, refuge facilities, adjacent property or

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endangerment of health arise, we will work, in coordination with the MassWildlife, to either trap and relocate individual animals from problem sites, permit licensed sports trappers or hunters to reduce population numbers, remove individual beavers through trapping or shooting by refuge staff, or to permit a licensed animal damage control firm to reduce population numbers by trapping. If needed, we will issue a special use permit and complete a compatibility determination outlining specific requirements and conditions for beaver removal.

We will monitor mute swans on the refuge. In an effort to keep this aggressive, non-native species from becoming a resident on the refuge, territorial or nesting swans on the refuge will be lethally removed after obtaining appropriate permits from our migratory bird office.

Goal 3: Build a public that understands, appreciates, and supports refuge goals for wildlife.

Objective 1: Mitigate existing physical safety hazards, complete necessary public use plans and regulations, and open portions of the refuge in phases.

Strategy 1: Correct the currently known safety hazards. Prior to opening specific portions of the refuge, we will remove concertina wire, razor wire, unneeded barbed wire and old Army communications wire; secure the buildings either by boarding windows and doors or by demolishing and removing buildings (if architectural/ engineering condition and historical significance assessments indicate that to be appropriate); install refuge signs to deter entrance into or around sites, where needed; and secure the large diameter, open hand-dug wells by filling in accordance with MADEP requirements. Most or all of these wells pre-date the Army's acquisition of the property in 1942. If any of the wells are determined to be of historical significance, we will coordinate with the State Historic Preservation Office to determine the appropriate closure method (filling, capping with concrete or wood closures, etc).



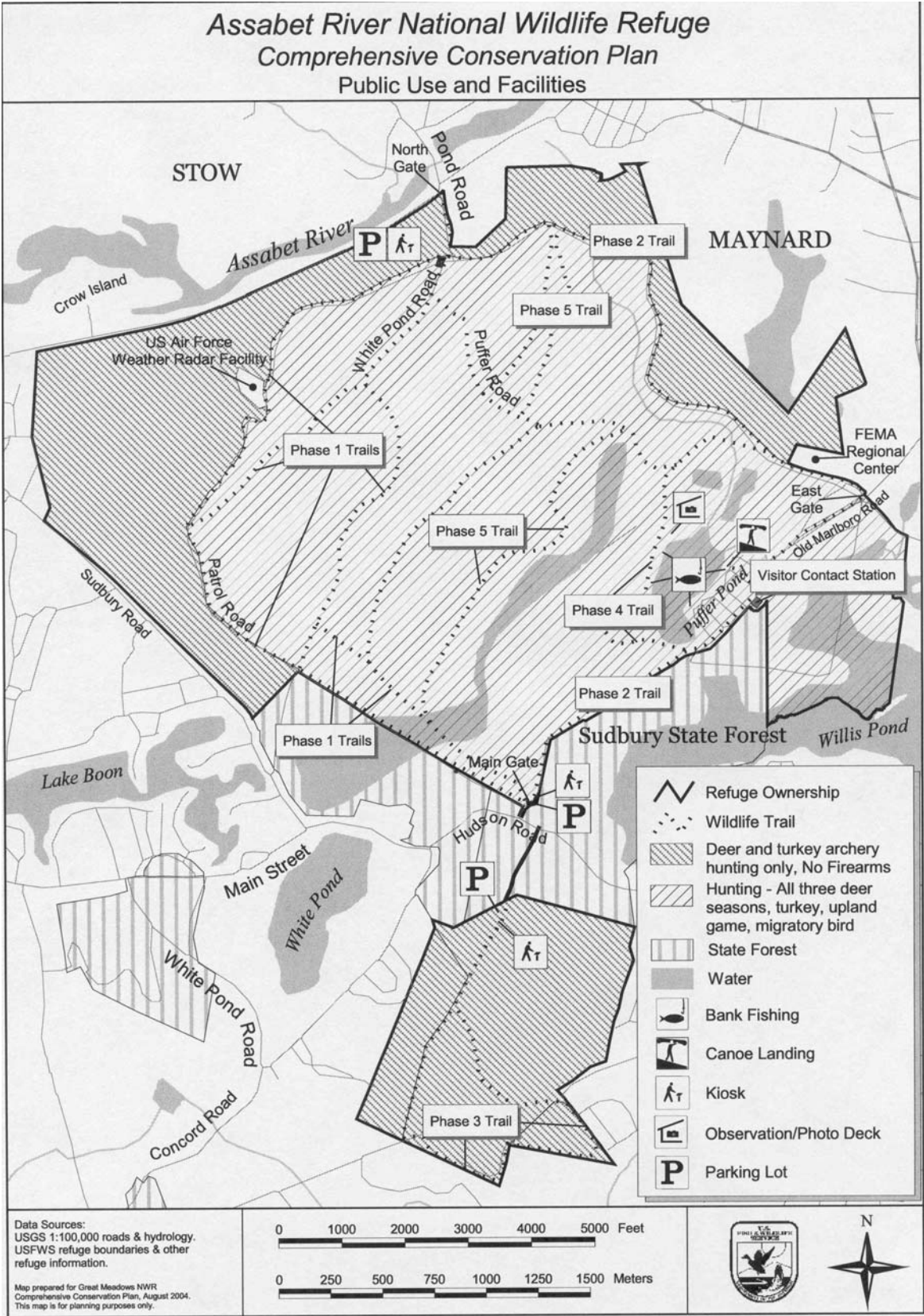
One of the buildings that has been removed from Assabet NWR: Staff photo

Strategy 2: Within 3 years, develop a Visitor Services Plan.

This document will include specific goals and strategies for the public use program. It will be available for public review and comment.

Strategy 3: Open portions of the refuge in phases. The sequencing of the portions to be opened may vary depending on availability of funding, completion of building condition and historical assessments, and continuation of support from the Friends of the Assabet River NWR and volunteers who have been assisting with this work. All opened trails are existing roads and will not require clearing of additional land. Our current conceptual plan (Map 4-1) is

Map 4-1: Public Uses to be Phased in at Assabet River NWR



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to clear the safety hazards and open portions of the refuge in the following sequence:

(1) The portion of the refuge running along Patrol Road from the former Main Gate on Hudson Road, past the Air Force Weather Radar Facility and ending at the former North Gate on White Pond Road. White Pond Road will be opened for foot traffic from the former North Gate to its southerly juncture with Patrol Road. At least rudimentary parking areas



Trail: Photo by Stanley Klein

will be provided at the North and Main Gate entry points. Access on the refuge will initially be limited to foot traffic use of the Patrol Road through this area. General use of areas of the refuge off Patrol Road will be limited to educational and interpretive programs, wildlife observation and photography opportunities and hunting season use.

(2) The portion of the refuge running along Old Marlboro Road (also known as Craven Lane) running from the former Main Gate to the former East Gate at the Federal Emergency Management Agency Regional Center, and continuing along Patrol Road to the former North Gate. At least a rudimentary parking area will be provided at the East Gate entry point. Limited access to the easterly side of Puffer Pond could be provided in this phase. General use of areas of the refuge off these former roads will be limited to fishing at Puffer Pond, educational and interpretive programs and hunting season use.

(3) A walking trail within the portion of the refuge located south of Hudson Road. A rudimentary parking area will be provided inside the refuge along the access road from Hudson Road. General use of areas of the refuge off the trail will be limited to educational and interpretive programs and hunting season use.

(4) A trail along the former railroad bed road network through the old bunker complex beginning at Old Marlboro Road and running northerly along the westerly side of Puffer Pond to old Puffer Road, and then easterly to Patrol Road. General use of areas of the refuge off the trail will be limited to educational and interpretive programs and hunting season use.

(5) Two additional foot trails through the former bunker complex will be opened for public use. These will begin near the former Main Gate, with the first running along the southerly and westerly edge of the complex to Puffer Road. The second will run northerly through the mid portion of the complex to Puffer Road. Puffer Road will be opened for foot traffic from White Pond Road and easterly to its junction with Patrol Road. General use of areas of the refuge off the trails will be limited to educational and interpretive programs and hunting season use.

Strategy 4: Provide minimally intrusive parking areas as funding and staff allow.

Objective 2: Provide opportunities for wildlife observation and photography where such opportunities can be safely provided while achieving refuge purposes.

Strategy 1: Provide a total of approximately 15 miles of trails for public use as defined in the phased opening above.

Strategy 2: Construct a wildlife observation platform and a photography blind. The current, proposed locations of these facilities are depicted on Map 4-1.

Objective 3: Provide and enhance opportunities for environmental education, interpretation, and outreach where appropriate and compatible with refuge purposes.

Strategy 1: Initiate a very active program in local and regional environmental education and interpretive programs.



Environmental Education: Staff photo

Strategy 2: Expand the Complex's Urban Education Program to include the refuge and an additional elementary-middle-high school system within the area.

Strategy 3: Endeavor to work with other school systems to provide instructional materials and presentations related to refuge resources and management programs that are occurring on the refuge.

Strategy 4: Provide teacher workshops when requested, if staffing allows.

Strategy 5: Construct three informational kiosks at entrances to refuge foot trails and a self guided interpretive trail with signage and explanatory pamphlets.

Objective 4: Provide opportunities for hunting and fishing where appropriate and compatible with refuge purposes.

Parts of the Assabet River NWR will be open for shotgun, primitive weapons, and archery hunting. Species that will be open for hunting on various portions of the refuge and the specific areas are identified below and are depicted on Map 4-1.

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Before hunting is allowed on the refuge, the Code of Federal Regulations must be amended to authorize the hunting of upland game (ruffed grouse, rabbit and squirrel), migratory birds (American woodcock) and big game (white tailed deer and turkey) hunting on Assabet River NWR. There will be a public comment period announced in the Federal Register. We anticipate an early 2005 Federal Register notice. Refuge staff will prepare a Hunt Plan before hunting is allowed. No additional NEPA compliance is necessary.



Water and pond lilies: Photo by Marijke Holtrop

Providing hunting and fishing opportunities addresses the mandates of Executive Order 12996 and the Refuge Improvement Act by providing the public with an opportunity to engage in wildlife-dependent recreation. Hunting and fishing are recognized by the Service as traditional forms of wildlife dependent outdoor recreation. We anticipate a low to moderate degree of hunting and fishing pressure to occur as a result of opening the refuge for these activities. The plan to permit hunting and fishing on the refuge will not

significantly affect the wildlife populations in Massachusetts, as the refuges represent only a very small portion of the overall habitat available in Eastern Massachusetts.

The refuge weighs a number of factors in opening an area to hunting or fishing, including visitor safety considerations. The Refuge Manager may, upon annual review of the hunting program, impose further restrictions on hunting and fishing activity, recommend that the refuge be closed to hunting or fishing, or further liberalize hunting or fishing regulations within the limits of State law. Restrictions will occur if hunting or fishing becomes inconsistent with other higher priority refuge programs or endangers refuge resources or public safety.

Annual permits will be required for hunting on the refuge. The permits will facilitate managing numbers of hunters and harvest. Fees charged for these permits will offset costs associated with managing hunting programs. For additional information on the fee program, see the section on fees beginning on page 59.

Enforcement of federal and state hunting and fishing regulations will be accomplished through patrols by refuge law enforcement officers. Enforcement patrols may also be conducted by Massachusetts Environmental Police Officers. The frequency of patrols will be determined by hunter use, the level of compliance observed during patrols, and information obtained from participants, visitors and other sources.

Refuge brochures and hunter orientation prior to the hunting seasons will emphasize refuge specific regulations, safety considerations and the protection of wildlife species found on the refuge.

In addition to state hunting regulations, the refuge may impose additional regulations. Examples of refuge regulations that would apply to hunting on the refuge include:

- hunters will be required to obtain permits from the refuge to hunt on the refuge;
- hunters may enter the refuge two hours before legal sunrise and must leave within 1.5 hours after legal sunset, and hunting can occur no earlier than one-half hour before sunrise and one-half hour after sunset;
- no night hunting will be allowed on the refuge;
- pre-hunt scouting of the refuge is allowed by permit, during specific time periods;
- carrying guns is not permissible during pre-hunt scouts;
- permanent blinds are not permitted on the refuge;
- all hunting materials, tree stands, and flagging must be removed at the end of each hunting day;
- no one shall insert a nail, screw, spike, wire, or other ceramic, metal, or other tree-damaging object into a tree, or may hunt from a tree into which such an object has been inserted ;
- the unauthorized distribution of bait and the hunting over bait is prohibited on wildlife refuge areas;
- all firearms must be unloaded outside of legal state hunting hours;
- the use of all terrain vehicles (ATV's) and snowmobiles on refuge land is prohibited;
- training of dogs on the refuge is not permitted;
- open fires are not permitted;
- the use or possession of alcoholic beverages while hunting is prohibited.

Check stations will not be established on the refuge at this time but reporting requirements may be instituted. Refuge staff will provide information about reporting forms when permits are issued.

The refuge will work with partners to provide increased hunter education through training, brochures, and news releases.

As a part of the hunt plan we will determine exactly when hunting will be allowed. The maximum amount of time that the refuge will be open for hunting is the full state seasons for each type of hunting. It is possible that we will open for a shorter duration, limited hours, or limited days of the week. In Massachusetts there is no hunting on Sundays. To illustrate the maximum potential hunting period, Table 4-1 displays the 2004 Massachusetts hunting seasons for each of the types of hunting proposed for Assabet River NWR.

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Table 4-1: 2004 Massachusetts Hunting Seasons

Season	Start Date 1	End Date 1	Start Date 2	End Date 2
Deer (Archery)	10/11/2004	11/20/2004		
Deer (Primitive Firearms)	12/13/2004	12/31/2004		
Deer (Shotgun)	11/29/2004	12/11/2004		
Wild Turkey	4/26/2004	5/22/2004		
Woodcock	10/14/2004	10/30/2004	11/1/2004	11/13/2004
Ruffed Grouse	10/16/2004	11/27/2004		
Cottontail Rabbit	10/16/2004	2/28/2005		
Gray Squirrel	10/16/2004	1/1/2005		

Strategy 1: Provide opportunities for archery, shotgun and primitive firearm big and upland game hunting on the refuge in accordance with Massachusetts State regulations and requirements. Among other restrictions, these regulations prohibit the discharge of any firearm or arrow upon or across any state or hard-surfaced highway or within 150 feet of any such highway, and hunting within 500 feet of any dwelling or building in use, except as authorized by the owner of occupant thereof.

A limited special season will be provided for physically handicapped hunters. Selected roads on the refuge will be open for vehicle traffic during this season. We believe the physical configuration of trails and roads on the refuge will allow us to provide handicapped accessible hunting opportunities from several of these access routes.

Shotgun hunting of upland game (ruffed grouse, rabbit, and squirrel) and big game (white-tailed deer and turkey (spring season only per current state season restrictions)) will be allowed on the “North Section” of Assabet River NWR. All state regulations and restrictions will apply and be enforced, including the safety related restrictions discussed above. In addition, the use of non-toxic shot (non-lead) will be required for all upland game seasons (see Map 4-1).

On the “South Section” of Assabet River NWR, hunting will be allowed by archery only for deer and turkey.

Strategy 2: Provide opportunities for migratory bird hunting on the refuge. American woodcock hunting will be provided according to federal regulations, north of Hudson Road only. Waterfowl hunting on the refuge (or portions of the refuge) may be opened in the future, if the wildlife and habitat inventories and plans previously discussed indicate such action will not have detrimental effect on waterfowl habitat or use of such habitat by migrating or overwintering populations. We are particularly concerned since most of the waterfowl may be concentrated in areas that will be difficult for hunters to access without impacting vegetation, including some rare state-listed plant species. We will continue to gather information to

assess waterfowl use on the refuge, specifically habitats being used and seasonality of that use.

Strategy 3: Provide fishing opportunities at Puffer Pond. Fishing will be restricted to “catch-and-release” and “no live-bait” use. After additional fisheries surveys are completed and we assess sustainable harvest, we may consider eliminating the “catch-and-release” restriction. However, until that data is collected, only “catch-and-release” fishing will be allowed. We will provide limited shoreline fishing from up to four areas along the pond perimeter and fishing from canoes will be allowed. Ice fishing will not be permitted. The current, proposed locations of these facilities are depicted on Map 4-1. These shoreline fishing areas may need to receive stabilization or be provided with erosion control measures prior to being opened, and they may be closed as needed to prevent or repair bank erosion if such should develop. At least one of these locations will be made handicapped accessible.

Objective 5: Improve the visibility of the refuge in the community and increase awareness of the Refuge System in general and the management activities and purpose of the refuge.

As the Assabet River NWR continues to contribute to the quality of life in east-central Massachusetts, strong support in the community and the region will also continue to contribute to its success. Helping hands are needed for program development, data gathering, and other opportunities discussed in these alternatives. Only with this type of assistance can the refuge fully achieve its goals and objectives, support the missions of the Refuge System and the Service, and help meet the needs of the community. Volunteers participate in a wide variety of activities. These include wildlife and wildlands photography, assisting with or conducting educational and interpretive programs, providing information to visitors, conducting observations and surveys of wildlife species, botanical surveys, litter pick-up, trail clearing and maintenance, sign rehabilitation, and other maintenance projects.



USFWS photo

The volunteer program at the Complex has been growing steadily. In 1990, volunteers provided more than 3,435 hours of assistance to the Refuge Complex. In 2000, volunteers provided 20,675 hours of service. The total for 2001 was 25,432. Six thousand of those hours were at Assabet River, 5,870 at Oxbow and 2,641 at Great Meadows. Much of this volunteer work was done by core volunteers and active Friends Group members. Through 2004, we have received incredible support from volunteers. We are deeply indebted to all of our volunteers for their dedication and services rendered for the betterment of our nation’s natural resources.

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Strategy 1: Organize and host one or more annual events (such as National Fishing Day, National Wildlife Refuge Week or Earth Day) designed to promote wildlife-dependent recreation and natural resource education.

Strategy 2: Initiate programs to provide local communities and landowners educational and informational material and strategies related to natural resource protection and restoration. On-going refuge resource management practices and habitat restoration areas will be incorporated in all of these programs to serve as illustrations or demonstrations of resource management concepts and techniques.

Strategy 3: Develop a refuge-specific informational brochure.

Strategy 4: Work with partners and local communities to place informational kiosks related to the refuge and resource management at three off-refuge locations.

Goal 4: Adequately protect cultural resources that occur in the complex.

Strategy 1: Continue evaluations or surveys of cultural resources (archeological and historical) on a refuge project-specific basis. Soil disturbance requires resource evaluation and clearance. Federal cultural resource protection laws and regulations would be enforced.



Wood Frog Eggs: Photo by Marijke Holtrop

Strategy 2: Within 10 years, initiate and complete cultural and historical resource surveys and inventories on a refuge-wide basis. The archeological survey portion of this work will be designed to develop predictive models that could be applied refuge-wide in evaluating the potential of future projects to impact cultural resources.

Strategy 3: Comply with Section 106 of the National Historic Preservation Act before conducting any ground disturbing activities. Compliance may require any or all of the following: State Historic Preservation Records survey, literature survey, or field survey. The Service has a legal responsibility to consider the effects its actions have on archeological and historic resources.

Goal 5: Maintain a well-trained, diverse staff working productively toward a shared refuge vision.

We will continue to utilize Service policy, training opportunities, and other appropriate means to meet the staffing goals.

General Refuge Management

The following management direction applies to various refuge goals and across program areas. Some of this direction is required by Service policy or legal mandates. Refuge management is organized by topic area.

Refuge Access and Fees

The Complex will charge an entrance fee at the Oxbow and Assabet River NWRs, and at the Concord impoundments of Great Meadows NWR, and a user fee for hunting on the Complex. Our fee program will be established under the Recreation Fee Demonstration Program (Fee Demo Program), a program which Congress initiated in 1997 to encourage Department of Interior agencies that provide recreational opportunities to recover costs for their public use facilities, improve visitor facilities, promote activities for visitors and address the maintenance backlog of visitor service projects (USFWS 1997a). Congress re-authorized the Fee Demo Program in 2004 for 10 years. The Fee Demo Program requires at least 70% of revenue remain at the collection site. Currently, 80% of the funds raised from user fees on a particular refuge in this region stay at the refuge. The other 20% is sent to the region to be distributed to other refuges. No more than 15% of the fees collected can be used for fee collecting or fee collection systems. The Complex has received money from these regional funds in previous years for public use facilities. If the program does become permanent, the percent of revenue remaining on site could change, however it will never be less than 70% and could be as much as 100%. Visitors with a current duck stamp, Golden Eagle Pass, Golden Age Pass or Golden Access Pass do not have to pay entrance fees.

The following entrance fee program will be initiated at the Complex.

- A one day entrance fee will be charged per car or per group if arriving via foot or bicycle. Our proposed fee will be \$4 per day.
- An annual pass for three refuges in the Complex (Assabet River, Great Meadows and Oxbow) will be available for \$12.
- Daily entrance fees will be collected by refuge staff stationed on site or at self-service fee collection stations.
- Self-service fee collection stations will likely consist of a secure box with envelopes to register and pay the daily or annual fee.
- We will attempt to make purchase of the annual pass available by fax and on-line. The pass will also be available at the Refuge Headquarters.

The following Hunting Permit Fee Program will be implemented in conjunction with the hunting program described earlier in this chapter.

- We will charge an annual fee of \$20 for a hunting permit. This permit will be valid for all unrestricted hunting seasons open on the Northern refuges (Assabet River, Great Meadows, and Oxbow NWRs). Hunters

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with a valid hunt permit will not have to pay an entrance fee while scouting or hunting.

- There may be a need to limit hunting during certain seasons to ensure a safe, high-quality hunt. Details of these restrictions and any application requirements will be outlined in the Hunting Management Plan. Based upon these restrictions, purchase of a permit does not guarantee the ability to hunt all seasons on all refuges. No additional fee would be required for hunting applications for restricted seasons.
- At the time of purchase of the annual hunting permit, the individual may choose to purchase an annual entrance pass for an additional \$5. The combined permit/pass must be purchased jointly.
- Individuals that do not purchase the combination permit/pass will be subject to entrance fees on the refuge during times when they are not hunting or scouting.

We realize that the new fee program will require an adjustment period. Our plan for instituting the fee includes: an educational period, a warning period, and finally a transition to full enforcement.

We may adjust fees over the 15 year period addressed in this plan to reflect changes in administrative costs or management goals.

Accessibility

Each refuge will operate its programs or activities so that when viewed in its entirety, it is accessible and usable by disabled persons. The Rehabilitation Act of 1973, as amended, requires that programs and facilities be, to the highest degree feasible, readily accessible to, and usable by, all persons who have a disability.

Fire Management

U. S. Department of the Interior and Service policy state that Refuge System lands with vegetation capable of sustaining fire will develop a Fire Management Plan (FMP) (620 DM 1.4B; 621 FW 1.1.1). The Complex FMP, which includes Assabet River NWR, provides direction and continuity in establishing operational procedures to guide all fire management objectives as identified in the plan. This plan was finalized in March 2003. The FMP includes descriptions of the refuges and addresses wildland and prescribed fire events. The FMP also defines levels of protection needed to ensure safety, protect facilities and resources, and restore and perpetuate natural processes, given current understanding of the complex relationships in natural ecosystems.

The associated EA was prepared in compliance with NEPA and the Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500 -1508). It provides a description of the purpose and need for the project, a brief background, the features of each alternative, the affected environment, and

resulting effects and consequences of each alternative. The selected alternative, “prescribed fire and wildland fire suppression” is discussed in detail in the EA. Alternatives which were considered, but not selected, include differing combinations of: allowing naturally ignited fires to burn in some instances; use of prescribed burning to achieve wildlife resource and habitat objectives; and, wildland fire suppression. A “no-action” alternative of allowing all fires to burn at all times was initially considered, but dismissed as not suitable for further consideration in the development of this proposal. The no-action alternative was rejected because it fails to meet Service policy in regards to potential liability for losses of life and property, as well as its unacceptable environmental, social, and economic costs.

The mission of the Complex is to protect and provide quality habitat for fish and wildlife resources and for the development, advancement, management, and conservation thereof. By defining an appropriate level of wildland fire protection, and integrating a prescribed fire program based on biological needs, the FMP and EA are fully supportive and sensitive to the purpose of the Complex, and of benefit to the Service, in performing its activities and services.



Wetland habitat: Photo by John Grabill

Land Protection

The Service is currently working on a new national land conservation policy and strategic growth initiative. This policy will develop a vision and process for growth of the Refuge System, helping individual refuges better evaluate lands suitable for inclusion in the Refuge System. The process will help ensure that lands the Service protects are of national and regional importance and meet certain nationwide standards and goals. Also, some of the focus of reevaluating Refuge System growth has come from the need to address nationwide operations and maintenance (O&M) backlogs on existing properties. Many refuges, including Assabet River NWR, are not fully staffed under current budgets and have significant O&M backlogs. Expanding boundaries creates a need for additional staff, O&M funds, as well as additional dollars for the land protection itself. Our Director has asked that we focus, on acquiring inholdings within already approved boundaries. The Service may make slight modifications to a refuge boundary to acquire additional lands of high resource value adjacent to the refuge, if we have a willing seller.

The Service’s land acquisition policy is to obtain the minimum interest necessary to satisfy refuge objectives. Conservation easements can sometimes be used in this context, when they can be shown to be a cost-effective method of protection. In general, conservation easements must preclude destruction or degradation of habitat, and allow refuge staff to

Chapter 4: Management Direction

adequately manage uses of the area for the benefit of wildlife. Because development rights must be included, the cost of purchasing conservation easements often approaches that of fee title purchase, thus rendering this method less practical. Donations of easements or voluntary deed restrictions prohibiting habitat destruction will be encouraged. In addition, the Service could negotiate management agreements with local and state agencies, and accept conservation easements on upland tracts.

Funding for land acquisition comes from the Land and Water Conservation Fund and the Migratory Bird Conservation Fund under the Migratory Bird Conservation Act.

In the future, we may look at wetland, upland and river systems near Assabet River NWR which are of interest for possible private-lands habitat improvement projects, easements, and/or acquisition. In particular, we believe protection of lands associated with the Sudbury, Assabet and Concord River watershed is important for the health of fish and wildlife on the refuge. All lands within the Assabet River NWR acquisition boundaries are already acquired.

Resource Protection and Visitor Safety

Protection of visitors and both natural and cultural resources will be improved. We propose to increase refuge staff by one additional, full-time Park Ranger, and provide the necessary, intensive federal law enforcement training required for dual function law enforcement responsibilities to two additional staff (e.g., an assistant manager, refuge operations specialist, or an outdoor recreation planner).



Former Army drop zone: Photo by Marijke Holtrop

Refuge staff will complete a fire suppression contract or agreement with state or local fire suppression agencies for wildfires occurring on the refuge (see section Fire Management at the beginning of this chapter).

Special Use Permits and Memorandum of Understanding and Agreement

Guided tours, by outside groups, are permitted on the refuges if the activity is determined to be appropriate and compatible with the refuge(s) purpose. Permitting will be divided into four categories by the type of use and the regularity of the activity requested. Where appropriate, one Permit or Agreement will be developed for all three northern refuges in the Complex including Oxbow, Assabet River and Great Meadows NWRs.

Special Use Permits may be issued to user groups or individuals for annual or single events. These organizations or individuals are those who want to

use the refuges for a special purpose (e.g. commercial photographer, special event or research study), or to gain access to an area otherwise closed to the public (e.g. one time entrance to closed areas to film/photograph special event or hold special wildlife celebration day on refuge). Groups will be given specific requirements and educational guidelines on materials to present to the public. The specific charge and specific requirements will be determined on a case by case basis.

A Memorandum of Understanding (MOU) or Memorandum of Agreement (MOA) may be issued to user groups/individuals who want to use the refuges for a special purpose or gain access to an area otherwise closed to the public, on a regular basis or annually. Groups will be given specific requirements and educational guidelines on materials to present to the public. The specific charge and specific requirements will be determined on a case-by-case basis.

A concession may be developed if a business operated by private enterprise is providing a public service (recreational, educational and interpretive enjoyment of our lands and waters for the visiting public), and generally requires some sort of capital investment.

Concessionaires will generally gross a minimum of \$1,000 and the concession will be charged either a fixed franchise fee or a percent of gross income. Groups will also be given specific requirements and educational guidelines on materials to present to the public.

Research

The Service encourages and supports research and management studies on refuge lands that improve and strengthen natural resource management decisions. The Refuge Manager encourages and seeks research relative to approved refuge objectives that clearly improves land management, promotes adaptive management, addresses important management issues or demonstrates techniques for management of species and/or habitats. Priority research addresses information that will better manage the Nation's biological resources and is generally considered important to: Agencies of the Department of Interior; the Service; the Refuge System; and state fish and game agencies, or important management issues for the refuge.

We will consider research for other purposes, which may not directly relate to refuge specific objectives, but may contribute to the broader enhancement, protection, use, preservation and management of native populations of fish, wildlife and plants, and their natural diversity within the region or flyway. These proposals must still pass the Service's compatibility policy.

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We will maintain a list of research needs that will be provided to prospective researchers or organizations upon request. Our support of research directly relates to refuge objectives and may take the form of: funding, in-kind services such as housing or use of other facilities, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

All researchers on refuges, current and future, will be required to submit research proposals which include a detailed research proposal following Service Policy FWS Refuge Manual Chapter 4, Section 6. All proposals must be submitted at least three months prior to the requested initiation date of the project. Special Use Permits must also identify a schedule for annual progress reports. The Regional Refuge biologists, other Service Divisions and state agencies may be asked to review and comment on proposals.

Chapter 5: Refuge Administration

Refuge Staffing

We will seek to fully staff the minimum requirement identified as a part of this CCP process. The Assabet River NWR will continue to share a refuge manager with Oxbow NWR, and fill the staffing needs as described in Appendix F. Those positions include:

- refuge operations specialist/manager
- outdoor recreation planner
- two maintenance workers
- park ranger (law enforcement)
- two refuge biologists
- forester (who will share responsibilities at several units of the Complex)
- administrative technician.

The eight Eastern Massachusetts NWRs are managed as a Complex, with centrally stationed staff taking on duties at multiple refuges. The CCP examines the need for staff specific to the three refuges that were organized under the Draft CCP/EA that was released in July 2003. A total of 39 full time personnel and a seasonal Biotech are needed to fully implement all three refuge CCPs. Permanent staff serving all three refuges may be stationed at the Refuge Headquarters in Sudbury, MA. Appendix F identifies currently filled positions, recommended new positions, and the overall supervisory structure. The new positions identified will increase visitor services, biological expertise, and visibility of the Service on refuge lands.



Painted turtle: Photo by Mena Schmid

Refuge Funding

Successful implementation of the CCPs for each refuge relies on our ability to secure funding, personnel, infrastructure, and other resources to accomplish the actions identified. Full implementation of the actions and strategies in this CCP will incur one-time costs of \$2.6 million. This includes staffing, major construction projects, and individual resource program expansions. Most of these projects have been identified as Tier 1 or Tier 2 Projects in the Refuge System's Refuge Operations Needs System database (RONS). Appendix E lists RONS projects and their recurring costs, such as salaries, following the first year. Also presented in Appendix E is a list of projects in the Service's current

Maintenance Management System (MMS) database for the Refuge Complex. Currently, the MMS database lists \$3.23 million in maintenance needs for the refuge.

Refuge Buildings and Facilities

We will complete our architectural/engineering condition assessment and historical significance review of the 9 structures remaining on the refuge. All buildings with historical significance will be appropriately documented. All 9 structures will be removed following review and documentation.

We will work with state, private and other federal partners to obtain authorization and funding that will enable the construction of a visitor contact station at the Assabet River NWR. The siting of the facility will be determined at a later date, and will be based on the wildlife and habitat management plans to be developed as well as the historical and condition assessments of existing facilities. A location close to the former Main or North Gates will be the most likely to be chosen for the center. The visitor



Redwing Blackbird chicks: USFWS photo

contact station will be no more than 4000 square feet in size. It will provide space for interpretive exhibits, a meeting room and administrative offices for refuge staff. The current, proposed locations of these facilities are depicted on Map 4-1.

As part of the Centennial Celebration for the Refuge System, the Service identified ten refuges in the country for new visitor centers. The Complex ranked number three on the Service's list. Refuges were ranked on a number of factors including their need for a facility and potential to provide opportunities for a

large audience. The site for the new facility is not identified in this document. However, below are the criteria we will use to identify potential sites. Sites chosen will be evaluated in a later Environmental Assessment. The new center might be located at Great Meadows, Oxbow, or Assabet River NWRs or off-site in the vicinity of one of these refuges. The new facility will house exhibits focusing on a variety of environmental themes as well as refuge management activities. We will implement recommendations for interior facility design from the Complex Project Identification Document, after it is finalized. We will evaluate each potential site with the following criteria:

- Access from a major travel route (Route 2, 128, etc.)
- Access from public transportation
- Accessibility of utilities
- Presence of trust species, habitats or other important resources
- Opportunity for outdoor features associated with center, including interpretive trails
- Topography
- Potential disturbance to habitats
- Presence of hazardous wastes
- Potential impacts to neighbors
- Buffer from current or predicted commercial activity

After the new Visitor Center is built, the current headquarters on Weir Hill Road will be used for administrative purposes only by refuge staff.

Step-Down Management Plans

The Refuge Manual (Part 4, Chapter 3) lists a number of step-down management plans generally required on most refuges. These plans describe specific management actions refuges will follow to achieve objectives or implement management strategies. Some require annual revisions, such as hunt plans, while others are revised on a 5-to-10 year schedule. Some of these plans require NEPA analysis before they can be implemented. In the case of the Complex, some of the plans are developed for each refuge, while some plans are developed for the Complex with specific sections that pertain to individual refuges. In the following lists, we have identified those plans that are specific to the refuge and those that will be included in an overall Complex plan.

The following plans are either up-to-date or in progress and will be completed within 1-year of issuance of the CCP.

- Habitat Management Plan (Refuge)
- Fire Management Plan (Complex)
- Spill Prevention and Counter Measure Plan (Complex)
- Law Enforcement Management Plan (Complex)

The plans indicated in the following list either need to be initiated or are out-of-date and require complete revision. Additional management plans may be required as future Service policy dictates.

- Habitat and Wildlife Inventory Plan (Refuge)
- Integrated Pest Management Plan (Complex)
- Visitor Services Plan (Complex)
- Energy Contingency Plan (Complex)
- Hunt Plan (Refuge)
- Fishing Plan (Refuge)
- Cultural Resources Management Plan (Complex)
- Migratory Bird Disease Contingency Plan (Complex)
- Safety Management Plan (Complex)
- Continuity of Operations Plan (Complex)
- Sign Plan (Complex)

Maintaining Existing Facilities

Periodic maintenance of existing facilities is critical to ensure safety and accessibility for Complex staff and visitors. There are no usable facilities that exist at the refuge for staff or visitors. Complex facilities that relate to Assabet River include the Great Meadows NWR visitor contact station and

offices, and the Complex maintenance compound. Many of these facilities are not currently Americans with Disabilities Act (ADA) compliant; upgrading is needed and in some cases, is underway. Appendix E displays the fiscal year (FY) 2004 Maintenance Management System (MMS)



Winterberries frozen in winter: Photo by Marijke

database list of backlogged maintenance entries for the Complex.

Compatibility Determinations

Federal law and Service policy provide the direction and planning framework to protect the Refuge System from incompatible or harmful human activities, and to ensure that Americans can enjoy Refuge System lands and waters. The Administration Act, as amended by the Refuge Improvement Act, is the key legislation regarding

management of public uses and compatibility. The compatibility requirements of the Refuge Improvement Act were adopted in the Service's Final Compatibility Regulations and Final Compatibility Policy published October 18, 2000 (Federal Register, Vol. 65, No. 202, pp 62458-62496). This Compatibility Rule changed or modified Service Regulations contained in Chapter 50, Parts 25, 26 and 29 of the Code of Federal Regulations (USFWS 2000c). To view the policy and regulations online, go to <http://policy.fws.gov/library/00fr62483.pdf>.

The Act and Regulations require that an affirmative finding be made of an activity's "compatibility" before such activity or use is allowed on a national wildlife refuge. A compatible use is one, "...that will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge" (Refuge Improvement Act). Not all uses that are determined compatible must be allowed. The refuge has the discretion to allow or disallow any use based on other considerations such as public safety, policy and available funding. However, all uses that are allowed must be determined compatible. Except for consideration of consistency with State laws and regulations as provided for in subsection (m) of the Act, no other determinations or findings are required to be made by the refuge official under this Act or the Refuge Recreation Act for wildlife-dependent recreation to occur (Refuge Improvement Act).

We completed compatibility determinations (CDs) for the six priority public uses, activities that facilitate participation in the priority public uses, and research for Assabet River NWR under existing Service regulations and policy, the Act and the recent revisions of our Compatibility Regulations (Appendix G). Each (with some restrictions) was found to be compatible with both the mission of the Refuge System and the purposes for which the refuges were established. We are issuing these CDs, for these activities, as part of this CCP.

We have also determined several modes of travel to be compatible. These are: walking or hiking, snowshoeing, canoeing, non-motorized boating, and cross-country skiing. All of these means of locomotion are subject to the stipulations outlined in the CDs for these activities as part of this CCP.

In addition, we have evaluated several other methods of locomotion (specifically, use of motor-vehicles in general, all-terrain vehicles, dirt bikes, gasoline-powered motor boats, snowmobiles, dogsleds, bicycles, and horses). Each of these has been determined to be inconsistent with the purpose for which the refuges were established.



Osprey nest: Photo by Marijke Holtrop

Draft CDs were distributed (in the draft CCP/EA) for a 45 day public review in mid 2003. These CDs have since been approved, and will allow wildlife dependent recreation on the refuge. Subsequent to releasing the draft CCP/EA, we also distributed CDs for scientific research for a public review period. All comments were considered and utilized in the revision. These new CDs are now final and included in Appendix G.

Additional CDs will be developed when appropriate new uses are proposed. CDs will be re-evaluated by the Refuge Manager when conditions under which the use is permitted change significantly; when there is significant new information on effects of the use; or at least every 10 years for non-priority public uses. Priority public use CDs will be re-evaluated under the conditions noted above, or at least every 15 years with revision of the CCP.

Additional detail on the compatibility determination process is in Parts 25, 26, and 29 of Title 50 of the Code of Federal Regulations, effective November 17, 2000.

Monitoring and Evaluation

This Final CCP covers a 15-year period. Periodic review of the CCP is required to ensure that established goals and objectives are being met, and that the plan is being implemented as scheduled. To assist this review process, a monitoring and evaluation program will be implemented, focusing on issues involving public use activities, and wildlife habitat and population management.

Monitoring of public use programs will involve the continued collection and compilation of visitation figures and activity levels. In addition, research and monitoring programs will be established to assess the impacts of public use activities on wildlife and wildlife habitat, assess conflicts between types of refuge uses, and to identify compatible levels of public use activities. We will reduce these public use activities if we determine that incompatible levels are occurring.

We will collect baseline data on wildlife populations and habitats as outlined in Chapter 4. This data will update often limited existing records of wildlife species using the refuge, their habitat requirements, and seasonal use patterns. This data will also be used in the evaluation of the effects of public use and habitat management programs on wildlife populations.



Evening Primrose at the refuge: Photo by Marijke Holtrop

We will monitor refuge habitat management programs for positive and negative impacts on wildlife habitat and populations and the ecological integrity of the ecosystem. The monitoring will assist in determining if these management activities are helping to meet refuge goals. Information resulting from monitoring will allow staff to set more specific and better management objectives, more rigorously evaluate management objectives, and ultimately, make better management decisions. This process of evaluation, implementation and reevaluation is known simply as “adaptive resource management”.

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

Adaptive Management

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

Objectives and strategies must be adaptable in responding to new information and spatial and temporal changes. We will continually evaluate

management actions, through monitoring or research, to reconsider whether their original assumptions and predictions are still valid. In this way, management becomes an active process of learning “what really works”. It is important that the public understand and appreciate the adaptive nature of natural resource management.

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

Additional NEPA Analysis

NEPA requires a site specific analysis of impacts for all federal actions. These impacts are to be disclosed in either an EA or EIS.

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

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

Plan Amendment and Revision

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

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

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Service policy and NEPA requirements. Minor revisions that meet the criteria for categorical exclusions (550 FW 3.3C) will only require an Environmental Action Statement.

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Glossary

accessibility- the state or quality of being easily approached or entered, particularly as it relates to the Americans with Disabilities Act.

accessible facilities- structures accessible for most people with disabilities without assistance; ada-accessible (e.g., parking lots, trails, pathways, ramps, picnic and camping areas, restrooms, boating facilities (docks, piers, gangways), fishing facilities, playgrounds, amphitheaters, exhibits, audiovisual programs, and wayside sites.)

adaptive management- responding to changing ecological conditions so as to not exceed productivity limits of specific place. For example, when crop growth slows, a good farmer learns to recognize ecological signs that tell either to add more manure or to allow a field to lie fallow. Adaptive management becomes impossible when managers are forced to meet the demands of outsiders who are not under local ecological constraints (from Dodson et al., 1998)

agricultural land- nonforested land (now or recently orchards, pastures, or crops)

alternative- a reasonable way to fix an identified problem or satisfy a stated need (40 cfr 1500.2 (cf. “management alternative”))

amphidromous fish- fish that can migrate from fresh water to the sea or the reverse, not only for breeding, but also regularly at other times during their life cycle

anadromous fish- fish that spend a large portion of their life cycle in the ocean and return to freshwater to breed

aquatic- growing in, living in, or dependent upon water

aquatic barrier- any obstruction to fish passage

appropriate use- a proposed or existing use of a national wildlife refuge that (1) supports the refuge system mission, the major purposes, goals or objectives of the refuge; (2) is necessary for the safe and effective conduct of a priority general public use on the refuge; (3) is otherwise determined under service manual chapter 605

FW 1 (draft), by the refuge manager and refuge supervisor to be appropriate

area of biological significance- cf. “special focus area”

best management practices- land management practices that produce desired results (n.b. usually describing forestry or agricultural practices effective in reducing non-point source pollution, like reseeding skidder trails or not storing manure in a flood plain. In its broader sense, practices that benefit target species.)

biological or natural diversity- the variety of life in all its forms

breeding habitat- habitat used by migratory birds or other animals during the breeding season

buffer zones- land bordering and protecting critical habitats or water bodies by reducing runoff and nonpoint source pollution loading; areas created or sustained to lessen the negative effects of land development on animals, plants, and their habitats

breeding habitat- habitat used by migratory birds or other animals during the breeding season

candidate species- species for which we have sufficient information on file about their biological vulnerability and threats to propose listing them

carrying capacity- the size of the population that can be sustained by a given environment

catadromous fish- fish that spend most of their lives in fresh water, but migrate to sea to reproduce

categorical exclusion- (CE, CX, CATEX, CATX) pursuant to the National Environmental Policy Act (NEPA), a category of federal agency actions that do not individually or cumulatively have a significant effect on the human environment (40 CFR 1508.4)

CFR- the Code of Federal Regulations

Challenge Cost Share Program- a service administered grant program that provides matching funds for projects supporting natural resource education, management, restoration, or

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protection on service lands, other public lands, and private lands

community- the locality in which a group of people resides and shares the same government

community type- a particular assemblage of plants and animals, named for its dominant characteristic

compatible use- “a wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the mission of the system or the purposes of the refuge.”—National Wildlife Refuge System Improvement Act of 1997 (public law 105-57; 111 stat. 1253)

compatibility determination- a required determination for wildlife-dependent recreational uses or any other public uses of a refuge before a use is allowed

Comprehensive Conservation Plan- a document mandated by the National Wildlife Refuge System Improvement Act of 1997 that describes desired future conditions for a refuge unit, and provides long-range guidance for the unit leader to accomplish the mission of the system and the purpose(s) of the unit (p.l. 105-57; FWS manual 602 FW 1.4)

concern- cf. “issue”

conservation- managing natural resources to prevent loss or waste (n.b. management actions may include preservation, restoration, and enhancement.)

conservation agreements - voluntary written agreements among two or more parties for the purpose of ensuring the survival and welfare of unlisted species of fish and wildlife or their habitats or to achieve other specified conservation goals.

conservation easement- a legal agreement between a landowner and a land trust (e.g., a private, nonprofit conservation organization) or government agency that permanently limits uses of a property to protect its conservation values

cool-season grass- introduced grass for crop and pastureland that grows in spring and fall and is dormant during hot summer months

cooperative agreement- the legal instrument used when the principal purpose of a transaction is the transfer of money, property, services, or anything of value to a recipient in order to accomplish a public purpose authorized by federal statute, and substantial involvement between the service and the recipient is anticipated (cf. “grant agreement”)

cultural resource inventory- a professional study to locate and evaluate evidence of cultural resources present within a defined geographic area (n.b. various levels of inventories may include background literature searches, comprehensive field examinations to identify all exposed physical manifestations of cultural resources, or sample inventories for projecting site distribution and density over a larger area. Evaluating identified cultural resources to determine their eligibility for the National Register of Historic Places follows the criteria in 36 CFR 60.4 (cf. FWS manual 614 FW 1.7).)

cultural resource overview- a comprehensive document prepared for a field office that discusses, among other things, project prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement of how program objectives should be met and conflicts resolved (an overview should reference or incorporate information from a field offices background or literature search described in section viii of the Cultural Resource Management Handbook (FWS manual 614 FW 1.7).)

dedicated open space- land to be held as open space forever

designated wilderness area- an area designated by Congress as part of the National Wilderness Preservation System (FWS Manual 610 FW 1.5 (draft))

diadromous- fish that migrate from freshwater to saltwater or the reverse; a generic term that includes anadromous, catadromous, and amphidromous fish

easement- an agreement by which landowners give up or sell one of the rights on their property (e.g., landowners may donate rights-of-way across their properties to allow community

members access to a river (cf. “conservation easement”).)

ecosystem- a natural community of organisms interacting with its physical environment, regarded as a unit

ecotourism- visits to an area that maintains and preserves natural resources as a basis for promoting its economic growth and development

ecosystem approach- a way of looking at socioeconomic and environmental information based on the boundaries of ecosystems like watersheds, rather than on geopolitical boundaries

ecosystem-based management- an approach to making decisions based on the characteristics of the ecosystem in which a person or thing belongs (n.b. this concept considers interactions among the plants, animals, and physical characteristics of the environment in making decisions about land use or living resource issues.)

emergent wetland- wetlands dominated by erect, rooted, herbaceous plants

endangered species- a federal- or state-listed protected species that is in danger of extinction throughout all or a significant portion of its range

environmental education- “...education aimed at producing a citizenry that is knowledgeable about the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solution.”—Stapp et al. 1969

Environmental Assessment- (EA) a concise public document that briefly discusses the purpose and need for an action, its alternatives, and provides sufficient evidence and analysis of its impacts to determine whether to prepare an Environmental Impact Statement or Finding of No Significant Impact (q.v.) (cf. 40 CFR 1508.9)

Environmental Impact Statement- (EIS) a detailed, written analysis of the environmental impacts of a proposed action, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources (cf. 40 CFR 1508.11)

estuaries- deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed or sporadic access to the ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from land

estuarine wetlands- “the estuarine system consists of deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.”—Cowardin et al. 1979

exemplary community type- an outstanding example of a particular community type

extirpated- no longer occurring in a given geographic area

Federal land- public land owned by the Federal Government, including national forests, national parks, and national wildlife refuges

Federal-listed species- a species listed either as endangered, threatened, or a species at risk (formerly, a “candidate species”) under the Endangered Species Act of 1973, as amended

Finding of No Significant Impact- (FONSI) supported by an Environmental Assessment, a document that briefly presents why a Federal action will have no significant effect on the human environment, and for which an Environmental Impact Statement, therefore, will not be prepared (40 CFR 1508.13)

fish passage project- providing a safe passage for fish around a barrier in the upstream or downstream direction

focus areas- cf. “special focus areas”

forbs- flowering plants (excluding grasses, sedges, and rushes) that do not have a woody stem and die back to the ground at the end of the growing season

forested land- land dominated by trees

forested wetlands- wetlands dominated by trees

Geographic Information System- (GIS) a computerized system to compile, store, analyze and display geographically referenced information (e.g., GIS can overlay multiple sets of information on the distribution of a variety of biological and physical features.)

grant agreement- the legal instrument used when the principal purpose of the transaction is the transfer of money, property, services, or anything of value to a recipient in order to accomplish a public purpose of support or stimulation authorized by federal statute and substantial involvement between the service and the recipient is *not* anticipated (cf. “cooperative agreement”)

grassroots conservation organization- any group of concerned citizens who come together to actively address a conservation need

habitat fragmentation- the breaking up of a specific habitat into smaller, unconnected areas (n.b. a habitat area that is too small may not provide enough space to maintain a breeding population of the species in question.)

habitat conservation- protecting an animal or plant habitat to ensure that the use of that habitat by the animal or plant is not altered or reduced

habitat- the place where a particular type of plant or animal lives

hydrologic or flow regime- characteristic fluctuations in river flows

important fish areas- the aquatic areas identified by private organizations, local, state, and federal agencies that meet the purposes of the Conte act

informed consent- “...the grudging willingness of opponents to go along with a course of action that they actually oppose.”—Bleiker

Integrated Pest Management (IPM)- sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks

interjurisdictional fish- populations of fish that are managed by two or more states or national or tribal governments because of the scope of their geographic distributions or migrations

interpretive facilities- structures that provide information about an event, place, or thing by a variety of means, including printed, audiovisual, or multimedia materials (e.g., kiosks that offer printed materials and audiovisuals, signs, and trail heads.)

interpretive materials- any tool used to provide or clarify information, explain events or things, or increase awareness and understanding of the events or things (e.g., printed materials like brochures, maps or curriculum materials; audio/visual materials like video and audio tapes, films, or slides; and, interactive multimedia materials, CD-Rom or other computer technology.)

interpretive materials projects- any cooperative venture that combines financial and staff resources to design, develop, and use tools for increasing the awareness and understanding of events or things related to a refuge

introduced invasive species- non-native species that have been introduced into an area and, because of their aggressive growth and lack of natural predators, displace native species

issue- any unsettled matter that requires a management decision (e.g., a service initiative, an opportunity, a management problem, a threat to the resources of the unit, a conflict in uses, a public concern, or the presence of an undesirable resource condition.)

Issues Workbook- a packet of questions distributed in order to solicit public comments on the Refuge Complex and the planning process. Basic information on the Refuge Complex was bundled with the Issues Workbooks. Workbooks were not randomly distributed, nor were questions intended to have statistical significance.

lacustrine wetlands- “the lacustrine system includes wetlands and deepwater habitats with all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with greater than 30% areal coverage; and (3) total area exceeds eight ha (20 acres).”—Cowardin et al. 1979

land trusts- organizations dedicated to conserving land by purchase, donation, or conservation easement from landowners

limiting factor- an environmental limitation that prevents further population growth

local land- public land owned by local governments, including community or county parks or municipal watersheds

local agencies- generally, municipal governments, regional planning commissions, or conservation groups

long-term protection- mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations over the long term

management alternative- a set of objectives and the strategies needed to accomplish each objective (FWS Manual 602 FW 1.4)

management concern- cf. “issue”; “migratory nongame birds of management concern”

management opportunity- cf. “issue”

management plan- a plan that guides future land management practices on a tract

management strategy- a general approach to meeting unit objectives (n.b. a strategy may be broad, it may be detailed enough to guide implementation through specific actions, tasks, and projects (FWS Manual 602 FW 1.4).)

mesic soil- sandy-to-clay loams containing moisture retentive organic matter, well drained (no standing matter)

migratory nongame birds of management concern- species of nongame birds that (a) are believed to have undergone significant population declines; (b) have small or restricted populations; or (c) are dependent upon restricted or vulnerable habitats

mission statement- a succinct statement of the purpose for which the unit was established; its reason for being

mitigation- actions taken to compensate for the negative effects of a particular project (e.g., wetland mitigation usually restores or enhances a previously damaged wetland or creates a new wetland.)

National Environmental Policy Act of 1969- (NEPA) requires all Federal agencies to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in planning and implementing environmental actions (Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decisionmaking (cf. 40 CFR 1500).)

National Wildlife Refuge Complex- (Complex) an internal Service administrative linking of refuge units closely related by their purposes, goals, ecosystem, or geopolitical boundaries.

National Wildlife Refuge System- (System) all lands and waters and interests therein administered by the Service as wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas for the protection and conservation of fish and wildlife, including those that are threatened with extinction

native plant- a plant that has grown in the region since the last glaciation and occurred before European settlement

non-consumptive, wildlife-oriented recreation- wildlife observation and photography and environmental education and interpretation (cf. “wildlife-oriented recreation”)

non-point source pollution- nutrients or toxic substances that enter water from dispersed and uncontrolled sites

nonforested wetlands wetlands dominated by shrubs or emergent vegetation

Notice of Intent- (NOI) an announcement we publish in the Federal Register that we will prepare and review an Environmental Impact Statement (40 CFR 1508.22)

objective- a concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is

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responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluation the success of strategies. Make objectives attainable, time-specific, and measurable.

occurrence site- a discrete area where a population of a rare species lives or a rare plant community type grows

old fields - areas formerly cultivated or grazed, where woody vegetation has begun to invade (n.b. if left undisturbed, old fields will eventually succeed into forest. Many occur at sites originally suitable for crops or pasture. They vary markedly in the Northeast, depending on soil and land use and management history.)

outdoor education project- any cooperative venture that combines financial and staff resources to develop outdoor education activities like labs, field trips, surveys, monitoring, or sampling

outdoor education- educational activities that take place in an outdoor setting

palustrine wetlands- “the palustrine system includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0‰.”—Cowardin et al. 1979

Partners for Wildlife Program- a voluntary, cooperative habitat restoration program among the Service, other government agencies, public and private organizations, and private landowners to improve and protect fish and wildlife habitat on private land while leaving it in private ownership

partnership- a contract or agreement among two or more individuals, groups of individuals, organizations, or agencies, in which each agrees to furnish a part of the capital or some service in kind (e.g., labor) for a mutually beneficial enterprise

planning updates- newsletters distributed, primarily through mailing lists, in order to update the interested public on the status of the CCP project.

population monitoring- assessing the characteristics of populations to ascertain their status and establish trends on their abundance, condition, distribution, or other characteristics

prescribed fire- the application of fire to wildland fuels, either by natural or intentional ignition, to achieve identified land use objectives (FWS Manual 621 FW 1.7)

private land- land owned by a private individual or group or non-government organization

private landowner- cf. “private land”

private organization- any non-government organization

proposed action (or alternative)- activities for which an Environmental Assessment is being written; the alternative containing the actions and strategies recommended by the planning team. The proposed action is, for all proactive purposes, the draft CCP for the refuge.

protection- mechanisms like fee title acquisition, conservation easements, or binding agreements with landowners that ensure land use and land management practices will remain compatible with maintaining species populations at a site (cf. “long-term ~”)

public- individuals, organizations, and non-government groups; officials of federal, state, and local government agencies; native american tribes, and foreign nations— includes anyone outside the core planning team, those who may or may not have indicated an interest in the issues and those who do or do not realize that our decisions may affect them

public involvement- offering to interested individuals and organizations that our actions or policies may affect an opportunity to become informed; soliciting their opinions.

public involvement plan- long-term guidance for involving the public in the comprehensive planning process

public land- land owned by the local, state, or Federal government

rare species- species identified for special management emphasis because of their uncommon occurrence

rare community types- plant community types classified as rare by any state program (as used in CCP's, includes exemplary community types.)

recommended wilderness- areas studied and found suitable for wilderness designation by both the Director (FWS) and Secretary (DOI), and recommended by the President to Congress for inclusion in the National Wilderness System (FWS Manual 610 FW 1.5 (draft))

Record of Decision- (ROD) a concise public record of a decision by a Federal agency pursuant to NEPA (N.b. a ROD includes: •the decision; •all the alternatives considered; •the environmentally preferable alternative; •a summary of monitoring and enforcement, where applicable, for any mitigation ; and, •whether all practical means have been adopted to avoid or minimize environmental harm from the alternative selected (or if not, why not).)

refuge goals- "...descriptive, open-ended, and often broad statements of desired future conditions that convey a purpose but do not define measurable units."— Writing Refuge Management Goals and Objectives: A Handbook

refuge mailing list- the "original" Great Meadows Refuge Complex mailing list which preceded the CCP process. This list contained names and addresses of people with an interest in the refuge. As part of the planning process, the list was continually updated to include conservation agencies, sporting clubs, Congressionals, workbook respondents, open house/focus group attendees, etc.

refuge purposes- "the terms 'purposes of the refuge' and 'purposes of each refuge' mean the purposes specified in or derived from the law, proclamation, Executive Order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit."—National Wildlife Refuge System Improvement Act of 1997

refuge lands- lands in which the service holds full interest in fee title or partial interest like an easement

restoration- the artificial manipulation of habitat to restore it to its former condition (e.g., restoration may involve planting native grasses

and forbs, removing shrubs, prescribed burning, or reestablishing habitat for native plants and animals on degraded grassland.)

riparian- of or relating to the banks of a stream or river

riparian agricultural land- agricultural land along a stream or river

riparian forested land- forested land along a stream or river (cf. note above)

riparian habitat- habitat along the banks of a stream or river (cf. note above)

riverine- within the active channel of a river or stream

riverine wetlands- generally, all the wetlands and deepwater habitats occurring within a freshwater river channel not dominated by trees, shrubs, or persistent emergents

runoff- water from rain, melted snow, or agricultural or landscape irrigation that flows over a land surface into a water body (cf. "urban runoff")

sandplain grassland- dry grassland that has resisted succession due to fire, wind, grazing, mowing, or salt spray (N.b. Characterized by thin, acidic, nutrient-poor soils over deep sand deposits, sandplains primarily occur on the coast and off-coast islands, or inland, where glaciers or rivers have deposited sands.)

Service presence- service programs and facilities that it directs or shares with other organizations; public awareness of the service as a sole or cooperative provider of programs and facilities

site improvement- any activity that changes the condition of an existing site to better interpret events, places, or things related to a refuge. (e.g., improving safety and access, replacing non-native with native plants, refurbishing footbridges and trail ways, and renovating or expanding exhibits.)

special focus area- an area of high biological value (N.b. fie normally direct most of our resources to SFA's that were delineated because of: 1.the presence of federal-listed endangered and threatened species, species at risk (formerly,

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“candidate species”), rare species, concentrations of migrating or wintering waterfowl, or shorebird stopover habitat; 2.their importance as migrant landbird stopover or breeding habitat; 3.the presence of unique or rare communities; or 4.the presence of important fish habitat.)

special habitats- as used in CCP’s; wetlands, vernal pools, riparian habitat, and unfragmented rivers, forests and grasslands (N.b. many rare species are dependent on specialized habitats that, in many cases, are being lost within a watershed.)

special riparian project- restoring, protecting, or enhancing an aquatic environment in a discrete riparian corridor within a special focus area

species at risk- a species being considered for Federal listing as threatened or endangered (formerly, “candidate species”)

species of concern- species not federal-listed as threatened or endangered, but about which we or our partners are concerned

State agencies- generally, natural resource agencies of State governments

State land- State-owned public land

State-listed species- cf. “Federal-listed species” (N.b. this is how to write the phrase “Federal- and State-listed species”.)

step-down management plan- a plan for dealing with specific refuge management subjects, strategies, and schedules, e.g., cropland, wilderness, and fire (FWS Manual 602 FW 1.4)

stopover habitat- habitat where birds rest and feed during migration

telecommunications- communicating via electronic technology

telecommunications project- any cooperative venture that combines financial and staff resources to develop and use computer-based applications for exchanging information about a watershed with others

threatened species- a federal-listed, protected species that is likely to become an endangered species in all or a significant portion of its range

tiering- incorporating by reference the general discussions of broad topics in Environmental Impact Statements into narrower statements of environmental analysis by focusing on specific issues (40 CFR 1508.28)

tributary- a stream or river that flows into a larger stream, river, or lake

trust resource- a resource that the government holds in trust for the people through law or administrative act (N.b. a Federal trust resource is one for which responsibility is given wholly or in part to the Federal government by law or administrative act. Generally, Federal trust resources are nationally or internationally important no matter where they occur, like endangered species or migratory birds and fish that regularly move across state lines. They also include cultural resources protected by Federal historic preservation laws, and nationally important or threatened habitats, notably wetlands, navigable waters, and public lands like state parks and national wildlife refuges.)

unfragmented habitat- large, unbroken blocks of a particular type of habitat

unit objective- desired conditions that must be accomplished to achieve a desired outcome

upland- dry ground (i.e., other than wetlands)

upland meadow or pasture- areas maintained in grass for livestock grazing; hay production areas (N.b. meadows may occur naturally in tidal marshes and inland flooded river valleys or, more frequently, at upland sites where vegetation has been cleared and grasses planted. Eventually, meadows will revert to old fields and forest if they are not mowed, grazed, or burned. Grasses in both managed meadows and pastures usually are similar, but pasture herbs often differ because of selective grazing.)

urban runoff water from rain, melted snow, or landscape irrigation flowing from city streets and domestic or commercial properties that may carry pollutants into a sewer system or water body

vernal pool- depressions holding water for at least two months in the spring or early summer, is absent of fish, and is important for amphibians during the breeding season.

vision statement- a concise statement of what the unit could achieve in the next 10 to 15 years

visitor center- a permanently staffed building offering exhibits and interpretive information to the visiting public. Some visitor center are co-located with refuge offices, others include additional facilities such as classrooms or wildlife viewing areas

visitor contact station- compared to a visitor center, a contact station is a smaller facility which may not be permanently staffed

warm-season grass- native prairie grass that grows the most during summer, when cool-season grasses are dormant

watchable wildlife- all wildlife is watchable (N.b. a watchable wildlife program is one that helps maintain viable populations of all native fish and wildlife species by building an active, well informed constituency for conservation. Watchable wildlife programs are tools for meeting wildlife conservation goals while at the same time fulfilling public demand for wildlife-dependent recreational activities (other than sport hunting, sport fishing, or trapping).)

watershed- the geographic area within which water drains into a particular river, stream, or body of water; land and the body of water into which the land drains

well protected- a rare species or community type 75 percent or more of its occurrence sites are on dedicated open space

wet meadows- meadows located in moist, low-lying areas, often dominated by large colonies of reeds or grasses (N.b. often they are created by collapsed beaver dams and exposed pond bottoms. Saltmarsh meadows are subject to daily coastal tides.)

wetlands- “Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water.”— Cowardin et al 1979

wilderness- cf. “designated wilderness”

wildfire- a free-burning fire requiring a suppression response; all fire other than

prescribed fire that occurs on wildlands (FWS Manual 621 FW 1.7)

wildland fire- every wildland fire is either a wildfire or a prescribed fire (FWS Manual 621 FW 1.3)

wildlife management- manipulating wildlife populations, either directly by regulating the numbers, ages, and sex ratios harvested, or indirectly by providing favorable habitat conditions and alleviating limiting factors

wildlife-oriented recreation- recreational experiences in which wildlife is the focus (“the terms ‘wildlife dependent recreation’ and ‘wildlife-dependent recreational use’ mean a use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation.”— National Wildlife Refuge System Improvement Act of 1997)

working landscape- the rural landscape created and used by traditional laborers (N.b. agriculture, forestry, and fishing all contribute to the working landscape of a watershed (e.g., keeping fields open by mowing or by grazing livestock).)

Glossary

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List of Preparers

Members of the Planning Team and Contributors

Elizabeth A. Herland
Project Leader
Eastern Massachusetts Complex

Tim Prior
Deputy Project Leader
Eastern Massachusetts Complex

Stephanie Koch
Wildlife Biologist
Eastern Massachusetts Complex

Bill Perry
Refuge Planner
Eastern Massachusetts Complex

Debra Kimbrell-Anderson
Refuge Manager
Assabet and Oxbow NWRs
Eastern Massachusetts Complex

Michael Dixon
Outdoor Recreation Planner
Eastern Massachusetts Complex

Sharon Fish Marino
Former Refuge Manager
Monomoy NWR

Carl Melberg
Land Acquisition Planner
U.S. Fish and Wildlife Service
Northeast Regional Office

Bud Oliveira
Deputy Chief of the National Wildlife Refuge
System, Region 4
Former Project Leader
Eastern Massachusetts Complex

Pamela Hess
Appalachian Mountain Club
Former Deputy Project Leader
Eastern Massachusetts Complex

Chuck Bell
Former District Manager Northeast District
Division of Fish and Game
Commonwealth of Massachusetts

Debbie Dineen, Natural Resources, Town of
Sudbury

Curt Laffin, Planning Consultant

Jack Lash
Planning and Ecology Director Department
of Environmental Management,
Commonwealth of Massachusetts

Tom Poole
Natural Resource Manager
Army at Devens Reserve Forces Training
Area

Bill Woytek
Division of Fish and Game, Commonwealth of
Massachusetts

Bruce Flaig and Marijke Holtrop
Generously allowed the refuge to use their
photographs, many of which were used in this
plan

Lindsay Krey
Assistant Planner
Former Team Leader
U.S. Fish and Wildlife Service
Northeast Regional Office

Nicole Allison
Former Wildlife Biologist
U.S. Fish and Wildlife Service
Northeast Regional Office

William Archambault
Fisheries Supervisor South
Former Regional NEPA Coordinator
U.S. Fish and Wildlife Service
Northeast Regional Office

Melissa Brewer
Former Fisheries Biologist
U.S. Fish and Wildlife Service
Northeast Regional Office

List of Preparers

John Eaton, Cartographer
U.S. Fish and Wildlife Service
Northeast Regional Office

Andrew French
Former Realty Officer
U.S. Fish and Wildlife Service
Northeast Regional Office

Thomas Bonetti
Refuge Planner
Former Team Leader for this project.
U.S. Fish and Wildlife Service
Northeast Regional Office

Victoria Barr
Archeologist
U.S. Fish and Wildlife Service
Northeast Regional Office

Rick Jorgensen
Realty Specialist
U.S. Fish and Wildlife Service
Northeast Regional Office

Wendy Lilly-Hanson
Former Wildlife Biologist
Eastern Massachusetts Complex

Janet Kennedy
Refuge Manager Parker River NWR
Former Deputy Project Leader for Eastern
Massachusetts Complex

Deborah Long
Deputy Refuge Manager Forsythe NWR
Former Monomoy NWR Refuge Manager

Lisa Plagge
Former Bio-technician
Great Meadows, Oxbow, and Assabet NWRs
Eastern Massachusetts Complex

Pamela Rooney
Engineering Supervisor
Former Planning Team Leader
U.S. Fish and Wildlife Service
Northeast Regional Office

Rick Schauffler
Wildlife Biologist and Cartographer
U.S. Fish and Wildlife Service
New England Field Office

Janith Taylor
Regional Biologist
U.S. Fish and Wildlife Service
New England Field Office

Sharon Ware
Refuge Manager Sachuest Point NWR
Former Refuge Manager at Monomoy NWR

Mike Amaral
Senior Endangered Species Specialist
U.S. Fish and Wildlife Service
New England Field Office

Addresses

Northeast Regional Office
U.S. Fish and Wildlife Service
National Wildlife Refuge System
300 Westgate Center Dr.
Hadley, MA 01035

Eastern Massachusetts National Wildlife
Refuge Complex Headquarters
73 Weir Hill Road
Sudbury, MA 01776

New England Field Office
70 Commercial St., Ste 300
Concord, NH 03301-5087

Monomoy NWR
Wikis Way, Morris Island
Chatham, MA 02633

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- Appendix C: Responses to Substantive Comments
- Appendix D: Species Lists
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Appendices

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Appendix A: Relevant Laws

Emergency Wetland Resources Act of 1986

This Act authorized the purchase of wetlands with Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. The Act also requires the Secretary to establish a National Wetlands Priority Conservation Plan, requires the States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transfers to the Migratory Bird Conservation Fund amount equal to import duties on arms and ammunition.

Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended

Public Law 93-205, approved December 28, 1973, repealed the Endangered Species Conservation Act of December 5, 1969 (P.L. 91-135, 83 Stat. 275). The 1969 Act had amended the Endangered Species Preservation Act of October 15, 1966 (P.L. 89-669, 80 Stat. 926). The 1973 Endangered Species Act provided for the conservation of ecosystems upon which threatened and endangered species of fish, wildlife, and plants depend, both through federal action and by encouraging the establishment of state programs. The act:

- authorizes the determination and listing of species as endangered and threatened;
- prohibits unauthorized taking, possession, sale, and transport of endangered species;
- provides authority to acquire land for the conservation of listed species, using land and water conservation funds;
- authorizes establishment of cooperative agreements and grants-in-aid to states that establish and maintain active and adequate programs for endangered and threatened wildlife and plants;
- authorizes the assessment of civil and criminal penalties for violating the act or regulations; and
- authorizes the payment of rewards to anyone furnishing information leading to arrest and conviction for any violation of the act or any regulation issued thereunder.

Executive Order 11988, Floodplain Management

The purpose of this Executive Order, signed May 24, 1977, is to prevent Federal agencies from contributing to the “adverse impacts associated with occupancy and modification of floodplains” and the “direct or indirect support of floodplain development.” in the course of fulfilling their respective authorities, Federal agencies “shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

Fish and Wildlife Improvement Act of 1978

This Act was passed to improve the administration of fish and wildlife programs and amends several earlier laws, including the Refuge Recreation Act, the National Wildlife Refuge Administration Act, and the Fish and Wildlife Act of 1956. It authorizes the

Appendix A: Relevant Laws

secretary to accept gifts and bequests of real and personal property on behalf of the United States. It also authorizes the use of volunteers on service projects and appropriations to carry out volunteer programs.

Historic Preservation Acts

There are various laws for the preservation of historic sites and objects.

Antiquities Act (16 U.S.C. 431 - 433) – The Act of June 8, 1906, (34 Stat. 225) authorizes the President to designate as National Monuments objects or areas of historic or scientific interest on lands owned or controlled by the United States. The Act required that a permit be obtained for examination of ruins, excavation of archaeological sites and the gathering of objects of antiquity on lands under the jurisdiction of the Secretaries of Interior, Agriculture, and Army, and provided penalties for violations.

Archaeological Resources Protection Act (16 U.S.C. 470aa - 470ll) -- Public Law 96-95, approved October 31, 1979, (93 Stat. 721) largely supplanted the resource protection provisions of the Antiquities Act for archaeological items.

This Act established detailed requirements for issuance of permits for any excavation for or removal of archaeological resources from Federal or Indian lands. It also established civil and criminal penalties for the unauthorized excavation, removal, or damage of any such resources; for any trafficking in such resources removed from Federal or Indian land in violation of any provision of Federal law; and for interstate and foreign commerce in such resources acquired, transported or received in violation of any state or local law.

Public Law 100-588, approved November 3, 1988, (102 Stat. 2983) lowered the threshold value of artifacts triggering the felony provisions of the act from \$5,000 to \$500, made attempting to commit an action prohibited by the Act a violation, and required the land managing agencies to establish public awareness programs regarding the value of archaeological resources to the Nation.

Archeological and Historic Preservation Act (16 U.S.C. 469-469c) -- Public Law 86-523, approved June 27, 1960, (74 Stat. 220) as amended by Public Law 93-291, approved May 24, 1974, (88 Stat. 174) to carry out the policy established by the historic sites act (see below), directed Federal agencies to notify the Secretary of the Interior whenever they find a Federal or Federally assisted, licensed or permitted project may cause loss or destruction of significant scientific, prehistoric or archaeological data. The Act authorized use of appropriated, donated and/or transferred funds for the recovery, protection and preservation of such data.

Historic Sites, Buildings and Antiquities Act (16 U.S.C 461-462, 464-467) -- The Act of August 21, 1935, (49 Stat. 666) popularly known as the Historic Sites Act, as amended by Public Law 89-249, approved October 9, 1965, (79 Stat. 971) declared it a National policy to preserve historic sites and objects of national significance, including those located on refuges. It provided procedures for designation, acquisition, administration and protection of such sites. Among other things, National Historic and Natural Landmarks are

designated under authority of this Act. As of January, 1989, 31 national wildlife refuges contained such sites.

National Historic Preservation Act of 1966 (16 U.S.C. 470-470b, 470c-470n) -- Public Law 89-665, approved October 15, 1966, (80 Stat. 915) and repeatedly amended, provided for preservation of significant historical features (buildings, objects and sites) through a grant-in-aid program to the states. It established a National Register of Historic Places and a program of matching grants under the existing National Trust for Historic Preservation (16 U.S.C. 468-468d).

The Act established an Advisory Council on Historic Preservation, which was made a permanent independent agency in Public Law 94-422, Approved September 28, 1976 (90 Stat. 1319). That Act also created the Historic Preservation Fund. Federal agencies are directed to take into account the effects of their actions on items or sites listed or eligible for listing in the National Register.

As of January, 1989, 91 historic sites on national wildlife refuges have been placed on the National Register.

Land and Water Conservation Fund Act of 1948

This Act provides funding through receipts from the sale of surplus federal land, appropriations from oil and gas receipts from the outer continental shelf, and other sources for land acquisition under several authorities. Appropriations from the fund may be used for matching grants to states for outdoor recreation projects and for land acquisition by various federal agencies, including the Fish and Wildlife Service.

Migratory Bird Conservation Act of 1929 (16 U.S.C. 715- 715d, 715e, 715f-715r)

This Act established the Migratory Bird Conservation Commission which consists of the Secretaries of the Interior (chairman), Agriculture, and Transportation, two members from the House of Representatives, and an ex-officio member from the state in which a project is located. The Commission approves acquisition of land and water, or interests therein, and sets the priorities for acquisition of lands by the Secretary for sanctuaries or for other management purposes. Under this Act, to acquire lands, or interests therein, the state concerned must consent to such acquisition by legislation. Such legislation has been enacted by most states.

Migratory Bird Hunting and Conservation Stamp Act (16 U.S.C. 718-718j, 48 Stat. 452), as amended

The “Duck Stamp Act,” as this March 16, 1934, authority is commonly called, requires each waterfowl hunter 16 years of age or older to possess a valid Federal hunting stamp. Receipts from the sale of the stamp are deposited in a special Treasury account known as the Migratory Bird Conservation Fund and are not subject to appropriations.

National and Community Service Act of 1990 (42 U.S.C. 12401; 104 Stat. 3127)

Public Law 101-610, signed November 16, 1990, authorizes several programs to engage citizens of the U.S. in full- and/or part-time projects designed to combat illiteracy and poverty, provide job skills, enhance educational skills, and fulfill environmental needs. Several provisions are of particular interest to the U.S. Fish and Wildlife Service.

American Conservation and Youth Service Corps -- as a Federal grant program established under Subtitle C of the law, the Corps offers an opportunity for young adults between the ages of 16-25, or in the case of summer programs, 15-21, to engage in approved human and natural resources projects which benefit the public or are carried out on Federal or Indian lands.

To be eligible for assistance, natural resources programs will focus on improvement of wildlife habitat and recreational areas, fish culture, fishery assistance, erosion, wetlands protection, pollution control and similar projects. A stipend of not more than 100 percent of the poverty level will be paid to participants. A Commission established to administer the Youth Service Corps will make grants to States, the Secretaries of Agriculture and Interior and the Director of ACTION to carry out these responsibilities.

National and Community Service Act -- Will make grants to states for the creation of full-time and/or part-time programs for citizens over 17 years of age. Programs must be designed to fill unmet educational, human, environmental, and public safety needs. Initially, participants will receive post-employment benefits of up to \$1000 per year for part-time and \$2500 for full-time participants.

Thousand Points of Light -- Creates a nonprofit Points of Light Foundation to administer programs to encourage citizens and institutions to volunteer in order to solve critical social issues, and to discover new leaders and develop institutions committed to serving others.

National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by P.L. 94-52, July 3, 1975, 89 Stat. 258, and P.L. 94-83, August 9, 1975, 89 Stat. 424).

Title I of the 1969 National Environmental Policy Act (NEPA) requires that all Federal agencies prepare detailed environmental impact statements for “every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment.”

The 1969 statute stipulated the factors to be considered in environmental impact statements, and required that Federal agencies employ an interdisciplinary approach in related decision-making and develop means to ensure that unquantified environmental values are given appropriate consideration, along with economic and technical considerations.

Title II of this statute requires annual reports on environmental quality from the President to the Congress, and established a Council on environmental quality in the Executive Office of the President with specific duties and functions.

National Wildlife Refuge System Administration Act of 1966 (16U.S.C. 668dd-668ee) as amended

This act defines the Refuge System as including wildlife refuges, areas for protection and conservation of fish and wildlife which are threatened with extinction, wildlife ranges, game ranges, wildlife management areas, and waterfowl production areas. The Secretary is authorized to permit any use of an area provided such use is compatible with the major purposes for which such area was established. The purchase considerations for rights-of-way go into the Migratory Bird Conservation Fund for the acquisition of lands. By regulation, up to 40% of an area acquired for a migratory bird sanctuary may be opened to migratory bird hunting unless the Secretary finds that the taking of any species of migratory game birds in more than 40% of such area would be beneficial to the species. The Act requires an Act of Congress for the divestiture of lands in the system, except (1) lands acquired with Migratory Bird Conservation Commission funds, and (2) lands can be removed from the system by land exchange, or if brought into the System by a cooperative agreement, then pursuant to the terms of the agreement.

National Wildlife Refuge System Improvement Act of 1997

Public Law 105-57, amends the National Wildlife System Act of 1966 (16 U.S.C. 668dd-ee), providing guidance for management and public use of the refuge system. The Act mandates that the Refuge System be consistently directed and managed as a national system of lands and waters devoted to wildlife conservation and management.

The Act establishes priorities for recreational uses of the Refuge System. Six wildlife-dependent uses are specifically named in the act: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. These activities are to be promoted on the Refuge System, while all non-wildlife dependant uses are subject to compatibility determinations.

A compatible use is one which, in the sound professional judgment of the Refuge Manger, will not materially interfere with or detract from fulfillment of the Refuge System Mission or refuge purpose(s).

As stated in the Act, “the mission of the System is to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.”

The act also requires development of a comprehensive conservation plan for each refuge and management of each refuge consistent with the plan. When writing CCP, planning for expanded or new refuges, and when making management decisions, The Act requires effective coordination with other Federal agencies, state fish and wildlife or conservation agencies, and refuge neighbors. A refuge must also provide opportunities for public involvement when making a compatibility determination or developing a CCP.

Appendix A: Relevant Laws

North American Wetlands Conservation Act (103 Stat. 1968; 16 U.S.C. 4401-4412)

Public Law 101-233, enacted December 13, 1989, provides funding and administrative direction for implementation of the North American Waterfowl Management Plan and the Tripartite Agreement on wetlands between Canada, U.S. and Mexico.

The Act converts the Pittman-Robertson account into a trust fund, with the interest available without appropriation through the year 2006 to carry out the programs authorized by the Act, along with an authorization for annual appropriation of over \$20 million plus an amount equal to the fines and forfeitures collected under the Migratory Bird Treaty Act.

Available funds may be expended, upon approval of the Migratory Bird Conservation Commission, for payment of not to exceed 50 percent of the United States share of the cost of wetlands conservation projects in Canada, Mexico, or the United States (or 100 percent of the cost of projects on Federal lands). At least 50 percent and no more than 70 percent of the funds received are to go to Canada and Mexico each year.

A North American Wetlands Conservation Council is created to recommend projects to be funded under the Act to the Migratory Bird Conservation Commission. The Council is to be composed of the Director of the Service, the Secretary of the National Fish and Wildlife Foundation, a State fish and game agency director from each flyway, and three representatives of different nonprofit organizations participating in projects under the Plan or the Act. The Chairman of the Council and one other member serve ex officio on the Commission for consideration of the Council's recommendations.

The Commission must justify in writing to the Council and, annually, to Congress, any decisions not to accept Council recommendations.

Oil Pollution Act of 1990

Public Law 101-380 (33 U.S.C. 2701 et seq.; 104 Stat. 484) established new requirements and extensively amended the Federal Water Pollution Control Act (33 U.S.C. 1301 et. seq.) to provide enhanced capabilities for oil spill response and natural resource damage assessment by the Service. It required Service consultation on developing a fish and wildlife response plan for the National Contingency Plan, input to Area Contingency Plans, review of Facility and Tank Vessel Contingency Plans, and to conduct damage assessments associated with oil spills.

One aspect of particular interest to the service involves the identification of ecologically sensitive areas and the preparation of scientific monitoring and evaluation plans. Research conducted by the Service is to be directed and coordinated by the National Wetland Research Center.

National Wildlife Refuge System Centennial Act of 2000

This Act paves the way for a special, nationwide outreach campaign. The law calls for a Centennial Commission of distinguished individuals to work with partners in carrying out

the outreach campaign. The law also calls for a long-term plan to address the major operations, maintenance, and construction needs of the Refuge System

These centennial activities will help broaden visibility, strengthen partnerships, and fortify facilities and programs for wildlife and habitat conservation and recreation. They will build a stronghold of support for the National Wildlife Refuge System to sustain it in a new era of both challenge and opportunity.

Refuge Recreation Act of 1962

This Act authorizes the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It authorizes construction and maintenance of recreational facilities and the acquisition of land for incidental fish and wildlife oriented recreational development or protection of natural resources. It also authorizes the charging of fees for public uses.

Refuge Revenue Sharing Act (16 U.S.C. 715s)

Section 401 of the Act of June 15, 1935, (49 stat. 383) provided for payments to counties in lieu of taxes, using revenues derived from the sale of products from refuges.

Public Law 93-509, approved December 3, 1974, (88 Stat. 1603) required that moneys remaining in the fund after payments be transferred to the Migratory Bird Conservation Fund for land acquisition under provisions of the Migratory Bird Conservation Act.

Public Law 95-469, approved October 17, 1978, (92 Stat. 1319) expanded the revenue sharing system to include National Fish Hatcheries and service research stations. It also included in the Refuge Revenue Sharing Fund receipts from the sale of salmonid carcasses. Payments to counties were established as:

1) on acquired land, the greatest amount calculated on the basis of 75 cents per acre, three-fourths of one percent of the appraised value, or 25 percent of the net receipts produced from the land; and

2) on land withdrawn from the public domain, 25 percent of net receipts and basic payments under Public Law 94-565 (31 U.S.C. 1601-1607, 90 Stat. 2662), payment in lieu of taxes on public lands.

This amendment also authorized appropriations to make up any difference between the amount in the Fund and the amount scheduled for payment in any year. The stipulation that payments be used for schools and roads was removed, but counties were required to pass payments along to other units of local government within the county which suffer losses in revenues due to the establishment of refuges.

Transfer of Certain Real Property for Wildlife Conservation Purposes Act of 1948

This Act provides that upon determination by the Administrator of the General Services Administration, real property no longer needed by a Federal agency can be transferred, without reimbursement, to the Secretary of the Interior if the land has particular value for migratory birds, or to a state agency for other wildlife conservation purposes.

Rehabilitation Act of 1973 (29 U.S.C. 794)as amended

Title 5 of Public Law 93-112 (87 Stat. 355), signed October 1, 1973, prohibits discrimination on the basis of handicap under any program or activity receiving Federal financial assistance.

The Volunteer and Community Partnership Act

The Volunteer and Community Partnership Act of 1998 brings recognition and additional authorities to the volunteer program and community partnerships, as well as supports education programs. Under this Act, refuges can now more easily conduct business with community partners under the auspices of the newly authorized and streamlined administrative processes. Leveraging Federal dollars and staff, Refuge Managers can operate and construct services through cooperative agreements, deposit donations in individual accounts at the refuge, and match donations.

Youth Conservation Corps Act (16 U.S.C. 1701-1706, 84 Stat. 794)

Public Law 91-378, approved August 13, 1970, declares the YCC pilot program a success and establishes permanent programs within the Departments of Interior and Agriculture for young adults who have attained the age of 15, but not the age of 19, to perform specific tasks on lands and waters administered under jurisdiction of these Secretaries. Within the Fish and Wildlife Service, YCC participants perform various tasks on national wildlife refuges, national fish hatcheries, research stations, and other facilities.

The legislation also authorizes the Secretary of Interior and the Secretary of Agriculture to establish a joint grant program to assist states employing young adults on non-Federal public lands and waters throughout the U.S.

Requires the Secretaries of Interior and Agriculture to prepare a joint report to the President and Congress prior to April 1 of each year.

Wilderness Act of 1964

Public Law 88-577, approved September 3, 1964, directed the Secretary of the Interior, within 10 years, to review every roadless area of 5,000 or more acres and every roadless island (regardless of size) within national wildlife refuges and national parks for inclusion in the National Wilderness Preservation System.

Appendix B: U.S. Forest Service Content Analysis Team Summary Report



Analysis of Public Comment

CAT

Content
Analysis
Team

November 26
2003

200 E
Broadway
Room 301
P.O. Box 7669
Missoula, MT
59807
406-329-3038



U.S. Department of the Interior, Fish & Wildlife Service

The Eastern Massachusetts
National Wildlife Refuge Complex

Assabet River, Great Meadows,
Oxbow Wildlife Refuges

Draft Comprehensive
Conservation Plan and
Environmental Assessment



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Introduction

The contracted U.S. Forest Service Content Analysis Team report summarizes public comment submitted on the Draft Comprehensive Conservation Plan and Environmental Assessment (hereafter Draft CCP/EA) prepared to describe the alternatives for the Assabet River, Great Meadows, and Oxbow refuges in the Eastern Massachusetts National Wildlife Refuge Complex. This report provides a narrative review of concerns raised as well as appendices detailing the coding process for reviewing public comments, analyzing demographic information derived from responses, and listing individuals responsible for the analysis. The narrative summary provides an overview of pervasive themes in public sentiment rather than a comprehensive description of each public concern.

Public input on the Draft CCP/EA is documented, analyzed, and summarized using a process called content analysis. This is a systematic method of compiling and categorizing the full range of public viewpoints and concerns regarding a plan or project. This process makes no attempt to treat comments as votes. In no way does content analysis attempt to sway decision makers toward the will of any majority. Content analysis ensures that every comment is considered at some point in the decision process. Content analysis is intended to facilitate good decision-making by helping the planning team to clarify, adjust, or incorporate technical information into the final guidelines. The process facilitates agency response to comment.

All responses (i.e., letters, emails, faxes, oral testimony, and other types of input) are included in this analysis. In the content analysis process, each response is given a unique identifying number, which allows analysts to link specific comments to original letters. Respondents' names and addresses are then entered into a project-specific database program, enabling creation of a complete mailing list of all respondents. The database is also used to track pertinent demographic information such as responses from special interest groups or federal, state, tribal, county, and local governments.

All input is considered and reviewed by an analyst. Comments are then entered into the database. In preparing the final summary analysis, public statements are reviewed again using database printouts. These reports track all coded input and allow analysts to identify a wide range of public concerns and analyze the relationships between them in a narrative summary.

The U.S. Fish and Wildlife Service solicited comments on the Draft CCP/EA from July 20, 2003 to September 3, 2003.

During the comment period, 1,907 responses, oral and written, were received. Twenty-five responses were duplicates; therefore 1882 responses were entered into the comment database. Organized response campaigns (forms) represented 70 percent (1,334 of 1,907) of the total responses.

Summary of Comments

Synopsis

The general tenor of comments is appreciative and laudatory. Typically, respondents endorse Alternative B. While there are many specific exceptions to these trends, the two most common are opposition to new or increased hunting on the refuge, and opposition to proposed limits on non-motorized recreation on the refuge, such as dog-walking and picnicking. Endorsement of Alternative B is often couched with provisos, such as that it eliminate hunting on the refuge.

Where analysts were able to identify unit-specific comments (such as those about the Great Meadows), the database includes that identification; FWS may wish to review unit-specific comments. In general, however, analysts do not discern any appreciable difference in comments addressed to the various units. The overall themes of comments are the same, and most specific suggestions could apply equally to all three refuges. Where site-specific suggestions or concerns are relevant to this summary, they are identified.

Planning Processes

General Planning

Although respondents are generally complimentary of U.S. Fish and Wildlife Service (FWS) staff and the CCP/EA, commentors provide some suggestions and various criticisms of the document. Respondents also request an opportunity to revisit the plan after its implementation and make any necessary changes.

Time frame for planning/length of comment period

Some respondents are disappointed in the comment period, arguing that holding the comment period during the summer months limits the informed input that communities and individuals can give. Specifically, the Suasco Watershed Community Council states, “The summer timing of this public review may have inadvertently and unfortunately limited public comment.” Also, some respondents want more time to review the “technical and voluminous” conservation plan so that they may submit more informed comments. Respondents are also disappointed that the agency failed to adequately inform the public of the comment period. One respondent from Concord, for example, wanted notice of the comment period posted on the bulletin board at the Great Meadows Refuge. The FWS, some argue, should extend the comment period and improve outreach efforts so that communities and individuals may provide well-informed and useful comments.

Public Involvement

Many respondents feel satisfied with the FWS’s level of public involvement and education; they praise the agencies past efforts and eagerly anticipate additional opportunities for interest groups and communities to stay involved in the refuge’s management. One Maynard respondent affirms, “Your efforts to involve the local communities are appreciated and should benefit us all.” There are, however, a significant number of respondents who believe the FWS could improve their public involvement and education efforts. One individual states, “Community members in the towns abutting the land appear to have very little knowledge about your proposal, and therefore have had very little input.” Respondents urge the FWS to hold more public meetings in schools, libraries, senior centers, and town offices, as well as take advantage of the media to improve public involvement and educate communities. “[Great Meadows Refuge] is a wonderful opportunity for public outreach—a place to engage dedicated environmentalists in a dialogue with U.S. Fish and Wildlife and to recruit new support for the service and its mission.”

Civic and conservation organizations express interest in collaborating with the FWS on management issues. The City of Marlborough Conservation Commission, for example, would like to work cooperatively with the FWS in managing the Refuge Complex and the Memorial Forest and Desert Natural Area “to enhance biodiversity and wildlife while allowing public access where suitable.” Conservation commissions from other towns express

interest in collaborative management as well. Similarly, respondents nominate the Massachusetts Audubon Society, the Trustee of Reservations, the Friends of Assabet River Wildlife Refuge, The Friends of the Oxbow National Wildlife Refuge, The Great Meadows Neighborhood Association, Bay State Trail Riders Association, and the Sudbury Valley Trustees as good candidates for public involvement.

Relationship to Regional Planning Efforts

Respondents ask for clarification of the CCP's compatibility with other regional management efforts, such as: the Maynard Open Space by-law for the Maynard portion of the Sudbury Annex in 1987 and its hunting restrictions; the Freedom's Way Association bill currently before congress to formally designate 43 communities as a national heritage area near the Great Meadows complex; wildlife management and conservation restrictions near Bolton Flats and Devens South Post; the goals of Wild and Scenic River designations; and the original intent of the O'Rourke farm "river reservation."

Statutory Authority

Respondents sometimes address real or perceived conflicts between the CCP and federal or state law. Some respondents remind the FWS that projects proposed "within the Oxbow boundary are subject to the Massachusetts Endangered Species Act," and that the National Wildlife Refuge Improvement Act of 1997 permits hunting as "one of six priority wildlife-dependent uses."

Trust and Integrity

Some respondents question the intent of the agency, and are disappointed that the land management decisions proffered in the CCP do not reflect the historical uses of the land. "I know that I would not have voted for FWS to take the land if I had believed that I would never have access to that property for recreational use. You duped the residents of these towns so that you could get this property," exclaims one respondent.

Other respondents, however, praise the FWS staff and their efforts. These respondents trust the agency to make appropriate land management decisions based on expertise and dedication.

Clarity/Organization of Planning Documents

Many respondents approve of the CCP and commend the agency. "I would like to say that it is an impressive document [and] remarkably well-written," comments one typical respondent. Commentors also support the document's consideration of and compatibility with neighboring areas.

Some respondents express disappointment, however, in the agency's website performance and the size of the electronic document.

Technical & Editorial

Respondents suggest the agency provide clearer, more accurate maps. Respondents also provided editorial suggestions. For example, “Correction: The Commission would like to point out an error on the map on page 2-71. A parking lot is shown on Maple St. north of the service road. This site is in fact a private home. There is a parking lot across the street on Greenough Conservation Land existing there.” Another respondent wrote, “Please correct the capitalization on Sudbury section maps 2-6, 2-7, 2-16 to Sherman Bridge Road. It is two words. It’s a street in Wayland.”

Purpose and Need

Range of Issues

Some respondents feel that FWS is making a mistake in classifying certain issues as beyond the scope of the EA. These respondents want the FWS to evaluate and mitigate noise and air pollution impacts on visitors and wildlife caused by Hanscom Field air traffic. One commentor states, “The CCP should include a plan to evaluate impacts to waterfowl, especially during nesting seasons, from air traffic at Hanscom Field. The CCP should identify noise from Hanscom Field as an issue with which the U.S. Fish and Wildlife staff should be more involved.” Respondents protest the expansion of Hanscom Field and its related impacts to the visitor experience; and ask that FWS partner with local communities and federal agencies—the Department of Transportation and the Federal Aviation Administration—to analyze the impacts of the expansion. One conservation organization asks the FWS to participate in the evaluation of jet ski impacts to recreation and wildlife on the Concord River.

Guiding Policy for Public Lands

Respondents repeatedly describe the agency’s mission as one of wildlife protection, and assert that human activities and development should be limited. “In establishing the permitted uses for the refuge, you must not bow to public pressure. You must follow the charter of a NWR. To do that, you need to establish what the sensitive species are in the refuge, and how they are best managed. You must define what additional resources should be involved to preserve habitat for the animals. This might include re-establishing topographical features, acquiring adjacent land, procuring easements on neighboring lands, or managing tourists.” Respondents emphasize the history of the land and its importance to local communities, and suggest that informed management decisions that benefit biodiversity would best preserve the refuge. To accomplish this, respondents suggest the agency “recognize areas in proximity to the refuge and consider such in managing refuge resources,” as wildlife and ecosystems do not recognize political boundaries.

The land that makes up the Assabet River, Great Meadows, and Oxbow Wildlife Refuges is important to the people in the neighboring communities. Many respondents feel connected to the land, historically, spiritually, and personally.

Alternatives

Many respondents either support Alternative A or B, while little is said regarding Alternative C. Proponents of Alternative A are concerned about expanding or limiting specific activities such as hunting and dog-walking. Some of these respondents request not expanding or allowing hunting. Other respondents ask to retain, rather than prohibit, existing “non-wildlife” dependent activities. In general, these respondents desire Refuge Complex management to continue as is.

Respondents support Alternative B more for its management approach than allowed activities. Many of these respondents favor active management for invasive species and wildlife habitat. Additionally, supporters of Alternative B approve of the levels of funding and staffing proposed. Respondents are divided about the benefits of the phased opening of the refuge. Other concerns stemming from Alternative B include additional fees, allowed uses, and land acquisitions. Repeatedly, respondents endorse Alternative B while asking that it permit non-motorized uses such as dog-walking, and prohibit hunting.

Some respondents feel that no alternative considered is adequate. New alternatives suggested include: emphasizing non-consumptive, non-lethal approaches to population control; promoting the refuge as “open space,” not a hunting preserve; and providing more local level decision-making.

Affected Environment

General resources

One respondent requests that the FWS include in its bibliography the respondent's publication, "A Bibliography of the Biodiversity and the Natural History of the Sudbury River- Concord River Valley, including the Great Meadows, the Estabrook Woods, and Walden Woods."

One respondent avows support for "projects that deal with restoring the native ecology to the area."

Water quality

One respondent requests protection of water quality and quantity in the Assabet River corridor and drainage. Related to the issue of quantity, one respondent raises the issue of connected aquifers: "Areas outside the scope of the CCP and town water supply wells (Pg. 1-24): Protecting the remaining base flow—the groundwater that supplies flow to the streams during dry times—in the tributaries and main stem of the Assabet River is critical to protecting water quality and aquatic habitat in the watershed . . . therefore, we suggest that any requests for access to the refuges for the purpose of drilling new water supply wells be reviewed for impacts to the wetlands and tributary streams on and off the refuges and suggest using the groundwater model of the Assabet River watershed currently being developed by the US Geological Survey (Northborough) to evaluate potential habitat impacts of proposed increased withdrawals."

One respondent argues that water quality degradation should be a critical part of the CCP/EA, rather than being considered out of scope: "I thought the water quality section was weak. Having raised the red flag that the rivers are heavily contaminated, I did not feel that the text clearly explained what that meant for the public and for wildlife in the refuge, and what the prospects for correction are. For example, I had thought that a major current issue was discharge of excessive nutrients from waste water treatment plants leading eutrophication and low-oxygen conditions."

Vegetation

Respondents request that the FWS complete proposed cover-type maps to assess species occurrence and distribution. One respondent provides extensive advice: "Biological Inventories and Mapping Alternative B calls for a thorough inventory of all species on the refuges: It would be ideal to be that comprehensive. If priorities are needed, we suggest the following order of importance: Reptiles, especially turtles; Complete documentation of vernal pools; Invertebrates: Select representative habitats to inventory macro invertebrates in order to provide a representational picture of invertebrates in the different habitats on the refuge and to identify any rare species. Invertebrates can also serve as indicators of overall

ecosystem health; Benthic macro invertebrates: select representative habitats for river, stream, pond and wetland surveys within the refuge; Field invertebrates: select a methodology that targets representative field types, such as wet meadow and upland field.”

Several respondents suggest that the refuge should sustain and enhance grassland and shrubland habitat on all three units to promote early-successional species, many of which are in decline in the Northeast. One respondent suggests creation of a butterfly refuge on the south side of the patrol road running from the Hudson Road gate to the radar station.

Invasives

The need to inventory refuge resources is connected by one respondent to the need to control invasives: “The Service's proposal to complete a comprehensive invasive plant inventory by 2007 will help guide species-specific management. Many exotic and invasive plant species in the watershed have become discouragingly pervasive. SVT recommends that the Service prioritize its efforts on species that are threatening rare habitats, out-competing rare or state-listed species, or are still in low density numbers. The need for exotic species control research is great and the Service's proposal to participate in experimental invasive species control could result in new innovative methods.”

Many respondents support efforts to eliminate invasive non-native species. Indeed, a number urge the FWS to help catalyze a regional control effort in cooperation with abutters, state, federal, and town authorities, and non-profits, arguing that, “Without a systematic treatment of this issue, invasive plants will continue to be dispersed throughout the area by wildlife, people, and mechanical means.”

Several respondents raise concerns about invasives at Puffer Pond, given new fishing access to Puffer. One respondent writes: “At present Puffer Pond is pristine and free from invasive species such as milfoil and water chestnut that have infected other waterways within Massachusetts, especially in local ponds including nearby Lake Boon. Allowing canoes previously used in these infected waterways increases the probability of infecting Puffer Pond with these invasives. Canoe portage presents still another problem in that Puffer Pond is a fair distance from the existing entrances. If auto canoe portage were allowed to the pond, temporary parking (allowing driving on the refuge proper) for canoe launch would have to be provided. This could (would) become permanent parking because of the undesirability of leaving the canoe and its contents to move the canoe carriers to an approved parking area after launch and then walking back to the canoe launch area.”

Concerns about targeted species are raised in two cases: one respondent argues that cattails are native, and should not be removed; a number of respondents argue that mute swans are harmless and should be

Wildlife Management

The most commonly offered input regarding wildlife management reflects an overwhelming sense of community and a desire to harmonize refuge planning efforts with past, present, and future local and regional land management activities. As one respondent summarizes, “The physical configuration and multiple ownership (plus the unique natural history heritage) of

the valley demands a common vision and a systems and team approach. If all the landowners will work together in supporting and adding to the enormous environmental, natural resource and knowledge base that has already been put in place by past generations, the resulting synergy will produce a ‘refuge’ of far greater proportions and impact than could ever occur if each property owner goes off on his/her own.” This sentiment is reflected over and over in comments. Often, people state, “our town” or “our organization” already has wildlife survey data, or “our town/community” wishes to expand its knowledge of natural resources in the area. These respondents encourage FWS to utilize existing data and established management practices when making decisions for the refuge, and frequently urge FWS to “coordinate,” “consult,” and “share information.”

A related theme touched on by many respondents is the quality of wildlife species data provided in the CCP. Respondents request consistently high-quality data, and some respondents request that FWS provide the most up-to-date species information possible.

Some respondents argue that the agency is drifting away from what they perceive to be its central mission: providing “refuge” for wildlife. A number of people assert that in a wildlife refuge, wildlife needs should take precedence over human needs. Echoing this view, many people request that FWS conduct thorough wildlife assessments to determine what kinds of human activities (if any) might be appropriate on the refuge. A number of respondents believe that hunting and trapping for wildlife population control are not appropriate. Some people encourage non-lethal—or at least humane—population control methods.

All respondents who comment on wildlife monitoring support Alternative B; however, these people encourage FWS to provide more detail regarding how, when, and where monitoring will occur.

Refuge Administration

General Suggestions

A number of respondents urge FWS to address refuge management from a regional perspective, encouraging the FWS to integrate refuge management with the management of surrounding lands through community partnerships. Several people ask the FWS to justify splitting the Great Meadows refuge into two units. They argue that this area is all part of one ecosystem and, accordingly, should be managed as one unit.

The few people who address historical and archaeological sites simply ask the FWS to inventory these resources and to preserve and enhance them when possible.

Land Acquisition

Many respondents comment on the proposed land acquisition boundaries, with the majority of people in favor of expanding them. A typical respondent argues that, "In a plan that purports to run for the next 15 years, it seems shockingly shortsighted to limit land acquisition (including through donations) by the refuge." Some respondents suggest that expansion is the best way to protect whole ecosystems and waterways, while others encourage an expanded refuge area to protect threatened and endangered species and wildlife corridors. Some people ask the FWS to include specific areas, such as the former Fort Devens South Post area and parts of the Assebet and Nashua rivers, in the land acquisition boundaries.

Some respondents discourage the FWS from expanding the land acquisition boundaries. Typically these sentiments stem from disagreement with FWS management choices, such as limits on horseback use.

Buildings and Facilities

Respondents voice a myriad of opinions regarding what kinds of buildings and facilities should be provided at the refuge. Suggesting that visitor education is an important component of gaining public support for the refuge, a number of respondents encourage the FWS to build a visitor center or at the least, a contact station. Some of these respondents make more specific suggestions, such as using existing buildings for a contact station/visitor center or locating such a facility at Hudson Road or at Deven's near Jackson Gate. A number of people support the idea of an administration building on the refuge.

Citing the importance of public education, many people ask the FWS to locate kiosks at strategic locations throughout the refuge. Comments regarding refuge parking focus on lot location with many people discouraging parking at Heard Pond. These respondents contend that there has been too much garbage dumping and vandalism at the Heard Pond site to make it a desirable parking place. One respondent asks the FWS to place portable toilets at all parking facilities in the refuge. A number of people support development of an observation deck. A few other specific refuge management suggestions offered by respondents include:

remove barbed wire from the refuge, use smaller information signs, establish a picnic area with a bear-proof garbage can, and construct fire hydrants on White Pond Road and along Sudbury Road.

Staffing and Funding

Although one respondent believes that the refuge should not have rangers because they merely “. . . harass old ladies . . .,” most people feel that adequate refuge staffing is essential. While many people assert that Alternative B will meet desired staffing levels, a number of other respondents contend that proposed staffing levels are too low. These people cite anticipated user conflicts, present refuge hazards, and the current downsizing trend in government as reasons to increase proposed staffing levels. Some respondents suggest utilizing community groups and/or to form partnerships with volunteer organizations to supplement staffing needs.

With regard to refuge management funding, the only direction provided by respondents is a request that the FWS ensure its adequacy.

Enforcement

Respondents who comment on enforcement say that the level of enforcement on the refuge needs to increase. Some respondents suggest that implementation of some programs be delayed until adequate enforcement is in place. Others recommend developing a contingency plan in case proposed enforcement levels are not effective. An additional suggestion offered by some people is that the FWS have a backup force in place of either volunteers and/or community officers.

The key areas identified by respondents as needing increased policing efforts are off-highway vehicle trespass, poaching, dumping, trespass, and vandalism. As a typical respondent writes, “Preventing illegal use by ATVs is a major enforcement challenge for properties with large borders surrounded by suburban landscapes and with many potential entry points.”

Wild and Scenic Rivers

The one concern regarding wild and scenic river designation expressed by several respondents is that hunting is incompatible with this designation and should be prohibited within these areas.

Priority Public Uses

Analysis of Existing Conditions and Need for Further Analysis

Several respondents question CCP visitor estimates and request better calculations, one respondent suggesting that based on personal experience the estimate of 70,000 people per year visiting Oxbow is “wildly incorrect. It is probably more like 7,000.”

Numerous respondents request that scientific analysis of wildlife populations take place prior to any hunting or trapping. One conservation organization suggests that the CCP be driven entirely by wildlife surveys: “We suggest three overarching management priorities when considering policies about public use activities: 1. Public uses allowed under the CCP should be based on the findings of wildlife inventory and habitat management step-down plans. Public use plans should be based on wildlife inventory and habitat management plans; 2. The Service should monitor and adjust allowed public uses based on impacts to wildlife and habitat during the drafting/revision of step-down plans; 3. Public use should be coordinated among partner organizations with land holdings in the vicinity of refuges.”

Several respondents argue that ongoing monitoring will be critical to management of wildlife-dependent recreation, typically: “The proposed additional monitoring projects in Alternative B for all three refuges must include at least that level of detail about how the monitoring and evaluation will be carried out. For example: The CCP states on pages 2-29, 2-68, and 2-95 that the Visitor Services Plans, to be completed by 2007, for Assabet River, Great Meadows, and Oxbow Refuges would include a monitoring program to evaluate the intensity and potential impacts of all the wildlife-dependent public uses on the refuges. What data have you collected to date on this issue and what has your analysis of the results shown? What steps are now being taken or will be taken until 2007 when the monitoring program is in place to ensure that current management of wildlife-dependent uses is not having an adverse effect on the resources?”

General Management Direction

Respondents offer a number of suggestions for general management direction of the Refuge Complex relating to priority public uses, typically defining the extent to which they believe various recreational activities should be permitted. Many respondents, for example, argue that the refuge should be “open to the public,” by which they typically mean members of the public who undertake non-motorized recreation such as picnicking and jogging. For many, this is their defining test of the value of the refuge and a natural consequence of it being public land, e.g., since we pay taxes we get to use it.

For a few respondents, general access to the refuge is part payback for the original government acquisition of the land. For many more, there is a significant level of anger at the prospect of restriction of passive uses, e.g., “[Great Meadows] has been used with great respect and affection by the local public for well over the thirty years that we’ve lived here. I

can't imagine what reason or right the Federal Government might think it has to interfere with that use."

Some respondents acknowledge the mission of the refuge, and couch their suggestions in terms of "wildlife-dependent uses." These respondents suggest that jogging, dog-walking, picnicking, and bicycling are dependent on wildlife.

Many other respondents functionally argue that the purpose of the refuge should be redefined, making other arguments for permitting non-motorized recreation. For example, although few respondents articulate the thought as clearly and plainly, many implicitly advanced an argument in consonance with this comment: "The following suggestions are based upon the assumption that the primary purpose of the refuge is to preserve native species and habitat, but that other compatible uses are acceptable if they support and do not significantly interfere with the primary use."

Other respondents implicitly or explicitly question the priority attached to those activities defined as wildlife-dependent, e.g., "The boundary between wildlife-dependent and non-wildlife dependent activities is not always clear. The more important distinction, in our view, is between outdoor activities that have an adverse effect on the health and diversity of populations of natural organisms, and those that have little or no such impact."

Related to the assertion that only harmful public uses should be restricted, one respondent suggests that permitting only harmless uses would mean "hiking, skiing, snowshoeing, and not much else." A significant number of respondents asserted that off-highway vehicle use—legal and illegal—results in harm, and should be prohibited.

Some respondents offer support for the general direction of the FWS preferred alternative or general confidence in the agency's ability to sort things out. Some respondents ask the agency to monitor use and make appropriate judgments down the line, saying that the agency should continually evaluate relationship between recreational uses, ensure that all legal uses receive fair consideration and access, and minimize conflict.

Refuge Access

Again, many respondents argue for "access" to the Refuge Complex, by which they usually mean easy entrance for non-motorized recreation. While some respondents assert that certain specific activities (dog-walking, jogging, etc.) may negatively impact the refuge, most argue that non-motorized uses are harmless.

Regarding infrastructure, some respondents request that the FWS eliminate the maximum number of trails and roads to protect wildlife. Some respondents assert that off-trail access should be by permit only. One respondent asks that access be limited where it may impact state-listed rare species, such as Blanding's turtles, and argues that the FWS should survey for rare reptiles and amphibians before opening areas or new infrastructure for recreation access.

According to one respondent, "It would be nice if one long trail could be paved for handicapped people in wheelchairs."

Respondents provide many suggestions for specific access points and trails they would like to see developed.

Fees

A considerable number of respondents support fees for use of the Refuge Complex. As one respondent said at a public meeting, “They are great areas; I enjoy walking them a lot. I’d be happy to give somebody twenty bucks tonight to walk in them the rest of the year.” Some of those who support user fees hinge continued support on clear and appropriate local application of funds, or on fee levels remaining stable.

A considerable number of respondents also oppose user fees at the refuge. Some respondents oppose fees based on their perception that the FWS is effectively double-dipping; quote one respondent, “We’ve already paid through taxes.”

Respondents oppose user fees for a number of other reasons, arguing variously that fees will deter use (especially by low-income individuals) or alienate local residents and collaborators. Some perceive fees as a barrier, e.g.: “I am very much opposed to the plans for Great Meadows. This land has been use and enjoyed for many years, and I cannot fathom that access may be impeded by restricted hours and fees. The community benefits greatly from a refuge that is easily and freely accessible to all.” “It belongs to all of us,” another respondent writes, “not the few who are able to pay admission costs.” A number of respondents argue that fees change the nature of a recreational experience, e.g., “It destroys the soul of the experience.”

With regard to both opposition to fees and concern about the proposed fee schedule, it is worth noting that a number of respondents appear unaware of or uninterested in the possibility of purchasing an annual pass instead of paying upon each entrance to the park. For some respondents, then, fees may appear deceptively exorbitant.

With regard to fee schedules, several suggestions are advanced. Several respondents propose that local residents be exempted from fees. Some respondents suggest that volunteers receive free passes. A number of respondents suggest that hunting fees be higher than other entrance fees. Some respondents complain that a car full of hunters (for example) would be charged less for entrance than a family of bicyclists, and argue that non-motorized arrivals are less intrusive and solve parking problems, and should be admitted for lower charges than motor vehicles. One respondent suggests charging a parking fee, rather than an entrance fee.

Several respondents request clarification of fee schedules, in one case asking whether there are any fee differences between Alternatives B and C, and in another asking whether a \$15 annual duck stamp wouldn’t obviate the need to pay \$20 for an annual permit.

Respondents also offer suggestions and concerns regarding the mechanics of fee collection and enforcement. A number of respondents argue that enforcement will be impractical and expensive, arguing that self-service doesn’t work and that all refuge entrances will have to be staffed. Likewise, a number of respondents question whether entrance gates will work in a refuge with as many porous boundaries between local residences and conservation land as the refuge has. Several respondents ask whether fee income will be outweighed by financial and goodwill costs, and ask the FWS to provide a detailed analysis of costs and benefits.

Hunting

Hunting was the issue most frequently addressed in comments on the EMNWR CCP. The hunting issue most frequently raised by respondents was safety—many residents and recreationists fear that hunting will put them in danger. These responses merit close scrutiny, which follows in a section on public safety. However, many other issues were raised vis-à-vis hunting, and they will be discussed here.

Hunting advocates

Although lesser in number than those opposed to hunting, a number of both area residents and others voiced support for hunting on the Refuge. Some respondents assert that the purpose of refuges is conservation—not preservation—and that hunting should be allowed on all wildlife refuges. Others argue that hunting is plainly a wildlife-dependent activity, and one with important cultural and educational values. One respondent writes, “Hunting should also be recognized and allowed as a legitimate wildlife-dependent recreational activity. Pursuing wild game for sport and table fare is an American tradition as old as our country itself. Family bonds are forged and strengthened as parents pass on to their children valuable lessons in conservation and outdoor ethics. Hunting is a total wildlife-dependent experience that fosters an intimate knowledge of game and habitat and teaches a wide variety of wilderness skills.”

Other respondents argue that sportsmen and women have “been the primary source of funding” for many conservation efforts, provide money to FWS, and therefore deserve entry to the refuge complex. Some respondents assert that hunters have been losing territory to development in northeast Massachusetts for decades, and argue that the refuge complex should, in fairness, and to relieve hunting pressure on other areas, be available.

Addressing the issue of displacement, several respondents indicate that hunting does not impact other recreationists. As a typical respondent states, “If you're worried about compatibility issues on the river as to being able to share, I hunt the Sudbury River, and people go by in their kayaks, I don't shoot when they're paddling by. I wave to them. They don't wave back, but I wave to them. I'm sitting there with my dog just, you know, letting them go on by.”

Some hunting advocates also seek to allay safety concerns, arguing that hunting is an extremely safe sport. “Some local people have concerns about the opening of these areas to hunting. It is important to inform the public of the safeguards, rules and restrictions that will be associated with the harvest of resident wildlife. . . . If practiced safely hunting is no more dangerous than many other daily activities.”

Some respondents (hunters and non-hunters alike) suggest that the Refuge permit bow hunting only, .e.g., “Once the abutters have an understanding of how close one must be to their quarry to execute a lethal shot, they will also understand that before a shot is made, and there is no question about what it is the archer is taking aim at. So there will be no mistaking a human or household pet for a deer. . . . It is not some beer-guzzling bubba sitting in wait for the first thing that moves but rather responsible people who have been through state-mandated training in the sport of bow hunting and who are dedicated to the sport who wish

every hunt to be a safe incident free experience for themselves and anybody they share the woods with.”

Respondents also offer suggestions for ensuring safe hunts, such as banning buckshot and limiting magazine capacity. Some respondents suggest using testing, expense, and the willingness of hunters to assist with Refuge goals to ensure that only a safe and ethical subset of hunters have access to the Refuge.

Advocates of hunting also claim that hunting provides effective population control for nuisance species, arguing that waterfowl befoul water and recreation areas, and that deer cause traffic accidents, browse crops and ornamentals, and carry lyme disease-infected ticks.

Hunters also assert that their activities are humane, asserting that overpopulation will be addressed either through lingering, painful deaths by starvation or disease, or through quick and painless execution.

Some respondents support hunting but are concerned that access to Oxbow may be being increased too much, and ask that use be monitored and adjusted as necessary. Some respondents ask the agency to limit expansion to what can be handled by existing enforcement capability. Some respondents ask that waterfowl hunting at Oxbow include “the marshes and potholes,” as well as Hop Brook near the train tracks. One respondent urges that there be no limits on waterfowling.

One respondent suggests that pheasant stocking continue at Oxbow, but not be expanded to Assabet.

Opposition to hunting

Opposition to hunting at the EMNWR is intense and widespread, at least within the subset of individuals who provided comment on the CCP. When respondents differentiate between game species, opposition to hunting turkey and grouse is common, but support for a limited deer hunt is more common. Leaving aside public safety, and the associated question of displacement, comments which question the wisdom of permitting (or expanding existing) fall into four broad categories: requests for additional analysis; concern over impacts; moral outrage; and concerns about iniquitous treatment of recreationists.

Additional Analysis

Some respondents don’t plainly oppose hunting, but ask for additional analysis to justify and focus hunting. For example, one respondent says, “I am not in favor of hunting in that area unless it is required to control species that have no natural means of control, and justified by appropriate studies.” Some respondents suggest that hunting not be regarded as recreation, but as wildlife population management, and that therefore it should be utilized only where comprehensive biological surveys and analysis indicate it would be of value for biodiversity or habitat protection. These respondents argue that only species with real overpopulations should be hunted (and ask for hard evidence, rather than anecdotes of browsed ornamentals), excluding species—such as woodcocks—that appear to be in decline. Some respondents question whether scientific analysis will indicate that hunting in such a limited area will have real impacts on area populations.

Some respondents assert that the CCP inadequately analyzes the impact of hunting. Respondents request more data on the cost of ministering to hunters, on impacts on public safety, habitat, and species, and on methods of implementation. Some respondents ask the FWS to evaluate the economic impacts of hunting, positing that displacement of other recreationists' results in negative impacts. Respondents ask for boundary clarifications and improved maps of available hunting areas. Respondents ask whether the agency has assessed its liability for hunting accidents.

Connected with the sense that analysis is inadequate is the argument that the "cure" is inappropriate to the problem. Respondents suggest that beavers be controlled through non-lethal means, which they argue have been proven more effective than trapping.

Impacts

Several respondents oppose hunting based on perceived impacts to other resources. As one respondent writes, "A great number of migratory birds rely on this sanctuary for breeding, as do many amphibians, reptiles, fish and mammals. Loud noise such as gun shot is known to interfere with breeding. Such interference seems in direct conflict with the intent of this land as sanctuary." Numerous area residents complain that the sound of gun shots is aesthetically disturbing as well as frightening.

Several respondents express concern about the impact of lead shot on wildlife and water quality. Several respondents argue that hunting off-trail with or without dogs will cause damage, and suggest that off-trail use be as limited for hunters as it is for other recreationists. Several respondents argue that many migratory birds are in decline, and ask that none be hunted.

Moral objections

Comments from both area residents and apparent respondents to a campaign by animal rights organizations indicate revulsion at the idea of hunting, particularly on a national wildlife refuge. For example: "Of all the violent, destructive activities in the world, hunting is right up at the top of the list. I am really disgusted at these proposed changes, as is the rest of my family. We live very close to Great Meadows, and I'm sure that the last thing we want to hear in the middle of a peaceful Saturday afternoon is gunfire ripping through the air followed by the squeal of a helpless animal gasping its last breath." Or: "Hunting, especially trapping, is an unnecessary and cruel attack on nature's innocent creatures. To permit people to entertain themselves by cruelly destroying the lives of other beings is unconscionable. Hatred, selfishness, and violence tear the world we live in today. Encouraging people to hunt and to kill does nothing to heal our wounds and move us toward a better world."

Respondents argue that hunting should not be permitted, because, they allege: it benefits a small constituency; fees for sportsmen and women are a minor part of overall conservation funding; hunters kill two animals for each they harvest, leaving the others to die suffering, lingering deaths; hunters present a danger to non-game species; in terms of population control, predators better select prey; hunting stresses wildlife.

Respondents are particularly angered by the idea of hunting on a refuge, which they perceive to be directly in conflict with the purpose and definition of a refuge. One typical respondent describes shooting wildlife on a wildlife refuge as “oxymoronic.”

Iniquity

A strong sentiment running through the comments is a sense that there is something inconsistent, unfair, and hypocritical about permitting hunting on the EMNWR while prohibiting activities such as dog-walking, jogging, and picnicking on the basis of their wildlife impacts. As one respondent writes, “It makes absolutely no sense to me that hunting will be allowed in the refuge, but dogs on leashes and bike riding will not be allowed. How in the world are dogs on leashes and people on bicycles considered dangerous to wildlife, yet people with guns are okay?” Or as a conservation group writes, “Inconsistent or arbitrary management of public use could lead to confusion and resentment. Why could someone who is hunting grouse have a dog (unleashed!) whereas non-hunters must leave their canine friends at home? Can a birdwatcher take along a sandwich, or is that considered picnicking? If the pace of a jogger spooks wildlife, then why can someone cross-country ski?”

Many respondents assert that quiet recreation opportunities are rare, but that adequate hunting is already available.

Hunting and Public Safety

Many respondents argue that expanded hunting will threaten the safety of area residents and other recreationists. It is easiest to consider these comments in two categories: threats to people, and displacement of recreationists.

Threats to people

Many respondents, including many local residents, argue that a) they will feel unsafe if hunting is permitted on the Refuge, and b) that people or animals will be injured or killed by friendly fire. A typical comment: “I was brought up learning how to handle a gun, including shotguns, and remember going deer hunting with my father in Lincoln, Lexington and other towns west of Boston—albeit over 50 years ago. . . . Without prejudice one way or the other about the justification for hunting, I think the CCP fails to address the important issue of public safety and the dangers resulting to adjacent schools, roadways and homes in the Refuge area. Clearly, MetroWest is already too overbuilt to allow for the extended hunting proposed in the CCP.” Or: “I do not want to be shot hanging clothes in my back yard.”

To protect visitors to other conservation lands, some respondents suggest that hunters be prohibited from using public access points to other lands (such as Foss Farm and Greenough Conservation lands). Local abutters and area residents are particularly concerned about stray or mistargeted bullets, and raise concerns regarding a number of specific sites such as the Maynard public school campus and the southern portion of the Sudbury unit.

One respondent raises concerns regarding the resources local law enforcement will expend as a result of increased hunting: “As the Chief of Police in the Town of Billerica I am concerned about proposed hunting on and around the Concord River. This has been a safety and noise concern for residents of west Billerica for many years. I feel that this proposed change will increase these problems. Please take into consideration that this end of the refuge is a

populated area and hunting can pose safety risks. Additionally this will cause an influx of Police calls to the area to determine if hunters are on private property or refuge land. Does the plan have any contingency to compensate the town for this added use of resources?"

Displacement

Many respondents aver that they will be unable to use the Refuge during hunting season. One respondent asks that the FWS "Expand the Compatibility Determination analysis to include an assessment of recreational compatibility. This should include a determination that the conditions that motivated the past Refuge Manager to ban hunting have been alleviated." Respondents argue that creating an exclusive use for significant portions of the year is unfair and unwise. Some respondents express significant concern for area recreationists over unmarked and porous boundaries between the Refuge, conservation land, and residences, particularly where hunters might go off-trail. A typical respondent writes, "I am also opposed to hunting, not for moral reasons, but for safety reasons. I and my dogs were the target of a hunter at Great Meadows several years ago. I had to hit the ground and crawl behind a tree for safety. He didn't see me, though when he heard me, he took off in a hurry."

Some respondents complain that hunting season occupies optimal use times for the Refuge, one respondent stating that no one uses refuges in summer because "the deer flies will kill you." Several respondents think along similar lines, suggesting reduced hunting opportunities to permit other recreation: "Maybe hunting could be limited to a few weekends per season," writes one, while another suggests a couple days of hunting per week. Another respondent suggests things would be better "if you had one or two hunting days where experienced hunters signed up to do a 'cull' if you could actually get them to kill sick, old and slow individuals instead of the healthiest, biggest and most impressive animals—and those days be highly publicized so innocent people wouldn't be hurt."

Some respondents suggest that the only safe course of action is to close the Refuge to other uses during hunting season.

To alleviate these concerns, some respondents argue that hunting should only be done by professionals paid by the refuge for wildlife management: "If the refuge needs to use deadly force to carry out the mission, have that applied by trained professionals and not by anyone with ten bucks and a shotgun."

Several respondents mention the need to educate both hunters and area residents on the schedule and placement of legal hunting. Several respondents talk about the need to increase law enforcement to deal with increased hunting, and some assert that the Refuge's record of successful interdiction of motorized trespass and vandalism indicates a current inability to enforce laws, and little confidence that hunting can be safely policed.

Dogs and Public Safety

A number of respondents offer intensely felt comments advocating continued use of dogs on the refuge as a matter of personal safety. These respondents, all women, state that prohibiting dogs effectively prohibits their use of the refuge, e.g., "I am a woman and very aware that when I am in the woods—I am an easy prey object for defective human types. I would never walk alone in the woods without my dog—a 120 pound dog at my side is a huge deterrent to

even trying something. I have been approached in the past by questionable behavior and my dog at that time did place himself between me and the man creeping up behind me. The man turned and left. By banning dogs on-leashes at Great Meadows you effectively ban all women.”

Fishing

With the exception of the occasional “let us fish anywhere we want,” most fishing comments are restricted to Puffer Pond on the Assabet River. There is considerable support for fishing on Puffer Pond, and for the proposal to do so, and some respondents argue that anglers infrequently transport invasives.

There are also a number of respondents who request that fishing be prohibited on Puffer Pond. Respondents argue that anglers will disturb nesting birds, erode the shore, trample vegetation, bring in invasives, and drag boats through the refuge. As one respondent writes, “Little consideration has been given to the effect [fishing] would have upon Puffer Pond’s habitat. The shoreline risking areas would gradually be expanded by use, destroying additional shoreline habitat and pond plants. Trash that is left behind such as beverage containers, fishing gear wrappers, tangled fish line in trees, on the ground and in the water, are a danger to birds, waterfowl, and other wildlife. How a shoreline fishing area would be made handicapped accessible is not discussed. Catch and release is an ideal fishing concept. However, it can prove to be fatal to many fish due to hook swallowing and extraction. Enforcement of catch and release will be difficult. Due to the small size of the pond, the popularity of fishing, and the high density of the area, the pond would soon be in danger of being greatly depleted. This rapid removal of fish would affect other wildlife populations that depend upon the pond for food. These would include the colony of great blue herons currently residing in the refuge near the pond, raccoon, and other water and fish dependent animals.”

Respondents concerned about impacts to Puffer Pond, but not categorically opposed to fishing, suggest very limited shoreline access to the Pond, to reduce impacts, and in one case a prohibition on the use of treble hooks. One respondent offers extensive recommendations for minimizing the threat of invasives.

Several respondents ask how the agency intends to adequately enforce restrictions and monitor impacts at Puffer Pond.

Environmental Education

A large majority of respondents who chose to address this section of the CCP support the environmental efforts and facilities proposed in Alternative B, advocating more environmental education for people of all ages. Several respondents encourage completion of the proposed Sudbury River interpretive canoe trail. Several respondents encourage the FWS to think bigger, and develop its educational plan in concert with other regional entities and efforts, such as a Sudbury-Concord River valley regional conservation study and education effort. One respondent urges that “a full-scale information/education center is included as part of the future considerations for the Oxbow. . . . The Oxbow is also significant because it

offers the additional opportunity for linkages with other state, private and town owned lands. And it is also situated in the center of the proposed Freedom's Way National Heritage Area.” One respondent urges the FWS to use the refuge principally for biological studies.

With regard to facilities, one respondent is “very interested in the potential development of a visitor center in the area of Great Meadows NWR. We would like to explore any opportunities to increase the public understanding of the Sudbury, Assabet River and Concord Wild and Scenic Rivers within the educational materials and displays presented at the visitor center.” One respondent urges the FWS to continue historical tours: “These have been very popular and have provided a way by which some of Maynard's older residents can view the refuge. Several such tours a year would provide access to history and wildlife through use of a motorized van or bus.”

One organization requests clarification on facilities development “The proposed management of public outreach is unclear. The only designated public outreach position is slotted for Great Meadows. Does this position support all three refuges, or Great Meadows, or the complex as a whole? Does this individual coordinate volunteer efforts and recruit volunteers for all three refuges, or Great Meadows, or the complex as a whole?”

Some respondents complain that recreational restrictions undermine opportunities for education at the refuge, and urge that leashed dogs and off-trail nature study and photography be permitted. Several respondents urge the FWS to close some areas to hunting to permit educational tours in spring and fall.

Recreation

Due to the refuge's proximity to heavily populated areas, and an already existing recreational trail system, accessing the refuge for recreation is a major concern of many respondents. Some respondents even see the refuge as a sort of town park. Many local residents that responded did not expect restrictions on recreation when they supported FWS's offer to buy the property. Others support the concept that wildlife sanctuary should be the priority, and use limitations should be imposed.

Some respondents see access for recreation at the refuge as a means to an end: "Through controlled access to refuges you can create and sustain a community of citizens who will not only care for the refuges but also support the Fish and Wildlife Service in its struggle to maintain them."

Some respondents want the refuge to be used for quiet sports only, and ask that motors be prohibited to reduce noise, air and water pollution, erosion of soil, and to increase safety. As one respondent states, "I urge you to support making the refuge into a place where passive recreation can take place. By that I mean prohibiting motorized vehicles and hunting. The land is a treasure for hikers, bikers, runners, birdwatchers, nature lovers and, as such, should be preserved for this and future generations."

Snowmobiling

Snowmobilers describe themselves as law-abiding recreationists that are respectful of others and wildlife. One local snowmobile club would like to establish a trail through the refuge, maintained by the club, for the club's enjoyment. This club goes on to point out that snowmobiling will not harm the terrain or wildlife because snowmobiling usually occurs from the beginning of January to the beginning of April (at the latest) and only when there is a minimum of four inches of snow. Further, snowmobiling is already governed by Massachusetts laws requiring, among other things, that snowmobiles stay on the trail. Snowmobiling, the club concludes, is a traditional use in the area and ask the FWS to let snowmobilers use traditional trails.

Jogging

Joggers view the refuge as a safe, peaceful place to pursue their activity, and are confused as to why jogging would be banned. One respondent states that the refuge ". . . is a beautiful place to jog, particularly because it is one of the few off-road places with no early morning traffic. It would be shame if joggers were not allowed to use the paths of the Wildlife refuge." Another respondent asserts that, "The joggers I've seen are respectful of walkers, seems inconsistent when hiking, snowshoeing, and cross-country skiing are allowed." Another respondent writes: "If anyone ever asks, I guess I'll just tell folks, 'Oh no, I'm not running, I'm just hiking real fast.'"

Picnicking

Picnicking is viewed by many respondents as a harmless past time that allows people to enjoy the refuge's beauty. As one respondent puts it, "Is this really such a huge problem? On my daily walks I never see any trash along the trails. . . . What is so bad about taking a family, a lunch basket, and enjoying a couple of hours surrounded by nature?" These respondents ask the FWS to allow picnicking within the refuge.

Bicycling

Similar to jogging, many respondents assert that the refuge offers a safe, traffic-free environment for bicycling. These respondents also point out that bicycling is already an important component of the surrounding towns, and that many local residents have moved into the area because of its extensive town trail system. By not allowing bicycling in the refuge, FWS will be creating a gap in the local trail systems. For example, the nearby areas of the Stow Town Forest, the Sudbury State Forest, the Memorial Forest Reservation, and Desert Natural Area allow bicyclists on the trails. The addition of the refuge to this significant resource would yield excellent opportunities for exercise and enjoyment of the natural setting, by allowing cyclists to connect with other available areas. Therefore, respondents ask that the refuge acknowledge the local trail systems' benefits by allowing responsible cyclists to use the refuge's roads. Some cyclists are willing to be flexible as to when and where they can pursue their sport. One respondent suggests FWS provide signage to indicate allowed routes and speed limits to help restrict bicycling that may conflict with wildlife activities. Another proposes that the FWS set aside periods during the day when bicycling would be permitted. Others suggest allowing cycling on paved roads only.

Other respondents aren't as sympathetic to cyclists, and would like to see bicycles kept off the refuge. One respondent asserts that riding a bike is a poor way to observe wildlife, and that if the refuge allows cycling, many cyclists would speed through or venture off designated paths.

Horseback Riding

As with the cyclists, equestrians are concerned that not allowing horseback riding in the refuge will compromise access to other conservation/state/local forest trails immediately surrounding the refuge, such as the Stow Town Forest, Sudbury State Forest, Marlboro State Forest, Sudbury Conservation Land, and the Desert Memorial Forest. The refuge is located directly in the middle these properties, and presently corridors allow horseback riders to travel from one conservation land to another. Further, this group asserts that horseback riding has not impacted other uses in the aforementioned areas. These trail riders ask that the refuge be open to horseback riding, and that consideration be given to an access trail so riders may traverse the refuge to access other conservation areas. Another respondent asks FWS to work with various trail riding and breed organizations in Massachusetts, to establish a horseback riding plan that serves the needs of wildlife and those who enjoy nature from horseback. Further, the Bay State Trail Riders offer to help with the maintenance of any connector trails with volunteer work days and funds if necessary.

Some respondents point out the economic benefits of horseback riding, stating that equine activities are engaged in by a large number of Massachusetts citizens and also make a significant contribution to the Massachusetts economy. For example, they assert that equine agriculture provides over \$200 million per year in direct spending into the Massachusetts economy, over 5,000 jobs and more than \$13.2 million in state and local tax revenues. Limiting horseback riding would harm the economy.

Equestrians state that they oppose expansion of the refuge's boundaries as long as it limits horseback riding.

Dog-Walking

Many respondents assert that given the popularity and demand for areas to walk dogs, and the fact that parts of the refuge have been used responsibly for decades by dog-walkers; FWS should make part of the refuge available for this pastime. These dog walking enthusiasts request that leashed dog-walking be allowed on refuge trails in appropriate areas, and that strict fines are in place for anyone releasing a dog or failing to pick up after their animal. Others are willing to allow an exclusion of dogs during the most sensitive times, when wildlife surveys identify an impact on nesting birds or other animal life. Many of these respondents view dog-walking as meditative and a way of connecting to the natural beauty of the earth, something that is consistent with refuge goals. These respondents assert that without substantial evidence that dog-walkers are threatening the integrity of the refuge it is unjust and an act of discrimination to prohibit dog-walking. On the other hand, one respondent would like to see dogs banned from the refuge, stating that many dog owners don't obey leash rules to the detriment of wildlife, and further, even on a leash dogs frighten animals.

Birdwatching

Birdwatchers and nature photographers are concerned that they will be confined strictly to trails when observing wildlife, while hunters would not. If hunters are allowed off trail, they assert, birders should be allowed off trail as well.

Trapping

Some respondents ask that the Refuge be open to beaver and muskrat trapping, asserting that modern traps are instant and humane, and arguing that small game threatens children, pets, and livestock, and that beavers "cause extensive property damage."

Some respondents ask whether and under what circumstances which furbearers could be trapped, and what constitutes an invasive species and appropriate control methods. Some respondents oppose trapping on the grounds that it is inhumane; other respondents perceive trapping as ham-fisted interference in natural systems that function best on their own.

Socioeconomic Concerns

Several respondents applaud Alternative B for helping to make Maynard a “destination.” One respondent requests permission to graze in the Oxbow unit, and one requests continued cooperative farming.

Several area residents request development of an “abutter policy,” without clearly articulating what the components of such a policy would be.

Several respondents urge consideration of impacts to area parking, specifically at Monsen Road at Great Meadows, and at the east gate of Assabet River off Old Marlborough Road. Some respondents are concerned about refuse at entry points.

Appendix A

Coding Structure and Demographic Codes

Eastern Massachusetts National Wildlife Refuge Complex Draft CCP/EA

Header Information

Coders will identify organization type, number of signatures, response type and delivery type on all letters by filling in the proper box. Use **CIC** (Common Interest Class) field only if this information is requested by the Administration. Fill in additional fields when necessary.

Header Order: **MID**, **OT**, **S**, and **RT**, and **DT** fields are required. **IA**, **UT**, **LG**, **F**, **CIC**, **RI**, and **CE** fields are optional fields and used only where necessary. The **TS** (Total Signatures) field will tally automatically in Oracle. A stamp containing these fields will be placed on the working copy.

MID	OT	S	RT	DT	IA	UT	LG	F	CIC	RI	CE	TS	

Mail Identification (MID)

The Mail Identification number is a unique respondent number assigned in the CAET Oracle Program. The Oracle form contains mailing information needed to create mailing labels and obtain project specific demographic information about a respondent.

Organization Types (OT)

The Organization Type code identifies a specific type of organization, association, government agency, elected official, or individual.

Government Agencies and Elected Officials

F	Federal Agency
N	International Government/International Government Association
S	State Government Agency/Elected Official/Association
C	County Government Agency/Elected Official /Association
T	Town/City Government Agency/Elected Official/Association
Q	Tribal Government/Elected Official/Tribal Member/Association
E	Government Employees Organizations/Unions

- FW** Fish Wildlife Service Employee
XX Regional/other governmental agency (multi-jurisdictional)

Business and Industry

- A** Agriculture Industry or Associations (Farm Bureaus, Animal Feeding)
B Business (my/our, Chamber of Commerce)
G Range/Grazing Orgs and Permittees
HT Hunting/trapping Industry or Org
M Mining Industry/Assn (locatable)
O Energy Industry (Oil, Gas, Coal, Pipeline)
U Utility Group or Org (water, electrical, gas)
L Timber or Wood Products Industry/Assn

Other Organizations

- AD** Academic
AR Animal Rights
CH Church/Religious Groups
D Placed Based Groups (Multi-issue, focused on a specific region—i.e., QLG)
H Consultants/legal representatives
J Civic Organizations (Kiwanis, Elks, Community Councils)
K Special Use Permittees (Outfitters, Concessions, Ski Areas)
P Preservation/Conservation Organization
PA Professional Association/Society
QQ Tribal Non-Governmental Organization/Member
RB Mechanized Recreation (bicycling)
RC Recreational/Conservation (Trout Unlimited, Elk Foundation, Ducks Unlimited)
RM Recreational - Motorized
RN Recreational - Non-Motorized (hiking, biking, horseback riding)
SC All Schools
X Conservation Districts
Y Other (Organization with an indecipherable focus—i.e., Ice Cream Socialist Party)
Z Multiple Use/Wise Use

Unaffiliated

- I** Unaffiliated Individual or Unidentifiable Respondent

Number of Signatures (S)

The number of signatures is the total count of names associated with a mail identification (Mail ID) number. The procedure for determining the number of signatures for a Mail ID number is consistent across all response types. In other words, letters, forms, and other types will be treated the same for determining the number of signatures. Each individual name associated with one Mail ID is counted as one signature. When a Mail ID has an incomplete name associated with it, such as an anonymous letter or an email address, it is counted as one signature. Mr. and Mrs. X are counted as two signatures.

Response Type (RT)

The Response Type identifies the specific format of correspondence.

- 1 Letter
- 2 Form or Letter Generator
- 3 Resolution
- 4 Action Alert
- 5 Transcript (dictated Audio, Video, Telephone response)

Delivery Types and Descriptions (DT)

The Delivery Type identifies the method of delivery for the correspondence.

- E Email
- F Fax
- H Hand-delivered/oral testimony (personally delivered)
- M Mail or commercial carrier (includes video, audio, letter format)
- T Telephone
- U Unknown

User Type (UT)

The User Type identifies the purpose for which an individual, organization, or agency uses public lands/refuge.

- A Area Residents
- B Businesses and Services
- D Dog Walkers
- E Environmental Educational
- K Bikers
- F Anglers
- H Hikers
- P Photographers
- W Non-motorized Recreation
- M Motorized Recreation
- S Horseback Riding
- T Hunters
- X Non-identifiable

Early Attention (IA)

Early Attention codes are applied only to those documents requiring an early response from the ID team. The Early Attention codes are listed in order of priority. If more than one code applies to a single document, the code with the highest priority is attached.

- 1 **Threat of harm** – Any response that threatens physical harm to administration, agency, or project personnel.
- 2 **Notice of appeal or litigation** – Any response that describes the respondents' intent to appeal an action or bring legal suit against the agency.

- 3 **Freedom of Information Act (FOIA) requests** – Any response that officially requests information and documentation under the FOIA.
- 4 **Provides proposals for new alternatives** – Any response that suggests a new alternative to the proposed action. These do not include critiques of alternatives or partial changes of existing alternatives.
- 5 **Requires detailed review** – Any response that requires detailed review. These responses may include detailed scientific or technical analysis, or significant enclosures.
- 5A **Provides extensive technical edits** – includes extensive use of lined out text, suggestions to delete text, and/or replace text.
- 5M **Provides maps** – Any response that includes map enclosures.
- 6 **Government entities** – Any response from an elected official, writing in his/her official capacity, representing a Federal, State, county, or municipal government. Also includes official correspondence from any government agency.
- 6A **Requests for cooperating agency status from a government entity.**
- 7 **Public hearing** – Any response that requests a public hearing.

Information Request (RI)

Information Request codes are applied only to those documents with specific requests for information pertaining to the proposal.

- A Mailing List Only/Nothing to Code
- B Request to be Removed from the Mailing List
- C Request for Copy of Federal Register Notice
- D General Request for Other Information
- E Request for Confirmation of Receipt of Letter

Comment Extension Request (CE)

Comment Extension codes are used when a respondent has a specific request for extending the comment period.

- 0 Request to Extend the Comment Period

Eastern Massachusetts National Wildlife Refuge Complex Draft CCP/EA

The coding structure is a topical outline with alpha and numeric codes attached. It is a tool to identify public comments and sort them into recognizable topic categories. Once comments are assigned codes, they are then entered into a database from which they can be reported and sorted in any combination needed for analysis.

The coding structure is organized into required fields called subject and category codes. Subject codes are five-character alpha codes that represent broad themes associated with a project. Category codes are five-digit numeric codes that define specific subtopics within each subject code, and they are generally arranged from the general to specific with subcategories nested within categories.

PLANN (Subject Code) - Introduction - Chapter 1 and Coordination with Others - Chapter 5

10000 (Category Code) Planning Process and Policy

- 10100 Timeframes for planning/Length of comment period (*adequacy of, timing*)
- 10200 Public Involvement (*General strategies, methods & techniques, collaborative efforts, pre-EIS/CCP consultation*)
- 10300 Scoping (*General comments, planning before the EIS*)
- 10400 Relationship to other planning processes (*Conflicts with other area projects, general planning*)
- 10500 Statutory Authority (*Compliance with laws and regulations; general references to violations of NEPA, APA, NFMA, Planning Regs. For resource-specific regulations, code to resource*)
- 10600 Science/Resource-Based Decision-Making (*Use of science in Decisionmaking; general references to use of science and scientific documents*)
- 10700 Budgetary Ramifications (*References to the cost of implementing the proposed rule, project funding*)
- 10800 Agency Organization, Structure and Staffing (*General comments not specific to project, includes trust and integrity issues*)
 - 10810 Trust and Integrity
- 10900 Coordination & Consultation (*Interagency, State, Private, Tribal*)
- 11100 Clarity/organization of planning documents
- 11200 Technical and Editorial Comments

12000 Purpose and Need (*General references to the purpose and need of the CCP/EA and needs for further analysis; if specific, code to the resource*).

- 12100 Project Area (*Scope of project*)
- 12200 Proposed Action/ Decision to be Made (*What it should/should not include*)

- 12300 Range of Issues Identified through Public Scoping (*General; Comments specific to resource areas go to AFFEC*)
- 12400 Issues and Concerns Considered Outside the Scope of This Analysis
- 12500 Permits and Agency Approvals Required
- 12600 Guiding Policy for Public Lands (*General land management philosophies*)

ALTER - Alternatives - Chapter 2

13000 Alternatives (Comments that simply vote, without rationale)

- 13100 Alternative A: Current Management (*General comments not specific to a resource; Assumptions made in the analysis*)
- 13200 Alternative B: Proposed Action
- 13300 Alternative C
- 13400 Formulating Alternatives (*Issues used, Design criteria, Development, etc.*)
- 13500 Features common to all Alternatives
- 13600 Features common to Action Alternatives only (B & C)
- 13700 Alternatives Considered But Not Given Detailed Study (*Same as eliminated alternatives*)
- 13800 Range/Comparison of Alternatives (*General comments, adequacy of range; I like A & C better than B*)
- 13900 New Alternatives (*Support for or recommendation for a new one*)
 - 13910 Alternative Matrices (*Including Map comments and references*)

AFFEC - Affected Environment - Chapter 3, and Environmental Consequences - Chapter 4

14000 Physical, Biological, and Socio-Economic Resources (general Climate comments, extensive lists)

15000 Geology/Topography

- 15100 Analysis of Existing Conditions and Need for Further Analysis
- 15200 General Management Direction (*including other Management Impacts on this Resource*)
- 15300 Cumulative Impacts
- 15400 Mitigation and Monitoring

16000 Soils

- 16100 Analysis of Existing Conditions and Need for Further Analysis
- 16200 General Management Direction (*including other Management Impacts on this Resource*)
- 16300 Cumulative Impacts
- 16400 Mitigation and Monitoring

17000 Hydrology

- 17100 Analysis of Existing Conditions and Need for Further Analysis
- 17200 General Management Direction *(including other Management Impacts on this Resource)*
- 17300 Cumulative Impacts
- 17400 Mitigation and Monitoring

18000 Air Quality

- 18100 Analysis of Existing Conditions and Need for Further Analysis
- 18200 General Management Direction *(including other Management Impacts on this Resource)*
- 18300 Cumulative Impacts
- 18400 Mitigation and Monitoring

19000 Water Quality

- 19100 Analysis of Existing Conditions and Need for Further Analysis
- 19200 General Management Direction *(including other Management Impacts on this Resource)*
- 19300 Cumulative Impacts
- 19400 Mitigation and Monitoring

20000 Vegetation and Habitat Types

- 20100 Analysis of Existing Conditions and Need for Further Analysis
- 20200 General Management Direction *(including other Management Impacts on this Resource)*
- 20300 Forested and Shrub Dominated Wetlands
- 20400 Vernal Pools and Ponds
- 20500 Bordering Communities *(Uplands, Marshes, Swamps)*
- 20600 Invasive or Overabundant Species
- 20700 Cumulative Impacts
- 20800 Mitigation and Monitoring

21000 Wildlife and Fisheries

- 21100 Analysis of Existing Conditions and Need for Further Analysis
(Fencing)
- 21200 General Management Direction *(including other Management Impacts on this Resource; general habitat comments.*
- 21300 Migratory Birds
- 21400 Mammals
- 21500 Reptiles and Amphibians
- 21600 Fisheries
- 21700 Invertebrates

21800 Cumulative Impacts

21900 Mitigation and Monitoring

22000 Cultural Resources and Special Designations (focus areas)

22100 Analysis of Existing Conditions and Need for Further Analysis

22200 General Management Direction *(including other Management Impacts on this Resource)*

22210 Land Acquisitions

22300 Refuge Buildings and Facilities

22400 Refuge Administration and Staffing

22410 Volunteers

22420 Enforcement

22500 Wild & Scenic River Plan / Designation

22600 Cumulative Impacts

22700 Mitigation and Monitoring

23000 Priority Public Uses

23100 Analysis of Existing Conditions and Need for Further Analysis

23200 General Management Direction *(including other Management Impacts on this Resource)*

23210 Access

23220 Fees

23230 Passes and Permits

23240 Visitor Safety

23241 Hunting

23242 Dog Walking

23300 Hunting *(If safety concern, code to 23241)*

23310 Big and Upland Game Hunting

23320 Migratory Bird Hunting

23400 Fishing

23500 Wildlife Observation and Photography

23600 Environmental Education and Interpretation

23610 Natural and Cultural History Tours

23620 Outreach for Public Awareness

23700 Cumulative Impacts

23800 Mitigation and Monitoring

24000 Recreation and Other Opportunities

24100 Analysis of Existing Conditions and Need for Further Analysis

24200 General Management Direction *(including other Management Impacts on this Resource)*

- 24300 Motorized Recreation
 - 24310 Snowmobiling
- 24400 Non-Motorized Recreation
 - 24410 Snowshoeing / X-Country Skiing
 - 24420 Walking/Jogging
 - 24430 Picnicking
 - 24440 Biking
 - 24450 Horseback Riding
 - 24460 Dog-Walking, general (*if safety concern, code to 23242*)
 - 24470 Bird Watching
- 24500 Cumulative Impacts
- 24600 Mitigation and Monitoring

25000 Socio-Economic Resources

- 25100 Analysis of Existing Conditions and Need for Further Analysis
- 25200 General Management Direction (*including other Management Impacts on this Resource*)
- 25300 Population and Demographic Conditions
- 25400 Schools
- 25500 Neighboring Communities
 - 25510 Infrastructure (*Roads, Plazas, Utility Corridors, etc.*)
 - 25520 Revenue Sharing
- 25600 Cumulative Impacts
- 25700 Mitigation and Monitoring

26000 Appendices (*General Comments and Technical/Editorial*)

ATTMT – Attachments

27000 [Attachment No., Title, Author's name]

Site Specific 1

The Site Specific 1 code is an up to four digit alpha/numeric comment specific code. For this project, the alpha-code is used to indicate which refuge the comment addresses.

- A Assabet River NWR
- G Great Meadows NWR
- O Oxbow NWR
- X Multiple NWRs/Null

Appendix B

Demographics

Demographic coding allows managers to form an overall picture of who is submitting comments, where they live, their general affiliation with various organizations or government agencies, and the manner in which they respond. The database can be used to isolate specific combinations of information about public comment. For example, a report can include public comment only from people in Massachusetts or a report can identify specific types of land users such as recreational groups, agricultural organizations, or businesses. Demographic coding allows managers to focus on specific areas of concern linked to respondent categories, geographic areas, and response types.

Although demographic information is captured and tracked, it is important to note that the consideration of public comment is not a vote-counting process. Every comment and suggestion has value, whether expressed by one or a thousand respondents. All input is considered, and the analysis team attempts to capture all relevant public concerns in the analysis process. The Content Analysis Team processed 1,907 responses. Because 28 responses are duplicates, the team entered 1,882 responses into the database representing 1,959 signatures, for the Draft CCP/EA.

In the tables displayed below, please note that demographic figures are given for number of responses, respondents, and signatures. For the purposes of this analysis, the following definitions apply: “response” refers to a discrete piece of correspondence; “respondent” refers to each individual or organization to whom a mail identification number is assigned (e.g., a single response may represent several organizations without one primary author); and “signature” simply refers to each individual who adds his or her name to a response, endorsing the view of the primary respondent(s).

Geographic Representation

Geographic representation is tracked for each response during the course of content analysis. Letters and emails were received from 49 of the United States, the District of Columbia, and one foreign country. The response format did not reveal geographic origin for 102 respondents.

Table C1 - Geographic Representation of Respondents by Country and State

Country	State	Number of Respondents	Number of Signatures
Costa Rica		1	1
United States	Alabama	9	9
	Alaska	2	2
	Arizona	22	22
	Arkansas	6	6

Country	State	Number of Respondents	Number of Signatures
	California	201	208
	Colorado	16	16
	Connecticut	19	19
	Delaware	1	1
	District of Columbia	4	6
	Florida	63	65
	Georgia	16	16
	Hawaii	4	4
	Idaho	2	2
	Illinois	45	45
	Indiana	16	16
	Iowa	3	3
	Kansas	10	10
	Kentucky	4	4
	Lousiana	7	7
	Maine	8	9
	Maryland	36	39
	Massachusetts	710	752
	Michigan	30	32
	Minnesota	21	21
	Mississippi	2	2
	Missouri	17	17
	Montana	2	2
	Nebraska	2	3
	Nevada	12	12
	New Hampshire	16	16
	New Jersey	35	38
	New Mexico	6	6
	New York	110	111
	North Carolina	28	29
	Ohio	30	31
	Oklahoma	6	6
	Oregon	14	14
	Pennsylvania	58	60
	Rhode Island	10	10
	South Carolina	13	14

Country	State	Number of Respondents	Number of Signatures
	South Dakota	1	1
	Tennessee	8	8
	Texas	68	69
	Utah	6	6
	Vermont	6	6
	Virginia	19	20
	Washington	29	29
	West Virginia	5	5
	Wisconsin	21	21
	Wyoming	2	2
	Unidentified	102	106
	Total	1,884	1,959

Organizational Affiliation

Responses were received from various organizations and unaffiliated individuals. Respondents include conservation organizations, wood products associations, as well as unaffiliated individuals and others. Organization types were tracked for each response.

Table C2 - Number of Respondents/Signatures by Organizational Affiliation

Organization Field	Organization Type	Number of Respondents	Number of Signatures
AR	Animal Rights	5	7
B	Business	1	1
D	Place-Based Group	6	6
F	Federal Agency/Elected Official	2	2
HT	Hunting/Trapping Organization	8	8
I	Unaffiliated Individual or Unidentifiable Respondent	1,820	1,885
J	Civic Organization	2	2
P	Preservation/Conservation Organization	14	14
RB	Recreational – Mechanized	1	1
RC	Recreational – Conservation Organization	2	2
RM	Recreational - Motorized	2	2
RN	Recreational – Non-motorized/Non-mechanized	2	2

Organization Field	Organization Type	Number of Respondents	Number of Signatures
S	State Government Agency	6	6
SC	Schools	1	1
T	Town/City Government Agency/Elected Official	12	20
Total		1,884	1,959

Response Type

Response types were tracked for each response received on the project. Responses were received as letters and public meeting transcripts.

Table C3 - Number of Responses/Signatures by Response Type

Response Type #	Response Type	Number of Responses	Number of Signatures
1	Letter	497	543
2	Form	1,334	1,365
5	Transcript	51	51
Total		1,882	1,959

Delivery Type

Delivery types were tracked for each response received on the project. Responses were received as email, fax, hand-delivered, standard mail, and one telephone call. Delivery type was not revealed for 11 responses.

Table C4 - Number of Responses/Signatures by Delivery Type

Delivery Type Code	Delivery Type	Number of Responses	Number of Signatures
E	Email	1,630	1,677
F	Fax	1	1
H	Hand-delivered	67	67
M	Mail or commercial carrier	172	202
T	Telephone	1	1
U	Unknown	11	11
Total		1,882	1,959

User Type

User type was tracked for each response received on the project. User types include anglers, bikers, area residents, dog walkers, photographers and others.

Table C5 - Number of Responses/Signatures by User Type

User Type Code	User Type	Number of Responses	Number of Signatures
A	Area Residents	202	220
B	Businesses and Services	1	2
D	Dog Walkers	14	15
E	Environmental Education	2	2
F	Anglers	2	2
H	Hikers	19	23
K	Bikers	7	7
M	Motorized Recreation	3	3
P	Photographers	2	2
S	Horseback Riding	25	26
T	Hunters	39	39
W	Non-motorized Recreation	8	8
X	No Identifiable Type	1,558	1,610
Total		1,882	1,959

Appendix C

Early Attention Letters

The early attention designation is attached to public responses in the content analysis database for a variety of reasons. Our intent is to identify responses that fall into certain key categories, such as threats of litigation or comments from government officials, etc. These designations alert the project team members to public concerns or inquiries that may require an agency response or may necessitate detailed project team review for policy, political, or legal reasons.

The early attention designated responses are primarily intended for an internal audience. The categories of responses selected are designed to meet project team needs. This report is not intended to, nor should it be construed to, obviate the need to review all responses.

CAT identified seven early attention categories. The relevant designations are outlined below and followed by report tables.

- 1 **Threat of harm** – Any response that threatens physical harm to administration, agency, or project personnel.
- 2 **Notice of appeal or litigation** – Any response that describes the respondents' intent to appeal an action or bring legal suit against the agency.
- 3 **Freedom of Information Act (FOIA) requests** – Any response that officially requests information and documentation under the FOIA.
- 4 **Provides proposals for new alternatives** – Any response that suggests a new alternative to the proposed action. These do not include critiques of alternatives or partial changes of existing alternatives.
- 5 **Requires detailed review** – Any response that requires detailed review. These responses may include detailed scientific or technical analysis, or significant enclosures.
- 5A **Provides extensive technical edits** – includes extensive use of lined out text, suggestions to delete text, and/or replace text.
- 5M **Provides maps** – Any response that includes map enclosures.
- 6 **Government entities** – Any response from an elected official, writing in his/her official capacity, representing a Federal, State, county, or municipal government. Also includes official correspondence from any government agency.
- 6A **Request for cooperating agency status from a government entity.**
- 7 **Public hearing** – Any response that requests a public hearing.

Table D1 – (4) Proposes a New Alternative

Letter Number	Name and Address	Remarks
41	Bette Stallman, Wildlife Scientist Linda Huebner, Program Coordinator Humane Society of the United States New England Regional Office 2100 L St. NW Washington, DC 20037	Respondent requests that the USFWS prohibit hunting and trapping in wildlife refuges. Respondent requests the inclusion of an alternative that emphasizes non-consumptive land uses.

Table D2 – (6) Government Entities

Letter Number	Name and Address	Remarks
97	Brenda Kelly Conservation Commission Chair 10 Mudge Way Bedford, MA 01730-2144	Respondent expresses concern for resident safety with regard to nearby hunting and asks the USFWS to address this issue.
98	Tricia Smith Carlisle Conservation Commission Chair P.O. Box 827 66 Westford Street Carlisle, MA 01741	Respondent expresses concern for public safety from proposed hunting on USFWS land. Also, respondent expresses concern regarding access for hunters across private land.
99	Ann Thompson Maynard Board of Selectmen Chair Municipal Building 195 Main Street Maynard, MA 01754	Respondent requests additional allowed uses of the refuge and encourages consistency with local planning processes.
100	Maureen Valente Town Manager 288 Old Sudbury Road Sudbury, MA 01776-1843	Respondent encourages increased refuge use for passive recreation activities; no hunting with firearms; and additional law enforcement.
101	Brian Monahan Wayland Conservation Commission Conservation Administrator Town Building 41 Cochituate Road Wayland MA 01778	Respondent requests no, or strictly regulated hunting in the refuge. Respondent also encourages the USFWS to increase its number of staff.

Letter Number	Name and Address	Remarks
102	John Dwyer Maynard Conservation Commission 4 Durant Ave Maynard, MA 01754	Respondent expresses concern regarding hunting impacts on public safety, wildlife populations, and other recreation activities.
103	Pamela Resor Massachusetts Senate State Senator District Office P.O. Box 1110 Marlborough, MA 01752	Respondent discourages hunting and trapping in the refuge.
104	Susan Pope The Commonwealth of Massachusetts House of Representatives State Representative State House, Boston 02133-1020	Respondent requests that hunting not be allowed in the refuge for safety and environmental reasons. Also, respondent discourages the USFWS from charging user fees.
106	Kathleen Farrell Board of Selectmen Chair 380 Great Road Stow, MA 01775	Respondent requests expansion of the proposed refuge acquisition boundary. Respondent also requests limitations on hunting as well as increased law enforcement for hunting activities.
108	Priscilla Ryder Conservation Commission Conservation Officer 140 Main Street Marlborough, MA 01752	Respondent encourages expansion of the proposed refuge acquisition boundary, increased law enforcement for unauthorized land use, and public education regarding the proposed introduction of hunting to the refuge.
109	William Galvin Massachusetts Historical Commission Secretary of the Commonwealth Massachusetts Archives Building 220 Morrissey Boulevard Boston, MA 02125	Respondent commends the proposed Draft CCP's compliance with Section 6 of the National Historic Preservation Act of 1966.
110	Wayne MacCallum Division of Fisheries and Wildlife Director	Respondent expresses concern for rare, threatened, and endangered species in the refuge, and encourages the USFWS to update species information.
111	Anne Gagnon Conservation Commission Conservation Administrator	Respondent encourages expansion of the proposed refuge acquisition boundary, and increased staffing to decrease user conflicts.
105	Charlie Gorss Conservation Commission Chair	Respondent supports proposed Alternative B.

Letter Number	Name and Address	Remarks
407	Patricia Perry Conservation Commission Administrative Assistant 380 Great Road Stow, MA 01775	Respondent encourages expansion of the proposed refuge acquisition boundary, discourages hunting within the refuge, and encourages coordination of refuge management with local communities.

Appendix D

Information Requests

Requests for additional information, excluding Freedom of Information Act requests, are presented in this appendix. CAT identified five information request categories. The relevant designations are outlined below and followed by report tables. In addition, requests for extension of the comment period are displayed below.

- A Mailing List Only/Nothing to Code
- B Request to be Removed from the Mailing List
- C Request for Copy of Federal Register Notice
- D General Request for Other Information
- E Request for Confirmation of Receipt of Letter

Table E1 – (D) General Requests for Information

Letter Number	Name and Address	Remarks
4	Kate Wheeler Maynard Open Space Planning Committee Chair 31 Harrison St Maynard, MA 01754	Respondent requests specific agency response to the Committee's concerns and notification of the final documents release.
18	Bonnie and John Chandler 183 Prospect Hill Road Harvard, MA 01451	Respondents request information on leasing part of the cow field across from their house for sheep and goat grazing.
117	Daniel Cassidy danc@arguscl.com	Respondent requests a copy of the Draft CCP and EA, and would like to be notified of any public hearings on the subject.
132	Edmund Schofield P.O. Box 598 Boylston, MA 01505-0598	Respondent requests hard copy of the Draft CCP and EA.
200	John Dwyer mjohndwyer@verizon.net	Respondent requests Lindsay Krey's email address.
307	Jason Hetherington hetherjw@yahoo.com	Respondent requests online links to information regarding the proposed project.
342	David Stepp 69 Peabody Dr. Stow, MA 01775	Respondent requests information regarding proposed types of hunting and seasons for the refuge.
353	Sally Hewitt Sarah.Hewitt@Simonandschuster.com	Respondent requests notification regarding meetings or plans about bicycling in the Assabet River NWR.

Table E2 – (E) Request for Confirmation of Receipt

Letter Number	Name and Address	Remarks
374	Steve Parker 109 Moore Road Sudbury, MA 01776	Respondent requests confirmation of receipt of letter.

Table E3 – Requests for Comment Period Extension

Letter Number	Name and Address	Remarks
13	Michael Ojemann Great Meadows Neighborhood Association 153 Monsen Road Concord, MA 01742	Respondent requests extension of comment period, no specific length of time specified.
69	Hope Luder 5 Edgehill Road Billercia, MA 01862	Respondent requests extension of comment period, no specific length of time specified.
138	Kathleen Farrell 267 Sudbury Road Stow, MA 01775	Respondent requests extension of comment period, no specific length of time specified.
121	Louise Berliner Strongwhitepine@aol.com	Respondent requests extension of comment period, no specific length of time specified.
232	Rob Aldape Joropab1@mac.com	Respondent requests extension of comment period, no specific length of time specified.

Appendix E

Organized Response Report

Organized response campaigns (forms) represent 70 percent (1,334 of 1,907) of the total responses received during the public comment period for the proposal.

Forms are defined as five or more responses, received separately, but containing nearly identical text. Once a form is identified, a “form master” is entered into the database with all of the content information. All responses with matching text are then linked to this master form within the database with a designated “form number.” If a response does not contain all of the text presented in a given form, it is entered as an individual letter. Duplicate responses from four or fewer respondents are also entered as individual letters.

Table F1 – Description and Number of Signatures for Each Form

Number of Form	Number of Signatures	Description of Form
1	11	FWS should reconsider the determination that horseback riding is not compatible with the purpose of the refuge. Opposes acquisition boundaries expansion.
2	1,104	FWS should not increase hunting/trapping in Oxbow National Wildlife Refuge, and prohibit hunting/trapping in the Assabet River and Great Meadows National Wildlife Refuges.
3	250	FWS should not increase hunting/trapping in Oxbow National Wildlife Refuge, and prohibit hunting/trapping in the Assabet River and Great Meadows National Wildlife Refuges. FWS should focus on habitat improvement and non-lethal methods of wildlife management.
Total:	1,365	

Appendix F

List of Preparers

Content Analysis Team

Project Coordination

Shari Kappel, Team Leader

John Adams, Assistant Team Leader

Program Coordination

Jody Sutton, Coordinator

James MacMillen, Contracting

Content Analysts

John Adams, Editor/Analyst

Anne Jensen, Writer/Analyst

Angela Concepcion, Writer/Analyst

Holly Schneider, Writer/Analyst

Theodore Hughes, Writer/Analyst

Karl Vester, Coder/Analyst

Database Administration

Buell Whitehead, Technical Support

Information Systems

Lori Warnell, Project Lead/Response Processing/Data Technician

Julie Easton, Data Technician

Kay Flink, Data Technician

Jon Hardes, Data Technician

Geraldine Hill, Data Technician

Linda Kenaston, Data Technician

Shanna Robison, Data Technician

Barbie Gibson, CD Production

Appendix B: U.S. Forest Service Content Analysis Team Summary Report

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Appendix C: Responses to Substantive Comments

Planning Process

Length of comment period

Some commentors were unhappy with the timing and length of the comment period.

The comment period was 45 days long, which is a standard period for a document such as a CCP. Unfortunately, the timing of the draft CCP release came during the summer months. We knew that there were many people eagerly anticipating its release and focused on releasing the plan to the public as quickly as we could. While, there were requests to extend the comment period, they came at the very end of the comment period. The notification process to ensure that all individuals and groups were aware of an extension could not have been completed before the scheduled end of the comment period. Despite the concerns of some commentors, we did receive nearly 2,000 comments and we feel confident that we heard from all viewpoints.

Public Involvement

Many respondents feel satisfied with the FWS's level of public involvement and education; they praise the agencies past efforts and eagerly anticipate additional opportunities for interest groups and communities to stay involved in the refuge's management. Civic and conservation organizations express interest in collaborating with the FWS on management issues.

We look forward to continued involvement and collaboration as we implement the provisions of the CCP, continue day-to-day operations, and develop necessary step-down plans.

Planning Vision

Relationship to Regional Planning Efforts and Legislation

Some respondents ask for clarification of the CCP's compatibility with other regional management efforts and role in an ecosystem context.

We realize that we are one of several conservation partners in a regional ecosystem. Where appropriate, we have worked with surrounding landowners and communities to ensure management that complements adjacent lands. Unfortunately, the missions of adjacent landowners do not always match the mission and purposes of the refuge. Because of these differences, there will be times when activities that are allowed in one area are prohibited in another, or vice versa.

We look forward to continuing to work with our various conservation partners. Our management actions are focused on the NWRs by design. Our jurisdiction and planning efforts include only these lands. We will continue to consider the effects our management

actions have on the surrounding landscape. The patchwork of lands that create these refuges creates unique challenges and partnerships. The Service mission and refuge purposes must be our first priority. We understand that this priority does not always mesh with adjacent landowners' wishes and concerns. We are a part of the larger Refuge System and must consider not only our role in the surrounding ecosystem, but our role in the Refuge System, as well.

Priority Public Uses

Hunting – General

Hunting was the issue most frequently addressed in comments on the draft CCP. General hunting comments include advocates for hunting on public lands and individuals that are opposed to hunting in any form.

The National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act) lists hunting as one of six priority, wildlife-dependent public uses to receive enhanced and preferential consideration in refuge planning and management. In addition to hunting, other priority uses include fishing, wildlife observation and photography, environmental education and interpretation. Our mandate is to provide high-quality opportunities for these priority uses where they are compatible with respective refuge purposes, goals, and other management priorities.

Regardless of individual opinions about the appropriateness of hunting on the refuges, the Refuge Improvement Act requires that we give preferential consideration to the six priority, wildlife-dependent uses. We are also concerned about the potential for hunting to impact other priority uses. There appears to have been some confusion about where we are proposing to allow hunting. We have outlined the areas where hunting is to be allowed on the maps that are included as a part of the CCP.

We have included some of the additional details in regard to hunting in the Final CCPs. In order to open the refuges to additional hunting opportunities, Federal regulations will need to be changed. There will be an additional public comment period when proposed hunting regulations are released in the Federal Register. This will likely occur during the winter/spring of 2005.

Additionally, we will be developing a Hunt Management Plan for each Refuge that will outline all of the details for each specific hunting program.

Each plan will be completed in cooperation with the Massachusetts Department of Fish and Game (MA DFG), Division of Fisheries and Wildlife. Refuge areas that meet certain criteria have been evaluated to determine tracts of land that have the ability to support a high quality public hunt. We have determined that certain areas are appropriate for certain types of hunting and not others. The criteria used included: 1) an area of sufficient size to insure public safety; 2) an area more than 500 feet from occupied dwellings (Massachusetts state law); and 3) an area that provides reasonable opportunities for a successful hunt. An additional consideration that was considered in some instances is

whether hunting of an area of the refuge is consistent with or complements other hunted areas in surrounding towns.

Hunting – Safety and Conflicts with Other Users

There were a large number of individuals that expressed concerns about safety and hunting. Some individuals expressed concerns about safety while using the refuge during hunting season and the assertion that the non-hunting public will not participate in other wildlife dependent activities during the hunting seasons. Other people indicated their concerns about the proximity to the refuge boundary of homes, schools, and conservation areas. Additionally, individuals raised the possibility of hunters accessing non-refuge lands or misguided arrows, shotgun slugs, or pellets injuring someone not on the refuge.

There will be areas on the refuges where no hunting will be allowed. In some cases, these are highly used areas, such as the Concord Impoundments at Great Meadows NWR. In others, we have restricted hunting because of the mandated safety zones. We realize that there may be people that will not visit the refuges during specific seasons. As mentioned previously, we have a responsibility to facilitate all forms of wildlife-dependent public use on the refuges, when possible, and there may be days when people engaged in hunting will have preferential access to parts of the refuges. National policy encourages refuges to follow state hunting regulations, but we do have the authority to set our own dates and times if needed and we can limit the number of hunting permits issued. We will evaluate these options in the development of the Hunt Management Plan for each refuge, but do not anticipate a need to include such restrictions at this time.

We strive to achieve a balance between consumptive and non-consumptive uses on the refuges. Because Massachusetts does not allow hunting on Sunday, at a minimum non-hunters will be free to enjoy our nature trails with no concern about possible hunting conflicts on those days during the hunting seasons. In addition, experience managing hunts both at Oxbow Refuge and at other refuges within the system shows that many areas can safely support both hunting and non-consumptive uses, such as wildlife observation, at the same time. We are confident that we can develop a hunting program that will safely provide opportunities for wildlife-dependent public use to a majority of our refuge visitors.

We contacted the Massachusetts Division of Fisheries and Wildlife to obtain hunting accident statistics. We considered investigating such statistics in other states, but decided that Massachusetts has a higher population density than the majority of other states with readily available accident statistics such as Pennsylvania, North Carolina, and Texas. According to Massachusetts Law, any person involved in a hunting accident or any person with knowledge of a hunting accident must file a report with the state or local police, who, in turn, must file a report with the Division of Law Enforcement. The Massachusetts Environmental Police, Hunter Education Program reports hunting accidents in the *Hunting Accident Report: 1995 – 2002*. During the reporting period, there were 38 hunting accidents. None of the accidents were fatal and none involved any individuals who were not hunting at the time of the accident. According to the *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*, there were 1.58 million days of

Appendix C: Responses to Substantive Comments

hunting that occurred in Massachusetts in 2001. During that year there were 3 hunting accidents, the corresponding accident rate is extremely low.

Specific areas were mentioned by local residents as being of concern. Some commentors indicated distances that bullets travel when fired from a rifle (effective range). The areas that were mentioned by commentors as being potential safety areas were:

Great Meadows NWR

Concord Impoundments

O'Rourke, Greenough, and Foss Properties in Carlisle

Dudley Road area in Bedford

Area along the Concord River in Billerica

Areas adjacent to Wayland Conservation Property

Heard Pond

Assabet River NWR

Stearns Lane and Hudson Road in Sudbury

The Maynard School Complex

Firecut Lane area in Sudbury

Based upon the concerns expressed in response to the draft, we reviewed the most up-to-date aerial photographs available. We analyzed the locations of the 500-foot safety zones around existing homes to determine whether or not a reasonable hunting area could be provided given the constraints associated with the safety zones. In addition to the aerial photo analysis, we went to the refuges to determine how visible the homes near the refuge are from inside the refuge. We would like to remind individuals that by state regulation there is a 500 foot zone around any inhabited structure. *Hunting, whether by gun or bow, is not allowed in this area unless the hunter received permission from the owner of the building. It is the hunter's responsibility to ensure that he/she is more than 500 feet from any such buildings.* There are times in which the safety zone extends into the refuge. Hunting will not be allowed within these areas.

However, the Service will assist hunters in delineating any areas where there may be confusion as to the actual location of the safety zone. The information that we gathered enabled us to make informed decisions about the appropriateness of areas for different hunting activities. We will require hunters to obtain an annual hunting permit. We may prepare maps showing the hunt areas in detail. Areas with adjacent homes can be depicted on the maps as a further guide to inform hunters of safety zones adjacent or within the refuge.

Also, there is some confusion as to whether or not hunting is being proposed in certain locations. We would like to clarify our original proposal and highlight the following changes:

- o Hunting is not proposed for the Concord Impoundments.
- o The waterfowl hunting area on the Concord River and associated wetlands starts at the Route 225 Bridge and extends upstream to the area where refuge ownership

ends on the west side of the Concord River in the town of Carlisle. This is the area at the northern end of the O'Rourke property. The area along the Concord River in Billerica has been removed from consideration for waterfowl hunting. The entire river in that area is within the 500 foot safety zone required by state hunting regulations. Hunting on the river in that area is illegal.

- o We understand the concern regarding hunting on the Greenough property. We will ensure that the boundary is clearly marked. The deer hunting opportunities on the property will be limited to archery only.
- o The area adjacent to private and conservation property in the vicinity of Dudley Road in Bedford is proposed as archery only for deer hunting.
- o In the Sudbury Division of the refuge, the proposed waterfowl hunting area south to Route 20 has been reduced. The waterfowl hunting opportunities adjacent to refuge lands out to the center line of the Sudbury River south of Route 20 have been reduced from 193 acres to 77. Additionally, no waterfowl hunting will be allowed between Route 20 and the Wayland School Complex. Waterfowl hunting will be allowed in a limited area upstream of the school along the Sudbury River south of Heard Pond. The revised hunting area will be a minimum of 1,000 feet from the school playing fields. Please see the maps in the Great Meadows NWR CCP for a depiction of this area.
- o In the South section of the Assabet River NWR, we have changed the designation to Archery Only.
- o Based upon the comments that we received regarding Hudson Road and Stearns Lane, we made a revision to the hunting areas on the North section of the Assabet River NWR. The area outside of the entire Patrol Road has been designated Archery Only.

Hunting – Various Species

Commentors indicated that it was necessary for the Service to conduct detailed surveys of wildlife populations before implementing a hunt program.

The hunting of migratory bird species is managed from a national point of view. The Service monitors the population status of all migratory bird game species and works with the States to set season lengths and harvest limits. Hunting is managed in a way that does not contribute to a decline in waterfowl and other migratory game bird populations.

The hunting of resident species, such as deer, rabbits, and squirrels, falls within the responsibility of state fish and wildlife agencies, which also monitor and manage populations to ensure healthy ecosystems, sustainable populations, and a certain level of hunter success. We work in partnership with the Massachusetts Division of Fisheries and Wildlife and rely on their knowledge and expertise to determine the appropriateness of hunting seasons. Any decisions we make to limit or prevent the harvest of resident species on any refuge is based on other management concerns and not on a concern about the

Appendix C: Responses to Substantive Comments

population of a given species. State fish and wildlife agencies have an excellent record of sound, professional wildlife management, and this is true in Massachusetts as well.

Fishing

Most fishing comments are directed toward the proposal to allow fishing at Puffer Pond on the Assabet River NWR. There is considerable support for fishing on Puffer Pond. There are also a number of respondents who request that fishing be prohibited on Puffer Pond. These individuals argue that anglers will disturb nesting birds, erode the shoreline, trample vegetation, contribute to the spread of invasives, and drag boats through the refuge.

Fishing is one of the priority wildlife dependent uses for national wildlife refuges, where compatible. As such, the staff has determined that fishing is compatible with refuge purposes. Staff from Assabet River NWR will finalize the details of fishing on Puffer Pond as a part of the Fishing Management Plan. Staff will ensure that impacts to the resources in and surrounding the pond are minimized. This is evidenced by the stipulations already included in the draft plan. No motorized boats will be allowed, greatly reducing the likelihood of invasive species being brought to the pond. Public use in general causes some disturbance of vegetation and wildlife. We will manage all public uses, including fishing, to minimize the disturbance and ensure that the level of disturbance does not materially interfere with the purposes of the refuges. We share the concern about the potential introduction of invasive species, as well as other types of disturbance. We will continue to monitor disturbance caused by public uses of the refuges and take any action that we deem necessary or appropriate.

Environmental Education

A majority of commentors who chose to address environmental education support the efforts and facilities proposed in Alternative B, advocating more environmental education for people of all ages. Several respondents encourage completion of the proposed Sudbury River interpretive canoe trail. Some of the commentors encourage the FWS to think bigger, and develop its educational plan in concert with other regional entities and efforts.

Environmental education is one of the priority wildlife dependent uses for national wildlife refuges. As such, the staff has determined that it is compatible with refuge purposes and will continue to work to provide these opportunities. The staff is encouraged by the support that individuals and groups have shown for environmental education. We look forward to continuing and expanding educational opportunities associated with the refuges.

Wildlife Observation Trails

Some of the organizations and towns that commented on the CCP included requests for trails to be developed in specific areas that would connect to adjacent trail systems. In some cases, the requests are for formalizing trails that have been created by individuals

for unauthorized access. In other cases, the requests are for new trails that would provide access to new areas.

Refuge staff will develop a system for evaluating such requests. This review system will provide refuge staff with the necessary tools to evaluate the need for and effects of recommended trails.

Non-wildlife Dependent Public Uses

Dog Walking

A large number of commentors assert that given the popularity and demand for areas to walk dogs, and the fact that parts of the refuge have been used responsibly for decades by dog-walkers, FWS should continue to allow dog walking and should authorize it at Assabet River NWR. Some commentors express support for a ban of dogs from the refuge; they cited safety concerns, conflicts between dog walkers and bird watchers, and owners that do not clean up after their dogs.

All of the refuges in the Eastern Massachusetts National Wildlife Refuge Complex were created with purposes related to protecting, managing, and conserving native wildlife. The 1997 Refuge Improvement Act establishes the mission of the Refuge System as “to preserve a national network of lands and waters for the conservation and management of fish, wildlife, and plant resources of the United States for the benefit of present and future generations.” The Refuge Improvement Act further stipulates that all activities occurring on refuges must be compatible with wildlife conservation and the specific purposes for which a refuge was established. This is an important distinction from other public lands and recreation areas; refuges have a narrow management focus and are not multi-purpose lands. Six public uses were identified by the Refuge Improvement Act as the priorities for receiving enhanced consideration on refuges. Dog walking is not one of the six priority public uses, nor are dogs (except hunting, seeing or hearing dogs) necessary to support the safe, practical, and effective conduct of the priority public use programs we would be implementing on the refuge.

Dogs running off leash and piles of dog waste left on trails or tossed in the bushes are consistent problems, not isolated incidences. Several circumstances prompted the elimination of this activity on the refuges, including

- Dogs can intimidate other refuge visitors, and deprive them of the peace that refuges provide. Visitation to the National Wildlife Refuges is expanding, potentially aggravating user conflicts;
- Dog feces left on trails are an unhealthy and unsightly nuisance to refuge visitors and impact refuge vegetation. The presence of dog feces on public trails is one of the most common complaints we receive;
- Dogs, whether leashed or unleashed, conflict with refuge efforts to provide recreational opportunities for a diversity of visitors, including those limited to handicapped accessible trails, and the many school groups which visit the refuges for environmental education;
- Dog walking has resulted in user conflicts with persons engaged in priority public uses (bird watching, photography, see below);

Appendix C: Responses to Substantive Comments

- Instinctively, dogs want to chase wildlife. Unleashed dogs commonly chase nesting wildlife, which can result in destruction of ground nests and young. Dogs may step on nests or young chicks, as they “freeze” in response to danger;
- Many dog owners consistently remove their dogs from leashes when they are away from the parking lots and believe they are unlikely to be observed by a refuge ranger;
- Wildlife can’t distinguish between dogs on leashes and unleashed dogs. In the presence of a dog, many species will abandon their nests or young, leaving them vulnerable to be killed by predators, or die from starvation or exposure.

We realize that many dog owners are responsible owners and have a strong emotional connection to the refuge and to walking their dog on the refuge. We realize that many people will not be happy with this decision. Nevertheless, we firmly believe that the overall adverse impacts from dog walking on wildlife and other visitors engaged in wildlife-dependent public use justify this prohibition. Our decision is also consistent with land managers throughout the State who manage lands specifically for wildlife. Massachusetts Audubon Society and State of Massachusetts wildlife sanctuary lands also do not allow pets.

Horseback Riding

A large number of commentors are opposed to a prohibition on horseback riding on any of the refuges. They are concerned that not allowing horseback riding in the refuge will compromise access to other conservation/state/local forest trails immediately surrounding the refuge. In addition, they point to the economic benefits of horseback riding.

We have decided to maintain our prohibition of horseback riding on refuge trails. This activity does not promote wildlife conservation, is not one of our six priority public uses, nor is it necessary to support the safe, practical, and effective conduct of a priority public use on the refuges.

While we appreciate the desire for horseback riding opportunities on Assabet River, Great Meadows, and Oxbow National Wildlife Refuges, we do not believe that these relatively small refuges are appropriate places for horseback riding. Existing refuge trails are not designed to accommodate horses. Most of our trails are not wide enough for riders and walkers to avoid each other, nor are trails designed to withstand the impact of horses. This is especially true in wetter areas. Another issue with horse use is the waste left on trails. It is well-documented that horse waste introduces seeds from non-native and invasive vegetation. Further, the horse waste is unsightly and detracts from other visitors’ experiences when they have to watch for and avoid stepping in it. We are supporting an appropriate level and type of public use on our refuges by maintaining our focus on wildlife-dependent public uses.

Jogging

Joggers view the refuge as a safe, peaceful place to pursue their activity, and would like more information as to why jogging would be banned.

As indicated in the draft CCP/EA, we will be investigating the impacts of jogging to determine whether or not this is an appropriate use and a compatible use. Jogging is not a priority public use nor is it necessary to support one of the six priority public uses. Currently, there are a relatively high number of individuals that participate in jogging on the refuges. Other refuges have documented impacts to wildlife caused by jogging. We have issued a compatibility determination that indicates that, based on our current knowledge, jogging is compatible with refuge purposes. If we gather information to the contrary, we will issue a new compatibility determination with appropriate public comment opportunities.

Picnicking

Some respondents view picnicking as a harmless past time that allows people to enjoy the refuge's beauty.

We would like to take this opportunity to clarify our position on picnicking. We believe that the draft CCP/EA conveyed a change that we did not intent. We do not intend to prohibit a refuge visitor from sitting on a bench or under a tree and eating a snack or drinking a beverage. However, we will not issue permits for large events, such as family reunions, where a meal is a normal part of the event to occur on the refuges, nor will we provide picnic tables or specific locations for picnicking.

Bicycling

Similar to jogging, a number of commentors assert that the refuge offers a safe, traffic-free environment for bicycling. By not allowing bicycling on the refuges, it is asserted that the FWS will be creating a gap in the local trail systems. Some cyclists are willing to be flexible as to when and where they can pursue their sport. Some of the commentors suggest allowing cycling on paved roads only. Of greatest interest to many of the commentors are the Patrol Road on Assabet River NWR and the Tank Road on Oxbow NWR.

Bicycling is not compatible with the refuge purposes for each of the 3 refuges. Bicycles frighten wildlife and cause changes in behavior that have potential adverse impacts to species. While there are places where bicycling can enhance wildlife dependent opportunities, in general the intention of a visitor on a bicycle is to engage in the act of cycling or transportation, not to observe wildlife. The refuges are small enough that bicycling is not needed to facilitate a wildlife-dependent public use. Additionally, while there may be some existing roads on the refuges (particularly Assabet River NWR) which seem to lend themselves to cycling, our long term plans for the refuges will include some road removal and return to a natural state.

Snowmobiling

Snowmobilers describe themselves as law-abiding recreationists that are respectful of others and wildlife. One local snowmobile club would like to establish a trail through the refuge, maintained by the club, for the club's enjoyment.

Appendix C: Responses to Substantive Comments

Snowmobiling is not a wildlife-dependent use of the refuges. Snowmobiles tend to frighten wildlife and can adversely impact wintering species. The refuges are small enough that non-motorized use (such as cross-country skiing or snowshoeing) would be the preferred method of travel for facilitation of wildlife dependent uses of the refuges during winter months.

Gathering

One respondent requested permission to collect mushrooms and suggested a daily limit for individuals that would like to collect them.

The picking of fruit, plants, and mushrooms is not allowed on the refuges. These plants and fungi are components of the natural ecosystem and can provide food for refuge wildlife. With the large volumes of refuge visitors, there could be significant depletion of certain plants and mushrooms as well as unauthorized access off-trail to collect these specimens if this were allowed. Our intention in managing these refuges is to allow natural processes to occur as much as possible, with specific land management techniques to maintain or restore specific habitat types for wildlife. Gathering of plants, mushrooms and other refuge resources (such as rocks found on stone walls) is not appropriate.

Fees

Commentors provided a number of arguments for and against fees. Additionally, some commentors questioned the viability of a fee system for the refuges. Some of the concerns raised include the appropriateness of fees on Federal land, a potential deterrence of visitors from low-income families or neighborhoods, and the costs of enforcement. Others point out the need to support local lands that are under-funded by Federal budgets.

In response to concerns expressed about the cost of a pass, we have lowered the annual pass fee from \$20 in our original proposal to \$12. Additional detail about the fees has been added to the final CCPs for each of the refuges.

Fees will be used to support local projects on the refuges. The only way the Service will be able to achieve, maintain and provide a high quality of visitor service in the future is with additional funds. Unfortunately, our budget is insufficient to meet our visitor services needs. Failure to receive additional revenues will have a significant impact on our ability to provide quality opportunities for visitors to engage in wildlife-dependent public uses. Fees are fair because they are paid by refuge users.

Land Acquisition

A large number of commentors expressed concern over the lack of additional lands within the proposed acquisition boundary. Some individuals specifically mentioned the Devens South Post land that has been identified as part of the Base Closure and Realignment Act as land to be transferred to Oxbow NWR. Other individuals expressed concern that some town conservation lands adjacent to the existing refuges were within the acquisition

boundary. These individuals expressed a preference that the land remains in town control.

Assabet River, Great Meadows, and Oxbow NWRs are a part of the much larger Refuge System. The Service is developing a plan for strategic growth of the Refuge System. This plan will allow the Service to prioritize land acquisition and boundary expansions for the System as a whole. The process for changing land acquisition boundaries is long and complex and takes a great deal of staff time. The plan for strategic growth will also allow Refuge System staff to focus boundary expansion efforts to those areas that are of greatest value to the System as a whole. Certainly, the refuges encompassed in the draft CCP/EA contribute a great deal to fulfilling the Refuge System mission. Any boundary expansion must also be shown to have a necessary contribution. Staff will continue to work toward boundary expansions within Service policy and guidelines.

Expansion of the boundaries at locations that provide important habitats is still possible. Staff will need to pursue these acquisition boundary issues as a separate process. Congress has specifically identified the Devens South Post land as appropriate for transfer to the Service. The transfer would not be hindered by the lack of an acquisition boundary around that land.

We would like to point out that the acquisition boundary identifies natural areas that are important to the purposes of the refuges. However, the Service does not plan to condemn land that is being protected by other entities. In the event that a group or individual, such as a town conservation commission, is attempting to sell some of this land, the Service would be interested in acquiring the land rather than allowing it to be developed.

Buildings and Facilities

Respondents voiced a myriad of opinions regarding what kinds of buildings and facilities should be provided at the refuge. Citing the importance of public education, many people ask the FWS to locate kiosks at strategic locations throughout the refuge. Comments regarding refuge parking focus on lot location with a number of people discouraging parking at Heard Pond. These respondents contend that there has been too much garbage dumping and vandalism at the Heard Pond site to make it a desirable parking place.

We are sensitive to the fact that there are a wide variety of opinions regarding development of buildings, restroom facilities, and parking areas at the refuges. We will work to ensure that buildings are sited to provide the greatest benefit to the groups that will use them, while at the same time reducing any associated impacts. Where appropriate, we will site and build kiosks to provide educational and informational opportunities. We understand the concern over past activities at Heard Pond. The proposed parking lot will be located along the road and not set back like the previous lot. We have proposed a limited expansion of no more than 6 cars depending on available area that will allow more visitors to enjoy the area.

Appendix C: Responses to Substantive Comments

NHESP suggested working cooperatively with the Service for review of impacts to state-listed species when construction or demolition projects are proposed.

The Service will continue to include NHESP in review of appropriate projects.

Staffing

Most commentors feel that adequate refuge staffing is essential. While many people assert that Alternative B will meet desired staffing levels, a number of other respondents contend that proposed staffing levels are too low. These people cite anticipated user conflicts, present refuge hazards, and the current downsizing trend in government as reasons to increase proposed staffing levels. Some respondents suggest utilizing community groups and/or to form partnerships with volunteer organizations to supplement staffing needs.

We appreciate the support for increased staffing levels. We have proposed the level of staffing that we feel is appropriate to implement the programs outlined in the CCP.

Wild and Scenic Rivers

The one concern regarding wild and scenic river designation expressed by several respondents is that hunting is incompatible with this designation and should be prohibited within these areas.

The Wild & Scenic Rivers Act (WSR) does not prohibit hunting, nor does it indicate that hunting is incompatible with the intent of the WSR designation.

Enforcement

Respondents who comment on enforcement indicate that the level of enforcement on the refuge needs to increase. The key areas identified by respondents as needing increased policing efforts are off-highway vehicle trespass, poaching, dumping, trespass, and vandalism.

We are aware of a number of violations that occur on refuge lands. Our law enforcement staff is working to correct these violations and are bringing in outside help when necessary. The number of violation notices issued during the past year is a testament to our focused law enforcement efforts. We look forward to implementation of the CCP and the opportunity to expand our law enforcement presence through the potential addition of staff, agreements with local law enforcement agencies, and continued cooperation with State environmental police officers.

Invasives

Many respondents support efforts to eliminate invasive non-native species. Several respondents raise concerns about invasives at Puffer Pond, given new fishing access. Concerns about targeted species are raised in two cases: one respondent argues that

cattails are native, and should not be removed; a number of respondents argue that mute swans are harmless.

We will develop specific strategies to deal with control and elimination of invasive species as a part of the Habitat Management Plan. We are aware of the problem with invasives at nearby lakes and ponds. We have proposed to allow only non-motorized boats on Puffer Pond to help ensure that new invasive species are not introduced to the pond.

State Listed Species

The Massachusetts Natural Heritage and Endangered Species Program (NEHSP) provided changes and edits to the Species Lists for each of the refuges, especially concerning the state listed species.

We have reviewed the suggestions and incorporated them into the species lists.

Wildlife Surveys

NEHSP suggested that we complete surveys to determine areas that should be closed to public use and prior to opening roads or trails for use.

Staff will continue to use survey information, along with local knowledge and known locations of sensitive species to determine whether there is a need to close areas of the refuge that are open or before opening areas to new public access opportunities.

Literature Cited

An individual suggested inclusion of a comprehensive bibliography of biodiversity for the Great Meadows NWR area that has been published.

We have included a reference to this bibliography in the Great Meadows NWR CCP.

Editorial/Corrections

A number of commentors made suggestions that were editorial or that offered corrections to place names, geography, or history.

We have made the corrections where appropriate.

Alternatives

The Humane Society of the United States expressed concern that the CCP/EA did not consider a reasonable range of alternatives. HSUS urged the Service to “give full consideration to an alternative that would emphasize non-consumptive uses, non-lethal approaches to conflicts with wildlife, aggressive acquisition of land that could provide important habitat for refuge wildlife, and removal of invasive plant species.

Appendix C: Responses to Substantive Comments

We worked hard to ensure consideration of the reasonable range of alternatives that were presented in the draft CCP/EA. Each of the items mentioned was considered and the majority are included in the final CCP. We analyzed the effects of continuing no-hunting on Assabet River and Great Meadows NWR, along with maintaining the existing level of hunting on Oxbow NWR as a part of Alternative A. Our current management plan is a balance of consumptive and non-consumptive uses with a focus on non-consumptive uses only for the majority of the year. All of our alternatives emphasize non-lethal approaches to wildlife conflicts with lethal control only utilized when our managers and biologists have determined that non-lethal controls have not been effective. Similarly, we will continue to acquire land as dictated by Service policy and as outlined under the “land acquisition” heading earlier in this section. Finally, removal of non-native invasive plant species is included in our final CCP and will be outlined further in our Habitat Management Plan.

Support for each alternative [No response required]

A number of commentors expressed support for all or portions of specific alternatives without citing specific reasons for doing so. The greatest number of such respondents indicated support for Alternative B or variations of Alternative B.

Appendix D: Species Lists

Table D-1: Fish of Assabet River NWR

<u>Scientific Name</u>	<u>Common Name</u>	<u>Reference</u>
<i>Micropterus salmonoides</i>	Largemouth Bass	MDFW, 1997
<i>Esox niger</i>	Chain Pickerel	MDFW, 1997
<i>Ictalurus natalis</i>	Yellow Bullhead	MDFW, 1997
<i>Ictalurus nebulosus</i>	Brown Bullhead	MDFW, 1997
<i>Lepomis gibbosus</i>	Pumpkinseed	MDFW, 1997
<i>Lepomis auritus</i>	Redbreast Sunfish	MDFW, 1997
<i>Lepomis macrochirus</i>	Bluegill	MDFW, 1997
<i>Perca flavescens</i>	Yellow Perch	MDFW, 1997
<i>Pomoxis nigromaculatus</i>	Black Crappie	MDFW, 1997
<i>Catostomus commersoni</i>	White Sucker	MDFW, 1997
<i>Notemigonus crysoleucas</i>	Golden Shiner	MDFW, 1997
<i>Semotilus corporalis</i>	Fallfish	MDFW, 1997
<i>Anguilla rostrata</i>	American Eel	MDFW, 1997
<i>Erimyzon oblongus</i>	Creek Chubsucker	MDFW, 1997

PUFFER POND:

<i>Micropterus salmonoides</i>	Largemouth Bass	U.S. Army, 1992
<i>Esox niger</i>	Chain Pickerel	U.S. Army, 1992
<i>Ictalurus nebulosus</i>	Brown Bullhead	U.S. Army, 1992
<i>Lepomis gibbosus</i>	Pumpkinseed	U.S. Army, 1992
<i>Lepomis macrochirus</i>	Bluegill	U.S. Army, 1992
<i>Perca flavescens</i>	Yellow Perch	U.S. Army, 1992
<i>Pomoxis nigromaculatus</i>	Black Crappie	U.S. Army, 1992
<i>Cyprinus carpio</i>	Common Carp	U.S. Army, 1992
<i>Notemigonus crysoleucas</i>	Golden Shiner	U.S. Army, 1992

Table D-2: Birds of Assabet River NWR

<u>Scientific Name</u>	<u>Common Name</u>	<u>Status</u>	<u>Reference</u>
<i>Ardea herodias</i>	Great Blue Heron		Lockwood 1999 & 2000
<i>Branta canadensis</i>	Canada Goose		Lockwood 1999 & 2000
<i>Anas platyrhynchos</i>	Mallard		Lockwood 1999 & 2000
<i>Aix sponsa</i>	Wood Duck		Lockwood 2000
<i>Mergus merganser</i>	Common Merganser		Lockwood 1999
<i>Accipiter striatus</i>	Sharp-shinned Hawk	SC	Lockwood 1999
<i>Buteo platypterus</i>	Broad-winged Hawk		Lockwood 2000
<i>Buteo jamaicensis</i>	Red-tailed Hawk		Lockwood 1999 & 2000
<i>Circus cyaneus</i>	Northern Harrier		Plagge 2000
<i>Falco sparverius</i>	American Kestrel		Lockwood 1999
<i>Cathartes aura</i>	Turkey Vulture		Lockwood 1999
<i>Accipiter cooperii</i>	Cooper's Hawk	SC	Lockwood 1999
<i>Haliaeetus leucocephalus</i>	Bald Eagle	FT-SE	Aneptek, 1991
<i>Buteo lineatus</i>	Red-shouldered hawk		Aneptek, 1991; Lockwood 2000

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<i>Bonasa umbellus</i>	Ruffed Grouse	Lockwood 1999 & 2000
<i>Meleagris gallopavo</i>	Wild Turkey	Lockwood 1999 & 2000
<i>Phasianus colchicus</i>	Ring-necked Pheasant	Meyer & Montemerlo 1995
<i>Porzana carolina</i>	Sora Rail	Aneptek, 1991
<i>Charadrius vociferus</i>	Killdeer	Lockwood 1999
<i>Scolopax minor</i>	American Woodcock	Plagge 2000
<i>Gallinago gallinago</i>	Common Snipe	Aneptek, 1991
<i>Larus argentatus</i>	Herring Gull	Lockwood 1999
<i>Zenaidura macroura</i>	Mourning Dove	Lockwood 1999 & 2000
<i>Columba livia</i>	Rock Dove	Lockwood 1999
<i>Chaetura pelagica</i>	Chimney Swift	Lockwood 1999 & 2000
<i>Ceryle alcyon</i>	Belted Kingfisher	Lockwood 1999
<i>Bubo virginianus</i>	Great Horned Owl	Lockwood 1999
<i>Strix varia</i>	Barred Owl	Lockwood 1999
<i>Caprimulgus vociferus</i>	Whip-poor-will	Aneptek, 1991 Meyer & Montemerlo 1995: Plagge 2000
<i>Archilochus colubris</i>	Ruby-throated Hummingbird	Lockwood 2000
<i>Ceryle alcyon</i>	Belted Kingfisher	Lockwood 2000
<i>Melanerpes carolinus</i>	Red-bellied Woodpecker	Lockwood 1999 & 2000
<i>Picoides villosus</i>	Hairy Woodpecker	Lockwood 1999 & 2000
<i>Picoides pubescens</i>	Downy Woodpecker	Lockwood 1999 & 2000
<i>Colaptes auratus</i>	Northern Flicker	Lockwood 1999 & 2000
<i>Dryocopus pileatus</i>	Pileated Woodpecker	Lockwood 2000
<i>Contopus virens</i>	Eastern Wood-Pewee	Lockwood 1999 & 2000
<i>Sayornis phoebe</i>	Eastern Phoebe	Lockwood 1999 & 2000
<i>Myiarchus crinitus</i>	Great-crested Flycatcher	Lockwood 1999 & 2000
<i>Empidonax alnorum</i>	Alder Flycatcher	Lockwood 2000
<i>Empidonax traillii</i>	Willow Flycatcher	Lockwood 2000
<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher	Lockwood 2000
<i>Tyrannus tyrannus</i>	Eastern Kingbird	Lockwood 1999 & 2000
<i>Cyanocitta cristata</i>	Blue Jay	Lockwood 1999 & 2000
<i>Corvus brachyrhynchos</i>	American Crow	Lockwood 1999 & 2000
<i>Tachycineta bicolor</i>	Tree Swallow	Lockwood 1999 & 2000
<i>Riparia riparia</i>	Bank Swallow	Lockwood 1999 & 2000
<i>Hirundo rustica</i>	Barn Swallow	Lockwood 1999 & 2000
<i>Stelgidopteryx serripennis</i>	Rough-winged Swallow	Lockwood 2000
<i>Parus atricapillus</i>	Black-capped Chickadee	Lockwood 1999 & 2000
<i>Parus bicolor</i>	Tufted Titmouse	Lockwood 1999 & 2000
<i>Sitta canadensis</i>	Red-breasted Nuthatch	Lockwood 1999 & 2000
<i>Sitta carolinensis</i>	White-breasted Nuthatch	Lockwood 1999 & 2000
<i>Certhia americana</i>	Brown Creeper	Lockwood 1999 & 2000
<i>Troglodytes aedon</i>	House Wren	Lockwood 1999
<i>Troglodytes troglodytes</i>	Winter Wren	Lockwood 1999 & 2000
<i>Troglodytes ludovicianus</i>	Carolina Wren	Lockwood 1999
<i>Sialia sialis</i>	Eastern Bluebird	Lockwood 1999 & 2000
<i>Catharus fuscescens</i>	Veery	Lockwood 1999 & 2000
<i>Catharus guttatus</i>	Hermit Thrush	Lockwood 1999 & 2000
<i>Hylocichla mustelina</i>	Wood Thrush	Lockwood 1999 & 2000
<i>Seiurus aurocapillus</i>	Ovenbird	Lockwood 1999 & 2000
<i>Turdus migratorius</i>	American Robin	Lockwood 1999 & 2000
<i>Dumetella carolinensis</i>	Gray Catbird	Lockwood 1999 & 2000

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<i>Mimus polyglottos</i>	Northern Mockingbird		Lockwood 1999 & 2000
<i>Toxostoma rufum</i>	Brown Thrasher		Lockwood 1999 & 2000
<i>Regulus satrapa</i>	Golden-crowned Kinglet		Lockwood 1999
<i>Regulus calendulasatrapa</i>	Ruby-crowned Kinglet		Lockwood 1999 & 2000
<i>Sturnus vulgaris</i>	European Starling		Lockwood 1999
<i>Bombycilla cedrorum</i>	Cedar Waxwing		Lockwood 1999 & 2000
<i>Vermivora pinus</i>	Blue-winged Warbler		Lockwood 1999
<i>Vermivora ruficapilla</i>	Nashville Warbler		Lockwood 1999
<i>Parula americana</i>	Northern Parula	ST	Lockwood 1999 & 2000
<i>Dendroica petechia</i>	Yellow Warbler		Lockwood 1999 & 2000
<i>Dendroica pensylvanica</i>	Chestnut-sided Warbler		Lockwood 1999
<i>Dendroica magnolia</i>	Magnolia Warbler		Lockwood 1999
<i>Dendroica caerulescens</i>	Black-throated Blue Warbler		Lockwood 1999 & 2000
<i>Dendroica coronata</i>	Yellow-rumped Warbler (Myrtle)		Lockwood 1999 & 2000
<i>Dendroica virens</i>	Black-throated Green Warbler		Lockwood 1999 & 2000
<i>Dendroica fusca</i>	Blackburnian Warbler		Lockwood 1999
<i>Vermivora bachmanii</i>	Bachman's Warbler		Lockwood 2000
<i>Dendroica pinus</i>	Pine Warbler		Lockwood 1999 & 2000
<i>Dendroica discolor</i>	Prairie Warbler		Lockwood 1999 & 2000
<i>Dendroica castanea</i>	Bay-breasted Warbler		Lockwood 1999
<i>Dendroica striata</i>	Blackpoll Warbler	SC	Lockwood 1999
<i>Mniotilta varia</i>	Black-and-white Warbler		Lockwood 1999 & 2000
<i>Setophaga ruticilla</i>	American Redstart		Lockwood 1999
<i>Seiurus noveboracensis</i>	Northern Waterthrush		Lockwood 1999 & 2000
<i>Geothlypis trichas</i>	Common Yellowthroat		Lockwood 1999 & 2000
<i>Wilsonia canadensis</i>	Canada Warbler		Lockwood 1999
<i>Vireo solitarius</i>	Blue-headed Vireo		Lockwood 1999 & 2000
<i>Vireo olivaceus</i>	Red-eyed Vireo		Lockwood 1999 & 2000
<i>Vermivora celata</i>	Tennessee Warbler		Lockwood 1999
<i>Dendroica palmarum</i>	Palm Warbler		Lockwood 1999 & 2000
<i>Piranga olivacea</i>	Scarlet Tanager		Lockwood 1999 & 2000
<i>Pipilo erythrophthalmus</i>	Eastern Towhee		Lockwood 1999 & 2000
<i>Spizella passerina</i>	Chipping Sparrow		Lockwood 1999 & 2000
<i>Spizella pusilla</i>	Field Sparrow		Lockwood 1999 & 2000
<i>Melospiza melodia</i>	Song Sparrow		Lockwood 1999 & 2000
<i>Melospiza georgiana</i>	Swamp Sparrow		Lockwood 1999 & 2000
<i>Zonotrichia albicollis</i>	White-throated Sparrow		Lockwood 1999 & 2000
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow		Lockwood 1999
<i>Cardinalis cardinalis</i>	Northern Cardinal		Lockwood 1999 & 2000
<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak		Lockwood 1999 & 2000
<i>Spizella arborea</i>	American Tree Sparrow		Lockwood 1999
<i>Melospiza lincolnii</i>	Lincoln's Sparrow		Lockwood 1999
<i>Passerella iliaca</i>	Fox Sparrow		Lockwood 1999
<i>Junco hyemalis</i>	Dark-eyed Junco		Lockwood 1999
<i>Passerina cyanea</i>	Indigo Bunting		Aneptek, 1991
<i>Dolichonyx oryzivorus</i>	Bobolink		Aneptek, 1991
<i>Agelaius phoeniceus</i>	Red-winged Blackbird		Lockwood 1999 & 2000
<i>Euphagus carolinus</i>	Rusty Blackbird		Lockwood 1999
<i>Quiscalus quiscula</i>	Common Grackle		Lockwood 1999 & 2000
<i>Molothrus ater</i>	Brown-headed Cowbird		Lockwood 1999 & 2000
<i>Icterus galbula</i>	Baltimore Oriole		Lockwood 1999 & 2000
<i>Carpodacus mexicanus</i>	House Finch		Lockwood 1999

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<i>Carduelis tristis</i>	American Goldfinch	Lockwood 1999 & 2000
<i>Passer domesticus</i>	House Sparrow	Lockwood 1999
<i>Carpodacus purpureus</i>	Purple Finch	Lockwood 1999 & 2000
<i>Vermivora chrysoptera</i>	Golden-winged Warbler	
<i>Dendroica tigrina</i>	Cape May Warbler	
<i>Protonotaria citrea</i>	Prothonotary Warbler	
<i>Seiurus aurocapillus</i>	Ovenbird	
<i>Oporornis philadelphia</i>	Mourning Warbler	
<i>Wilsonia pusilla</i>	Wilson's Warbler	
<i>Icteria virens</i>	Yellow-breasted Chat	
<i>Poocetes gramineus</i>	Vesper Sparrow	
<i>Passerculus sandwichensis</i>	Savannah Sparrow	
<i>Ammodramus nelsoni</i>	Nelson's Sharp-tailed Sparrow	
<i>Plectrophenax nivalis</i>	Snow Bunting	
<i>Spiza americana</i>	Dicksissel	
<i>Sturnella magna</i>	Eastern Meadowlark	
<i>Icterus spurius</i>	Orchard Oriole	
<i>Pinicola enucleator</i>	Pine Grosbeak	
<i>Carduelis flammea</i>	Common Redpoll	
<i>Carduelis pinus</i>	Pine Siskin	
<i>Coccothraustes vespertinus</i>	Evening Grosbeak	

Table D-3: Mammals of Assabet River NWR

<u>Scientific Name</u>	<u>Common Name</u>	<u>Reference</u>
<i>Sorex cinereus</i>	Masked Shrew	Thomas 1992
<i>Blarina brevicauda</i>	Northern Short-tailed Shrew	Thomas 1992
<i>Sylvilagus floridanus</i>	Eastern Cottontail	Thomas 1992
<i>Tamias striatus</i>	Eastern Chipmunk	Thomas 1992
<i>Tamiasciurus hudsonicus</i>	Red Squirrel	Plagge 2000
<i>Glaucomys sabrinus volans</i>	(Northern or Southern) Flying Squirrel	Lockwood 2000
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel	Thomas 1992
<i>Castor canadensis</i>	American Beaver	Thomas 1992
<i>Peromyscus leucopus</i>	White-footed Mouse	Thomas 1992
<i>Microtus pennsylvanicus</i>	Meadow Vole	Thomas 1992
<i>Clethrionomys gapperi</i>	Southern Red-backed Vole	Thomas 1992
<i>Zapus hudsonius</i>	Meadow Jumping Mouse	Thomas 1992
<i>Procyon lotor</i>	Common Raccoon	Thomas 1992
<i>Mustela vison</i>	Mink	Thomas 1992
<i>Lutra canadensis</i>	Northern River Otter	Thomas 1992
<i>Mephitis mephitis</i>	Striped Skunk	Thomas 1992
<i>Odocoileus virginiana</i>	White-tailed Deer	Thomas 1992; Plagge 2000
<i>Canis latrans</i>	Eastern Coyote	Meyer & Montemerlo 1995
<i>Marmota monax</i>	Woodchuck	Aneptek, 1991
<i>Erethizon dorsatum</i>	Common Porcupine	Aneptek, 1991
<i>Martes pennanti</i>	Fisher	Aneptek, 1991
<i>Lynx rufus</i>	Bobcat	Aneptek, 1991
<i>Ondatra zibethicus</i>	Common Muskrat	Preliminary Proposal 1992
<i>Vulpes fulva</i>	Red Fox	Aneptek, 1991
<i>Alces alces</i>	Moose	Lockwood 2000

Table D-4: Amphibians of Assabet River NWR

Scientific Name	Common Name	Status	Reference
<i>Bufo americanus</i>	American Toad		Meyer & Montemerlo 1995; Plagge 2000
<i>Rana catesbeiana</i>	Bull Frog		Meyer & Montemerlo 1995; Plagge 2000
<i>Rana clamitans melanota</i>	Green Frog		Meyer & Montemerlo 1995; Plagge 2000
<i>Rana palustris</i>	Pickerel Frog		Meyer & Montemerlo 1995; Plagge 2000
<i>Hyla c. crucifer</i>	Spring Peeper		Meyer & Montemerlo 1995; Plagge 2000
<i>Rana sylvatica</i>	Wood Frog		Meyer & Montemerlo 1995; Plagge 2000
<i>Hyla versicolor</i>	Gray Tree Frog		Plagge 2000
<i>Notophthalmus</i> <i>var. viridescens</i>	Eastern Spotted Newt		Meyer & Montemerlo 1995
<i>Ambystoma laterale</i>	Blue Spotted Salamander	SC	Meyer & Montemerlo 1995
<i>Plethodon cinereus</i>	Red Backed Salamander		Meyer & Montemerlo 1995
<i>Desmognathus fuscus</i>	Dusky Salamander		Aneptek, 1991
<i>Ambystoma maculatum</i>	Spotted Salamander		

Table D-5: Reptiles of Assabet River NWR

Scientific Name	Common Name	Status	Reference
<i>Coluber c. constrictor</i>	Northern Black Racer		Meyer & Montemerlo 1995
<i>Thamnophis s. sirtalis</i>	Eastern Garter Snake		Meyer & Montemerlo 1995
<i>Nerodia sipedon sipedon</i>	Northern Water Snake		Meyer & Montemerlo 1995
<i>Diadophis punctatus edwardsi</i>	Northern Ringneck Snake		Meyer & Montemerlo 1995
<i>Clemmys guttata</i>	Spotted Turtle	SC	Meyer & Montemerlo 1995
<i>Chrysemys p. picta</i>	Eastern Painted Turtle		Meyer & Montemerlo 1995
<i>Terrapene carolina</i>	Eastern Box Turtle	SC	Meyer & Montemerlo 1995
<i>Emydoidea blandingii</i>	Blanding's Turtle	ST	Preliminary Proposal 1992

Table D-6: Moths of Assabet River NWR

<u>MONA#</u>	<u>Scientific Name</u>	<u>References</u>
625F	<i>Oreta rosea form "irrorata"</i>	Mello & Peters 1992
6273	<i>Itame pustularia</i>	Mello & Peters 1992
6340	<i>Semiothisa minorata</i>	Mello & Peters 1992
6342	<i>Semiothisa bisignata</i>	Mello & Peters 1992
6570	<i>Aethalura intertexta</i>	Mello & Peters 1992
6597	<i>Ectropis crepuscularia</i>	Mello & Peters 1992
6638	<i>Eufidonia nototaria</i>	Mello & Peters 1992
6654	<i>Hypagyrtis unipunctata</i>	Mello & Peters 1992
6667	<i>Lomographa vestaliata</i>	Mello & Peters 1992
6720	<i>Lytrosis unitaria</i>	Mello & Peters 1992
6796	<i>Campaea perlata</i>	Mello & Peters 1992
6812	<i>Homochlodes fritillaria</i>	Mello & Peters 1992
6815	<i>Gueneria similaria</i>	Mello & Peters 1992
6823	<i>Metarranthia angularia</i>	Mello & Peters 1992
6837	<i>Probole alienaria</i>	Mello & Peters 1992
6964	<i>Tetracis cacheziata</i>	Mello & Peters 1992
6974	<i>Patelene olyzonaria</i>	Mello & Peters 1992
7009	<i>Nematocampa limbata</i>	Mello & Peters 1992
7071	<i>Chlorochlamys chloroleucaria</i>	Mello & Peters 1992

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7139	<i>Cyclophora pendulinaria</i>	Mello & Peters 1992
7159	<i>Scopula limboundata</i>	Mello & Peters 1992
7206	<i>Eulithis explanata</i>	Mello & Peters 1992
74XX	<i>Eupithecia</i> spp.	Mello & Peters 1992
7698	<i>Malacosoma disstria</i>	Mello & Peters 1992
7701	<i>Malacosoma americanum</i>	Mello & Peters 1992
7715	<i>Dryocampa rubicunda</i>	Mello & Peters 1992
7758	<i>Actias luna</i>	Mello & Peters 1992
7886	<i>Darapsa pholus</i>	Mello & Peters 1992
8129	<i>Pyrrharctia isabella</i>	Mello & Peters 1992
8133	<i>Spilosoma latipennis</i>	Mello & Peters 1992
8140	<i>Hyphantria cunea</i>	Mello & Peters 1992
8188	<i>Apantesis figurata</i>	Mello & Peters 1992
8316	<i>Orgyia leucostigma</i>	Mello & Peters 1992
8318	<i>Lymantria dispar</i>	Mello & Peters 1992
8322	<i>Idia americalis</i>	Mello & Peters 1992
8323	<i>Idia aemula</i>	Mello & Peters 1992
8326	<i>Idia rotundalis</i>	Mello & Peters 1992
8328	<i>Idia julia</i>	Mello & Peters 1992
8329	<i>Idia diminuendis</i>	Mello & Peters 1992
8334	<i>Idia lubricalis</i>	Mello & Peters 1992
8347	<i>Zanclognatha obscuripennis</i>	Mello & Peters 1992
8355	<i>Chytolita morbidalis</i>	Mello & Peters 1992
8357	<i>Hormisa absorptalis</i>	Mello & Peters 1992
8387	<i>Renia sobrialis</i>	Mello & Peters 1992
8397	<i>Palthis angulalis</i>	Mello & Peters 1992
8442	<i>Bomolocha baltimoralis</i>	Mello & Peters 1992
8490	<i>Pangrapta decoralis</i>	Mello & Peters 1992
8491	<i>Ledaea perditalis</i>	Mello & Peters 1992
8697	<i>Zale minerea</i>	Mello & Peters 1992
8704	<i>Zale helata</i>	Mello & Peters 1992
8707	<i>Zale metatoides</i>	Mello & Peters 1992
8717	<i>Zale horrida</i>	Mello & Peters 1992
8727	<i>Parallelia bistriaris</i>	Mello & Peters 1992
8739	<i>Caenurgina erechtea</i>	Mello & Peters 1992
8801	<i>Catocala ilia</i>	Mello & Peters 1992
8847	<i>Catocala gracilis</i>	Mello & Peters 1992
8849	<i>Catocala andromedae</i>	Mello & Peters 1992
8851	<i>Catocala coccinata</i>	Mello & Peters 1992
8857	<i>Catocala ultronia</i>	Mello & Peters 1992
8858	<i>Catocala crategi</i>	Mello & Peters 1992
9046	<i>Lithacodia bellicula</i>	Mello & Peters 1992
9059	<i>Capis curvata</i>	Mello & Peters 1992
9185	<i>Colocasia propinquinelinea</i>	Mello & Peters 1992
9193	<i>Raphia frater</i>	Mello & Peters 1992
9258	<i>Acronicta sperata</i>	Mello & Peters 1992
9364	<i>Apamea finitima</i>	Mello & Peters 1992
9545	<i>Euplexia benesimilis</i>	Mello & Peters 1992
9582	<i>Nedra ramosula</i>	Mello & Peters 1992
9631	<i>Callopietria mollissima</i>	Mello & Peters 1992
9638	<i>Amphipyra pyramidoides</i>	Mello & Peters 1992
9678	<i>Elaphria versicolor</i>	Mello & Peters 1992

9681	<i>Elaphria festivoides</i>	Mello & Peters 1992
9690	<i>Platysenta videns</i>	Mello & Peters 1992
9815	<i>Cosmia calami</i>	Mello & Peters 1992
9818	<i>Amolita fessa</i>	Mello & Peters 1992
10291	<i>Polia latex</i>	Mello & Peters 1992
10397	<i>Lacinipolia renigera</i>	Mello & Peters 1992
10436	<i>Aletia oxygala</i>	Mello & Peters 1992
10459	<i>Leucania inermis</i>	Mello & Peters 1992
10567	<i>Ulolonche culea</i>	Mello & Peters 1992
10569	<i>Ulolonche modesta</i>	Mello & Peters 1992
10578	<i>Pseudorthodes vecors</i>	Mello & Peters 1992
10587	<i>Orthodes cynica</i>	Mello & Peters 1992
10903	<i>Euagrotis illapsa</i>	Mello & Peters 1992
10928	<i>Graphiphora haruspica</i>	Mello & Peters 1992

Table D-7: Butterflies/Dragonflies at Assabet River NWR

Scientific name	Common name	Reference
<i>Aeshna canadensis</i>	Canada Darner	Walton 2001
<i>Aeshna constricta</i>	Lance-tipped Darner	Walton 2001
<i>Anax junius</i>	Common Green Darner	Walton 2001
<i>Celithemis elisa</i>	Calico Pennant	Lockwood 2001
<i>Cercyonis pegala</i>	Common Wood-Nymph	Walton 2001
<i>Coenonympha tullia</i>	Common Ringlet	Walton 2001
<i>Colias eurytheme</i>	Orange Sulphur	Walton 2001
<i>Colias philodice</i>	Clouded Sulphur	Walton 2001
<i>Danaus plexippus</i>	Monarch Catapillar	Walton 2001
<i>Dorocordulia lepida</i>	Petite Emerald	Lockwood 2001
<i>Dromogomphus spinosus</i>	Black-Shouldered Spinyleg	Lockwood 2001
<i>Erythemis simplicicollis</i>	Eastern Pondhawk	Walton 2001
<i>Everes comyntas</i>	Eastern Tailed-blue	Walton 2001
<i>Hesperia leonardus</i>	Leonard's Skipper	Walton 2001
<i>Leucorrhinia frigida</i>	Frosted Whiteface	Lockwood 2001
<i>Libellula cyanea</i>	Spangled Skimmer	Walton 2001
<i>Libellula incesta</i>	Slaty Skimmer	Walton 2001
<i>Libellula luctosa</i>	Widow Skimmer	Lockwood 2001
<i>Libellula lydia</i>	Common Whitetail	Lockwood 2001
<i>Libellula pulchella</i>	Twelve-spotted Skimmer	Lockwood 2001
<i>Libellula quadrimaculata</i>	Four-spotted Skimmer	Lockwood 2001
<i>Limenitis archippus</i>	Viceroy	Walton 2001
<i>Lycaena phlaeas</i>	American Copper	Walton 2001
<i>Pachydiplax longipennis</i>	Blue Dasher	Lockwood 2001
<i>Perithemis tenera</i>	Eastern Amberwing	Lockwood 2001
<i>Phyciodes tharos</i>	Pearl Crescent	Walton 2001
<i>Pieris rapae</i>	Cabbage White	Walton 2001
<i>Polites peckius</i>	Peck's Skipper	Walton 2001
<i>Pompeius verna</i>	Little Glassywing	Walton 2001
<i>Speyeria cybele</i>	Great Spangled Fritillary	Walton 2001
<i>Sympetrum sp.</i>	Meadow Hawk Dragonfly	Walton 2001
<i>Sympetrum obtrusum</i>	White-Faced Meadowhawk	Lockwood 2001
<i>Sympetrum rubicundulum</i> Int	RubyCherry-Faced Meadowhawk	Lockwood 2001
<i>Sympetrum vicinum</i>	Yellow-legged Meadowhawk	Lockwood 2001
<i>Vanessa atalanta</i>	Red Admiral	Walton 2001

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Table D-8: Vascular Plants of Assabet River NWR

Key to “status” column notations

FE	Federally Endangered
FT	Federally Threatened
SE	State (MA) Endangered
ST	State (MA) Threatened
SC	State (MA) Special Concern
WL	State (MA) Watch List Species

Scientific Name	Common Name	Status
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PTERIDOPHYTES (Ferns and fern allies)

Equisetaceae

<i>Equisetum arvense</i> L.	Common Horsetail	
<i>Equisetum fluviatile</i> L.	Water Horsetail	
<i>Equisetum sylvaticum</i> L.	Wood Horsetail	

Lycopodiaceae

<i>Lycopodium clavatum</i> L.	Staghorn Clubmoss	
<i>Lycopodium dendroideum</i> Michx.	Northern Tree Clubmoss	
<i>Lycopodium digitatum</i> Dill. ex A.Braun (= <i>L. flabelliforme</i>)	Running Pine	
<i>Lycopodium lucidulum</i> Michx.	Shining Clubmoss	
<i>Lycopodium tristachyum</i> Pursh	Northern Ground Pine	

Ophioglossaceae

<i>Botrychium dissectum</i> Spreng.	Cut-Leaf Grape Fern	
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Osmundaceae

<i>Osmunda cinnamomea</i> L.	Cinnamon Fern	
<i>Osmunda claytoniana</i> L.	Interrupted Fern	
<i>Osmunda regalis</i> L. var. <i>spectabilis</i>	(Willd.) Gray Royal Fern	

Polypodiaceae (includes Aspleniaceae, Cyatheaceae)

<i>Asplenium platyneuron</i> (L.) B.S.P. var. <i>platyneuron</i>	Ebony Spleenwort	
<i>Athyrium filix-femina</i> (L.) Roth subsp. <i>asplenioides</i> (Michx.) Hulten (= <i>A.</i> <i>filix-femina</i> var. <i>michauxii</i>)	Lady Fern	
<i>Dennstaedtia punctilobula</i> (Michx.) T.Moore	Hay Scented Fern	
<i>Dryopteris cristata</i> (L.)	Gray Crested Wood Fern	
<i>Dryopteris intermedia</i> (Willd.) Gray (= <i>D. spinulosa</i> var. <i>intermedia</i>)	Common Wood Fern	
<i>Dryopteris marginalis</i> (L.)	Gray Marginal Wood Fern	
<i>Onoclea sensibilis</i> L.	Sensitive Fern	
<i>Polypodium virginianum</i> L. (= <i>P. vulgare</i>)	Common Polypody	
<i>Polystichum acrostichoides</i> (Michx.) Schott	Christmas Fern	
<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>latiusculum</i> (Desv. Underw. ex A.Heller	Bracken Fern	
<i>Thelypteris noveboracensis</i> (L.) Nieuwl.	New York Fern	
<i>Thelypteris simulata</i> (Davenp.) Nieuwl.	Massachusetts Fern	

<i>Thelypteris thelypteroides</i> (Michx.) J.Holub (= <i>T. palustris</i> , <i>Dryopteris thelypteris</i>)	Marsh Fern
<i>Woodwardia virginica</i> (L.) J.E.Smith (= <i>Anchistea virginica</i>)	Virginia Chan Fern
GYMNOSPERMS (Cone Bearing Plants)	
Pinaceae (includes Cupressaceae)	
<i>Chamaecyparis thyoides</i> (L.) BSP.	Atlantic White Cedar
<i>Juniperus communis</i> L.	Common Juniper
<i>Juniperus virginiana</i> L.	Eastern Red Cedar
<i>Larix laricina</i> (DuRoi) K.Koch	American Larch
<i>Picea abies</i> (L.) Karst.	Norway Spruce
<i>Picea mariana</i> (Mill.) B.S.P.	Black Spruce
<i>Pinus resinosa</i> Soland. in Ait.	Red Pine WL
<i>Pinus rigida</i> Mill.	Pitch Pine
<i>Pinus strobus</i> L.	White Pine
<i>Pinus sylvestris</i> L.	Scotch Pine
<i>Tsuga canadensis</i> (L.) Carriere	Northern Hemlock
Taxaceae	
<i>Taxus baccata</i> L.	English Yew
ANGIOSPERMS (Flowering Plants)	
MONOCOTYLEDONEAE (Monocots)	
Alismataceae	
<i>Alisma subcordatum</i> Raf.	American Water Plantain
<i>Sagittaria engelmanniana</i> J.G.Smith subsp. <i>Engelmanniana</i>	Engelmann's Arrowhead
<i>Sagittaria latifolia</i> Willd. var. <i>latifolia</i>	Broad-Leaved Arrowhead
Araceae	
<i>Arisaema triphyllum</i> (L.) Schott subsp. <i>Triphyllum</i> (= <i>A. triphyllum</i> var. <i>triphyllum</i> , <i>A. atrorubens</i>)	Jack-in-the-Pulpit
<i>Calla palustris</i> L.	Water Arum
<i>Peltandra virginica</i> (L.) Kunth	Arrow Arum
<i>Symplocarpus foetidus</i> (L.) Salisb.	Skunk Cabbage
Commelinaceae	
<i>Commelina communis</i> L. var. <i>ludens</i> (Miq.) C.B.Clarke	Deceiving Asiatic Dayflower
Cyperaceae	
<i>Bulbostylis capillaris</i> (L.) C.B.Clarke	Sand Rush
<i>Carex annectens</i> (Bickn.) Bickn. var. <i>xanthocarpa</i> (Kuekenth.) Wiegand	Yellow-Fruited Sedge
<i>Carex blanda</i> Dewey	Woodland Sedge
<i>Carex brevior</i> (Dewey) Mackenz. ex Lunell	Shorter Sedge
<i>Carex bromoides</i> Schkuhr	Brome-Like Sedge
<i>Carex brunnescens</i> (Pers.) Poir.	Brownish Sedge
<i>Carex bullata</i> Schkuhr	Button Sedge
<i>Carex canescens</i> L. var. <i>canescens</i>	Common Silvery Sedge

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<i>Carex canescens</i> L. var. <i>disjuncta</i> Fernald	Separated Silvery Sedge	
<i>Carex cephalophora</i> Muhl. ex Willd.	Oval-Headed Sedge	
<i>Carex comosa</i> Boott	Bottlebrush Sedge	
<i>Carex crinita</i> Lam.	Fringed Sedge	
<i>Carex debilis</i> Michx. var. <i>rudgei</i> L.H.Bailey	White-Edged Sedge	
<i>Carex digitalis</i> Willd. var. <i>digitalis</i>	Slender Wood Sedge	
<i>Carex disperma</i> Dewey	Soft-Leaved Sedge	
<i>Carex emmonsii</i> Dewey		
(= <i>C. nigromarginata</i> var. <i>minor</i>)	Emmon's Sedge	
<i>Carex foenea</i> Willd. var. <i>foenea</i> (= <i>C. siccata</i>)	Hay Sedge	
<i>Carex gracillima</i> Schweinitz	Graceful Sedge	
<i>Carex gynandra</i> Schweinitz		
(= <i>C. crinita</i> var. <i>gynandra</i>)	Nodding Sedge	
<i>Carex howei</i> MacKenz.	Howe's Sedge	
<i>Carex intumescens</i> Rudge var. <i>intumescens</i>	Bladder Sedge	
<i>Carex lacustris</i> Willd.	Lake-Bank Sedge	
<i>Carex lanuginosa</i> Michx.		
(= <i>C. lasiocarpa</i> var. <i>latiflora</i>)	Wooly Sedge	
<i>Carex lasiocarpa</i> Ehrh. var. <i>americana</i> Fernald	Slender Sedge	
<i>Carex lonchocarpa</i> Willd. (= <i>C. smalliana</i> , <i>C. folliculata</i>)	Long Sedge	
<i>Carex lupulina</i> Muhl. ex Willd.	Hop Sedge	
<i>Carex lurida</i> Wahlenb.	Lurid Sedge	
<i>Carex mesochorea</i> MacKenz.		
(= <i>C. cephalophora</i> var. <i>mesochorea</i>)	Midland Sedge	SE
<i>Carex normalis</i> MacKenz.	Larger Straw Sedge	
<i>Carex oligosperma</i> Michx.	Few-Seeded Sedge	ST
<i>Carex pallescens</i> L.	Pale Sedge	
<i>Carex pensylvanica</i> Lam.	Pennsylvania Sedge	
<i>Carex radiata</i> (Wahlenb.) Small (= <i>C. convoluta</i> , <i>C. rosea</i>)	Stellate Sedge	
<i>Carex rostrata</i> J.Stokes	Umbel-Like Sedge	
<i>Carex scoparia</i> Schkuhr ex Willd.	Pointed Broom Sedge	
<i>Carex X stipata</i> Muhl. ex Willd. var. <i>stipata</i>	Awl-Fruited Sedge	
<i>Carex stricta</i> Lam. var. <i>stricta</i>	Tussock Sedge	
<i>Carex swanii</i> (Fernald) MacKenz.	Swan's Sedge	
<i>Carex tribuloides</i> Wahlenb.	Blunt Broom Sedge	
<i>Carex trisperma</i> Dewey	Three-Fruited Sedge	
<i>Carex vestita</i> Willd.	Velvet Sedge	
<i>Carex vulpinoidea</i> Michx.	Fox Sedge	
<i>Cyperus dentatus</i> Torr.	Toothed Cyperus	
<i>Cyperus erythrorhizos</i> Muhl.	Red-Rooted Cyperus	
<i>Cyperus filiculmis</i> Vahl	Slender Cyperus	
<i>Cyperus rivularis</i> Kunth (= <i>C. bipartitus</i>)	Shining Cyperus	
<i>Cyperus strigosus</i> L.	Straw-Colored Cyperus	
<i>Dulichium arundinaceum</i> (L.) Britton	Three-Way Sedge	
<i>Eleocharis obtusa</i> (Willd.) J.A.Schultes var. <i>obtusa</i>	Blunt Spikerush	
<i>Eleocharis olivacea</i> Torr.	Bright Green Spike Rush	
<i>Eleocharis smallii</i> Britton	Small's Spikerush	
<i>Eleocharis tenuis</i> (Willd.) J.A.Schultes var. <i>tenuis</i>	Slender Spikerush	
<i>Eriophorum virginicum</i> L.	Tawny Cottongrass	
<i>Fimbristylis autumnalis</i> (L.) Roem. & J.A.Schultes	Slender Fimbristylis	

<i>Rhynchospora alba</i> (L.) Vahl	White Beakrush
<i>Rhynchospora capitellata</i> (Michx.) Vahl	Small-Headed Beakrush
<i>Scirpus cyperinus</i> (L.) Kunth	Woolgrass
<i>Scirpus georgianus</i> R.M.Harper (= <i>S. atrovirens</i> var. <i>georgianus</i>)	Georgia Dark-Green Bulrush
<i>Scirpus validus</i> Vahl	Soft-Stem Bulrush

Gramineae (= Poaceae)

<i>Agropyron repens</i> (L.) Beauv. var. <i>repens</i> (= <i>A. leersianum</i>)	Quackgrass
<i>Agrostis perennans</i> (Walter) Tuckerman var. <i>perennans</i>	Autumn Bent
<i>Agrostis scabra</i> Willd. var. <i>scabra</i>	Hairgrass
<i>Agrostis tenuis</i> Sibth. var. <i>tenuis</i>	Rhode Island Bent
<i>Alopecurus aequalis</i> Sobol. var. <i>aequalis</i>	Short-Awn Foxtail
<i>Alopecurus pratensis</i>	Meadow Foxtail
<i>Andropogon gerardii</i> Vitman var. <i>gerardii</i>	Big Bluestem
<i>Anthoxanthum odoratum</i> L.	Sweet Vernalgrass
<i>Aristida dichotoma</i> Michx.	Poverty Grass
<i>Aristida oligantha</i> Michx.	Prairie Three-Awn
<i>Brachyelytrum erectum</i> (Schreb.) Beauv. var. <i>septentrionale</i> W.K.Babel (= <i>B. septentrionale</i>)	Bearded Short-Husk
<i>Bromus inermis</i> Leyss. var. <i>inermis</i>	Smooth Brome
<i>Calamagrostis canadensis</i> (Michx.) Beauv. var. <i>canadensis</i>	Bluejoint Grass
<i>Calamagrostis cinnoides</i> W.Barton nomen superfl.	Reedgrass
<i>Cinna arundinacea</i> L. var. <i>arundinacea</i>	Stout Woodreed
<i>Dactylis glomerata</i> L. var. <i>glomerata</i>	Orchard Grass
<i>Danthonia spicata</i> (L.) Beauv. ex Roem. & J.A.Schultes	Common Wild Oatgrass
<i>Deschampsia flexuosa</i> (L.) Trin.	Common Hairgrass
<i>Dichanthelium acuminatum</i> (Swartz) Gould & C.A.Clark (= <i>Panicum acuminatum</i>) var. <i>implicatum</i> (Scribn.) Gould & C.A.Clark (= <i>Panicum auburne</i> , <i>P. implicatum</i> , <i>P. lanuginosum</i> var. <i>implicatum</i> , <i>P. meridionale</i>)	Slender-Stemmed Panic Grass
<i>Dichanthelium acuminatum</i> (Swartz) Gould & C.A.Clark (= <i>Panicum acuminatum</i>) var. <i>lindheimeri</i> (Nash) Gould & C.A.Clark (= <i>Panicum lindheimen</i>)	Lindheimer's Panic Grass
<i>Dichanthelium clandestinum</i> (L.) Gould (= <i>Panicum clandestinum</i>)	Deer-Tongue Grass
<i>Dichanthelium depauperatum</i> (Muhl.) Gould (= <i>Panicum depauperatum</i>)	Poverty Panic Grass
<i>Dichanthelium dichotomum</i> (L.) Gould (= <i>Panicum dichotomum</i>) var. <i>dichotomum</i>	Forked Panic Grass
<i>Dichanthelium linearifolium</i> (Scribn.) Gould (= <i>Panicum linearifolium</i>)	Low White-Haired Panic Grass
<i>Dichanthelium oligosanthes</i> (J.A.Schultes) Gould var. <i>scribnerianum</i> (Nash) Gould (= <i>Panicum</i>	

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<i>oligosanthes</i> var. <i>scribnerianum</i> , <i>P. scribnerianum</i>)	Scribner's Panic Grass	
<i>Dichanthelium sabulorum</i> (Lam.) Gould & C.A.Clark var. <i>thinium</i> (A.Hitchc. & Chase) Gould & C.A.Clark (= <i>Panicum columbianum</i>)	American Panic Grass	
<i>Dichanthelium sphaerocarpon</i> (Elliott) Gould var. <i>sphaerocarpo</i> (= <i>Panicum sphaerocarpon</i>)	Round-Fruited Panic Grass	
<i>Digitaria ischaemum</i> (Schreb.) Schreb. ex Muhl. var. <i>ischaemum</i>	Smooth Crabgrass	
<i>Digitaria sanguinalis</i> (L.) Scop.	Tall Crabgrass	
<i>Echinochloa muricata</i> (Beauv.) Fernald var. <i>muricata</i>	Barnyard Grass	
<i>Eragrostis capillaris</i> (L.) Nees	Lacegrass	WL
<i>Eragrostis pectinacea</i> (Michx.) Nees	Comb-Like Lovegrass	
<i>Eragrostis spectabilis</i> (Pursh) Steud.	Purple Lovegrass	
<i>Festuca arundinacea</i> Schreb. (= <i>F. elatior</i>)	Reed Fescue	
<i>Festuca rubra</i> L. var. <i>commutata</i> Gaudin	Chewing's Fescue	
<i>Festuca rubra</i> L. var. <i>rubra</i>	Red Fescue	
<i>Festuca tenuifolia</i> Sibth. (= <i>F. capillata</i>)	Hair Fescue	
<i>Glyceria acutiflora</i> Torr.	Sharp-Scaled Mannagrass	
<i>Glyceria canadensis</i> (Michx.) Trin. var. <i>canadensis</i>	Rattlesnake Grass	
<i>Glyceria obtusa</i> (Muhl.) Trin.	Blunt Mannagrass	
<i>Glyceria striata</i> (Lam.) A.Hitchc. var. <i>striata</i>	Fowl Mannagrass	
<i>Leersia oryzoides</i> (L.) Swartz	Rice Cutgrass	
<i>Leersia virginica</i> Willd. var. <i>ovata</i> (Poir.) Fernald	White Grass	
<i>Lolium perenne</i> L. var. <i>multiflorum</i> (Lam.) R.Parnell (= <i>L. multiflorum</i>)	Awed Ryegrass	
<i>Lolium perenne</i> L. var. <i>perenne</i>	Perennial Ryegrass	
<i>Muhlenbergia frondosa</i> (Poir.) Fernald	Wirestem Muhly	
<i>Muhlenbergia mexicana</i> (L.) Trin.	Satingrass	
<i>Muhlenbergia schreberi</i> J.F.Gmel. var. <i>schreberi</i>	Nimblewill	
<i>Muhlenbergia uniflora</i> (Muhl.) Fernald	One-Flowered Muhly	
<i>Panicum capillare</i> L. var. <i>capillare</i>	Witchgrass	
<i>Panicum dichotomiflorum</i> Michx. var. <i>dichotomiflorum</i>	Common Smooth Panic Grass	
<i>Panicum dichotomiflorum</i> Michx. var. <i>geniculatum</i> (A.Wood) Fernald	Bent Smooth Panic Grass	
<i>Panicum philadelphicum</i> Bernh. ex Nees var. <i>philadelphicum</i>	Philadelphia Panic-grass (Wood Witchgrass)	SC
<i>Panicum rigidulum</i> Bosc ex Nees (= <i>P. agrostoides</i>)	Red Top Panic Grass	
<i>Paspalum setaceum</i> Michx. var. <i>muhlenbergii</i> (Nash) D.Banks (= <i>P. ciliatifolium</i> var. <i>muhlenbergii</i> , <i>P. pubescens</i>)	Slender Beadgrass	
<i>Phalaris arundinacea</i> L. (= <i>P. arundinacea</i> var. <i>picta</i>)	Reed Canary Grass	
<i>Phleum pratense</i> L. var. <i>nodosum</i> (L.) Huds.	Knotty Timothy	
<i>Phleum pratense</i> L. var. <i>pratense</i>	Common Timothy	
<i>Phragmites australis</i> (Cav.) Trin. ex Steud. (= <i>P. communis</i>)	Common Reed	
<i>Poa angustifolia</i> L.	Slender-Leaved Bluegrass	
<i>Poa annua</i> L. var. <i>annua</i>	Annual Bluegrass	
<i>Poa compressa</i> L.	Canada Bluegrass	
<i>Poa pratensis</i> L.	Kentucky Bluegrass	
<i>Puccinellia fernaldii</i> (A.Hitchc.) E.G.Voss		

(= <i>Glyceria fernaldii</i>)	Fernald's Mannagrass
<i>Schizachyrium scoparium</i> (Michx.) Nash	
(= <i>Andropogon scoparius</i>) var. <i>frequens</i> (F.T.Hubb.)	
Gould (= <i>A. scoparius</i> var. <i>septentrionalis</i>)	Frequent Little Bluestem
<i>Schizachyrium scoparium</i> (Michx.) Nash	
(= <i>Andropogon scoparius</i>) var. <i>scoparium</i>	Common Little Bluestem
<i>Secale cereale</i> L.	Rye
<i>Setaria glauca</i> (L.) Beauv. (= <i>S. lutescens</i>)	Yellow Foxtail
<i>Setaria viridis</i> (L.) Beauv.	Green Foxtail
<i>Spartina pectinata</i> Link var. <i>pectinata</i>	Prairie Cordgrass

Iridaceae

<i>Iris X germanica</i> L.	Fleur-de-Lis
<i>Iris pseudacorus</i> L.	Yellow Iris
<i>Iris versicolor</i> L.	Blue Flag
<i>Sisyrinchium atlanticum</i> Bickn.	Eastern Blue-Eyed Grass
<i>Sisyrinchium montanum</i> Greene	Montane Blue-Eyed Grass

Juncaceae

<i>Juncus brevicaudatus</i> Anon.	Narrow-Panicled Rush
<i>Juncus bufonius</i> L. var. <i>bufonius</i>	Toad Rush
<i>Juncus canadensis</i> J.Gay	Marsh Rush
<i>Juncus effusus</i> L. var. <i>solutus</i> Fernald & Wiegand	Soft Rush
<i>Juncus greenii</i> Oakes & Tuckerman	Greene's Rush
<i>Juncus marginatus</i> Rostk. var. <i>marginatus</i>	Grass Rush
<i>Juncus pelocarpus</i> E.Meyer	Brown-Fruited Rush
<i>Juncus secundus</i> Beauv.	Secund Rush
<i>Juncus tenuis</i> Willd. var. <i>tenuis</i> (= <i>J. tenuis</i> var. <i>antholatus</i>)	Path Rush
<i>Luzula multiflora</i> (Ehrh. ex Hoffm.) Lej. (= <i>L. campestris</i> var. <i>multiflora</i>)	Field Woodrush

Lemnaceae

<i>Lemna minor</i> L.	Lesser Duckweed
<i>Spirodela polyrhiza</i> (L.) Schleid.	Giant Duckweed
<i>Wolffia columbiana</i> Karst.	Watermeal

Liliaceae (includes Smilacaceae)

<i>Asparagus officinalis</i> L.	Asparagus
<i>Clintonia borealis</i> (Ait.) Raf.	Corn Lily
<i>Convallaria majalis</i> L. var. <i>majalis</i>	Lily-of-the-Valley
<i>Erythronium umbilicatum</i> C.R.Parks & J.W.Hardin (= <i>E. americanum</i>)	Trout Lily
<i>Hemerocallis fulva</i> (L.) L.	Yellow Day Lily
<i>Hemerocallis lilioasphodelus</i> L. (= <i>H. flava</i>)	Orange Day Lily
<i>Hosta ventricosa</i> (Salisb.) Stearn	Plantain Lily
<i>Lilium canadense</i> L. subsp. <i>canadense</i>	Canada Lily
<i>Lilium tigrinum</i> Ker-Gawl.	Tiger Lily
<i>Maianthemum canadense</i> Desf. var. <i>canadense</i>	False Lily-of-the-Valley

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<i>Medeola virginiana</i> L.	Indian Cucumber Root
<i>Muscari botryoides</i> (L.) Mill.	Grape Hyacinth
<i>Ornithogalum umbellatum</i> L.	Star-of-Bethlehem
<i>Polygonatum biflorum</i> (Walter) Elliott var. <i>biflorum</i>	Common Solomon's Seal
<i>Polygonatum pubescens</i> (Willd.) Pursh	Hairy Solomon's Seal
<i>Scilla nonscripta</i> (L.) Hoffmanns. & Link (= <i>Endymion non-scriptus</i>)	English Bluebell
<i>Smilacina racemosa</i> (L.) Desf. var. <i>cylindrata</i> Fernald	Cylindrical False Solomon's Seal
<i>Smilacina racemosa</i> (L.) Desf. var. <i>racemosa</i>	Common False Solomon's Seal
<i>Smilax herbacea</i> L.	Carion Flower
<i>Smilax rotundifolia</i> L. var. <i>rotundifolia</i>	Common Greenbrier
<i>Trillium cernuum</i> L.	Nodding Trillium
<i>Uvularia sessilifolia</i> L.	Sessile-Leaved Bellwort
<i>Yucca filamentosa</i> L. var. <i>smalliana</i> (Fernald) H.E.Ahles	Spanish Bayonet
Orchidaceae	
<i>Cypripedium acaule</i> Ait.	Pink Lady's Slipper
<i>Epipactis helleborine</i> (L.) Crantz	Helleborine
<i>Goodyera pubescens</i> (Willd.) R.Br.	Downy Rattlesnake Plantain
<i>Goodyera tessellata</i> Loddig.	Checkered Rattlesnake Plantain
<i>Platanthera grandiflora</i> (Bigel.) Lindl. (= <i>Habenaria fimbriata</i> , <i>P. fimbriata</i>)	Large Purple Fringed Orchid
<i>Platanthera lacera</i> (Michx.) G.Don (= <i>Habenaria lacera</i>)	Ragged Fringed Orchid
<i>Spiranthes cernua</i> (L.) L.C.Rich.	Nodding Lady's Tresses
Pontederiaceae	
<i>Pontedaria cordata</i> L. var. <i>cordata</i>	Pickerelweed
Potamogetonaceae (= Zosteraceae)	
<i>Potamogeton diversifolius</i> Raf. (= <i>P. capillaceus</i>)	Rafinesque's Pondweed
<i>Potamogeton pusillus</i> L. var. <i>pusillus</i> (= <i>P. pusillus</i> var. <i>minor</i>)	Small Pondweed
<i>Potamogeton spirillus</i> Tuckerman (= <i>P. dimorphus</i>)	Spiral Pondweed
Sparganiaceae	
<i>Sparganium americanum</i> Nutt.	Nuttall's Bur-Reed
Typhaceae	
<i>Typha X glauca</i> Godr.	Glaucous Cattail
<i>Typha latifolia</i> L.	Broad-Leaf Cattail
Ulmaceae (= Celtidaceae)	
<i>Ulmus americana</i> L.	American Elm

Ulmus glabra Huds.
Ulmus parvifolia Jacq.

Witch Elm
 Chinese Elm

Xyridaceae

Xyris torta J.E.Smith

Slender Yellow-Eyed Grass

DICOTYLEDONEAE (Dicots)

Aceraceae

Acer platanoides
Acer rubrum rubrum var. *rubrum*
Acer saccharum Marshall subsp.
saccharum var. *saccharum*

Norway Maple
 Red Maple
 Sugar Maple

Aizoaceae (includes Molluginaceae)

Mollugo verticillata L.

Carpetweed

Amaryllidaceae

Hypoxis hirsuta (L.)
Narcissus poeticus L.
Narcissus pseudonarcissus L.

Coville Stargrass
 Poet's Narcissus
 Daffodil

Anacardiaceae

Rhus copallinum L. var. *copallinum*
Rhus glabra L.
Rhus typhina L.
Toxicodendron radicans (L.) Kuntze
 (= *Rhus radicans*)
Toxicodendron vernix (L.) Kuntze (= *Rhus vernix*)

Winged Sumac
 Smooth Sumac
 Staghorn Sumac
 Poison Ivy
 Poison Sumac

Apocynaceae

Apocynum androsaemifolium L.
Apocynum cannabinum L.
Vinca minor L.

Spreading Dogbane
 Indian Hemp
 Common Periwinkle

Aquifoliaceae

Ilex laevigata (Pursh) Gray
Ilex verticillata (L.) Gray
Nemopanthus mucronatus (L.) Trelease

Smooth Winterberry
 Common Winterberry
 Mountain Holly

Araliaceae

Aralia hispida Ventenat
Aralia nudicaulis L.

Bristly Sarsaparilla
 Wild Sarsaparilla

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Hedera helix L.

English Ivy

Asclepiadaceae

Asclepias exaltata L.

Poke Milkweed

Asclepias incarnata L. var. *pulchra* (Ehrh.) Pers.

Swamp Milkweed

Asclepias syriaca L. var. *syriaca*

Common Milkweed

Cynanchum nigrum (L.) Pers.

Black Swallowwort

Balsaminaceae

Impatiens capensis Meerb.

Spotted Touch-Me-Not

Berberidaceae

Berberis thunbergii DC.

Japanese Barberry

Berberis vulgaris L.

Common Barberry

Betulaceae (= Corylaceae)

Alnus rugosa (DuRoi) Spreng.

Speckled Alder

Alnus serrulata (Dryand. in Ait.) Willd.

Smooth Alder

Betula alleghaniensis Britton (= *B. lutea*)

Yellow Birch

Betula lenta L.

Black Birch

Betula papyrifera Marshall var. *papyrifera*

Paper Birch

Betula populifolia Marshall

Gray Birch

Corylus americana Walter var. *americana*

American Hazelnut

Bignoniaceae

Campsis radicans (L.) Seem.

Trumpet Creeper

Catalpa speciosa (Warder ex Barney)

Catawba Tree

Warder ex Engelm

Boraginaceae

Myosotis scorpioides L.

True Forget-Me-Not

Campanulaceae (includes Lobeliaceae)

Campanula aparinoides Pursh

Marsh Bellflower

Campanula rapunculoides L.

Creeping Bellflow

Lobelia cardinalis L. subsp. *cardinalis* var. *cardinalis*

Cardinal Flower

Lobelia inflata L.

Indian Tobacco

Lobelia spicata Lam. var. *spicata*

Pale-Spiked Lobelia

Caprifoliaceae

Diervilla lonicera Mill.

Bush Honeysuckle

Lonicera X bella Zabel

Bella Honeysuckle

Lonicera japonica Thunb.

Japanese Honeysuckle

Lonicera morrowii Gray

Morrow Honeysuckle

<i>Sambucus canadensis</i> L. var. <i>canadensis</i>	Black Elderberry	
<i>Viburnum acerifolium</i> L.	Maple-Leaf Viburnum	
<i>Viburnum cassinoides</i> L.	Wild Raisin	
<i>Viburnum lentago</i> L.	Nannyberry	
<i>Viburnum recognitum</i> Fernald var. <i>recognitum</i>	Arrowwood	
Caryophyllaceae		
<i>Cerastium semidecandrum</i> L.	Small Mouse-Ear Chickweed	
<i>Cerastium vulgatum</i> L.	Common Mouse-Ear Chickweed	
<i>Dianthus armeria</i> L.	Deptford Pink	
<i>Gypsophila muralis</i> L.	Baby's Breath	
<i>Saponaria officinalis</i> L.	Bouncing Bet	
<i>Silene pratensis</i> (Rafn) Gren. & Godr. (= <i>Lychnis alba</i>)	White Campion	
<i>Spergularia rubra</i> (L.) J. & K. Presl	Common Sand Spurry	
<i>Stellaria calycantha</i> (Ledeb.) Bong. (= <i>S. borealis</i>)	Northern Starwort	WL
<i>Stellaria graminea</i> L.	Common Stitchwort	
<i>Stellaria media</i> (L.) Villars	Common Chickweed	
Celastraceae		
<i>Celastrus orbiculata</i> Thunb.	Asiatic Bittersweet	
<i>Celastrus scandens</i> L.	American Bittersweet	
<i>Euonymus alatus</i> (Thunb.) Siebold	Winged Spindle Tree	
Ceratophyllaceae		
<i>Ceratophyllum demersum</i> L.	Coontail	
Chenopodiaceae		
<i>Chenopodium album</i> L. var. <i>album</i>	Lamb's-Quarters	
<i>Chenopodium album</i> L. var. <i>lanceolatum</i> (Muhl. ex Willd.) Coss. & Germ. (= <i>C. lanceolatum</i>)	Lanceolate Pigweed	
Cistaceae		
<i>Helianthemum bicknellii</i> Fernald	Hoary Frostweed	
<i>Helianthemum canadense</i> (L.) Michx.	Long-Branched Frostweed	
<i>Lechea intermedia</i> Leggett ex Britton	Large-Podded Pinweed	
<i>Lechea maritima</i> Leggett ex B.S.P. var. <i>maritima</i>	Beach Pinweed	
<i>Lechea tenuifolia</i> Michx. var. <i>tenuifolia</i>	Slender Pinweed	
<i>Lechea villosa</i> Elliott	Hairy Pinweed	
Clethraceae		
<i>Clethra alnifolia</i> L. var. <i>alnifolia</i>	Sweet Pepperbush	
Compositae (= Asteraceae)		
<i>Achillea millefolium</i> L.	Common Yarrow	

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<i>Ambrosia artemisiifolia</i> L. var. <i>elatior</i> (L.) Descourt.	Ragweed	
<i>Anaphalis margaritacea</i> (L.) Benth. & J.D.Hook var. <i>margaritacea</i>	Pearly Everlasting	
<i>Antennaria neglecta</i> Greene var. <i>attenuata</i> (Fernald) Cronq. (= <i>A. brainerdii</i> , <i>A. neodioica</i>)	Attenuate Pussytoes	
<i>Antennaria neglecta</i> Greene var. <i>randii</i> (Fernald) Cronq. (= <i>A. canadensis</i>)	Rand's Pussytoes	
<i>Arctium minus</i> Bernh.	Common Burdock	
<i>Artemisia vulgaris</i> L.	Common Mugwort	
<i>Aster acuminatus</i> Michx.	Whorled Wood Aster	
<i>Aster cordifolius</i> L. var. <i>cordifolius</i>	Blue Wood Aster	
<i>Aster divaricatus</i> L.	White Wood Aster	
<i>Aster dumosus</i> L. var. <i>dumosus</i>	Bushy Aster	
<i>Aster ericoides</i> L. var. <i>ericoides</i>	Heath Aster	
<i>Aster lateriflorus</i> (L.) Britton var. <i>pendulus</i> (Ait.) Burgess	Calico Aster	
<i>Aster linariifolius</i> L.	Stiff-Leaf Aster	
<i>Aster macrophyllus</i> L.	Big-Leaf Aster	
<i>Aster novae-angliae</i> L.	New England Aster	
<i>Aster novi-belgii</i> L. var. <i>novi-belgii</i>	New York Aster	
<i>Aster puniceus</i> L. var. <i>puniceus</i>	Purple-Stemmed Aster	
<i>Aster umbellatus</i> Mill. var. <i>umbellatus</i>	Flat-Top White Aster	
<i>Aster undulatus</i> L.	Wavy-Leaf Aster	
<i>Aster vimineus</i> Lam. var. <i>vimineus</i>	Small White Aster	
<i>Bidens cernua</i> L. var. <i>cernua</i>	Bur Marigold	
<i>Bidens connata</i> Muhl. ex Willd. var. <i>petiolata</i> (Nutt.) Farw.	Swamp Beggar-Ticks	
<i>Bidens discoidea</i> (Torr. & Gray) Britton	Small Beggar-Ticks	WL
<i>Bidens frondosa</i> L. var. <i>frondosa</i>	Common Beggar-Ticks	
<i>Bidens tripartita</i> L.	European Beggar-Ticks	
<i>Centaurea maculosa</i> Lam.	Spotted Knapweed	
<i>Cichorium intybus</i> L.	Chicory	
<i>Cirsium vulgare</i> (Savi) Tenore	Bull Thistle	
<i>Conyza canadensis</i> (L.) Cronq. var. <i>canadensis</i> (= <i>Erigeron canadensis</i>)	Horseweed	
<i>Erechtites hieraciifolia</i> (L.) Raf. ex DC. var. <i>hieraciifolia</i>	Pilewort	
<i>Erigeron annuus</i> (L.) Pers.	Annual Daisy Fleabane	
<i>Erigeron pulchellus</i> Michx. var. <i>pulchellus</i>	Robin's Plantain	
<i>Erigeron strigosus</i> Muhl. ex Willd. var. <i>strigosus</i>	Strigose Daisy Fleabane	
<i>Eupatoriadelphus dubius</i> (Willd. Ex Poir.) R.M.King & H. Rob (= <i>Eupatorium dubium</i>)	Purple Boneset	
<i>Eupatorium perfoliatum</i> L. var. <i>perfoliatum</i>	Thoroughwort	
<i>Filaginella uliginosa</i> (L.) Opiz (= <i>Gnaphalium uliginosum</i>)	Low Cudweed	
<i>Galinsoga quadriradiata</i> Ruiz & Pavon (= <i>G. ciliata</i>)	Ciliate Quickweed	
<i>Gnaphalium obtusifolium</i> L. var. <i>obtusifolium</i>	Sweet Everlasting	
<i>Hieracium aurantiacum</i> L.	Orange Hawkweed	
<i>Hieracium canadense</i> Michx. var. <i>fasciculatum</i> (Pursh) Fernald (= <i>H. kalmii</i>)	Canada Hawkweed	
<i>Hieracium flagellare</i> Willd.	Whiplash Hawkweed	
<i>Hieracium florentinum</i> All. (= <i>H. piloselloides</i>)	King Devil	

<i>Hieracium paniculatum</i> L.	Panicled Hawkweed	
<i>Hieracium pilosella</i> L.	Mouse-Ear Hawkweed	
<i>Hieracium pratense</i> Tausch	Field Hawkweed	
<i>Hieracium scabrum</i> Michx. var. <i>scabrum</i>	Rough Hawkweed	
<i>Krigia virginica</i> (L.) Willd.	Dwarf Dandelion	
<i>Lactuca biennis</i> (Moench) Fernald	Blue Lettuce	
<i>Lactuca canadensis</i> L. var. <i>latifolia</i> Kuntze	Wild Lettuce	
<i>Leontodon autumnalis</i> L. var. <i>autumnalis</i>	Fall Dandelion	
<i>Leucanthemum vulgare</i> Lam. (= <i>Chrysanthemum leucanthemum</i>)	Ox-Eye Daisy	
<i>Liatris borealis</i> Nutt.	New England Blazing Star	SC
<i>Matricaria chamomilla</i> L.	Wild Chamomile	
<i>Prenanthes trifoliata</i> (Cass.) Fernald var. <i>trifoliata</i>	Gall-of-the-Earth	
<i>Rudbeckia serotina</i> Nutt. non Sweet var. <i>serotina</i>	Black-Eyed Susan	
<i>Senecio aureus</i> L.	Golden Ragwort	
<i>Solidago bicolor</i> L.	White Goldenrod	
<i>Solidago caesia</i> L.	Blue-Stem Goldenrod	
<i>Solidago canadensis</i> L. var. <i>canadensis</i>	Canada Goldenrod	
<i>Solidago gigantea</i> Ait. var. <i>gigantea</i>	Common Late Goldenrod	
<i>Solidago juncea</i> Ait.	Early Goldenrod	
<i>Solidago nemoralis</i> Ait. var. <i>nemoralis</i>	Gray Goldenrod	
<i>Solidago nuttallii</i> Greene (= <i>S. graminifolia</i> var. <i>nuttallii</i>)	Nuttall's Flat-Top Goldenrod	
<i>Solidago odora</i> Ait. var. <i>odora</i>	Sweet Goldenrod	
<i>Solidago puberula</i> Nutt. var. <i>puberula</i>	Downy Goldenrod	
<i>Solidago rugosa</i> Mill. subsp. <i>Aspera</i> var. <i>villosa</i> (Pursh) Fernald	Villose Rough Goldenrod	
<i>Solidago rugosa</i> Mill. subsp. <i>Rugosa</i> var. <i>rugosa</i>	Common Rough Goldenrod	
<i>Solidago uliginosa</i> Nutt. var. <i>uliginosa</i>	Swamp Goldenrod	
<i>Tanacetum vulgare</i> L.	Tansy	
<i>Taraxacum officinale</i> G.H.Weber	Common Dandelion	
<i>Tragopogon dubius</i> Scop.	Goat's Beard	
<i>Tussilago farfara</i> L.	Coltsfoot	
Convolvulaceae (includes Cuscutaceae)		
<i>Calystegia sepium</i> (L.) R.Br. subsp. <i>Sepium</i> (= <i>Convolvulus sepium</i>)	Hedge Bindweed	
<i>Cuscuta cephalanthi</i> Engelm.	Buttonbush Dodder	
<i>Cuscuta compacta</i> Juss. ex Choisy var. <i>compacta</i>	Compact Dodder	
<i>Cuscuta gronovii</i> Willd. ex J.A.Schultes var. <i>gronovii</i>	Gronovious' Dodder	
Cornaceae (includes Nyssaceae)		
<i>Cornus alternifolia</i> L.F.	Alternate-Leaved Dogwood	
<i>Cornus amomum</i> Mill. subsp. <i>amomum</i>	Silky Dogwood	
<i>Cornus canadensis</i> L.	Bunchberry	
<i>Cornus florida</i> L.	Flowering Dogwood	
<i>Cornus foemina</i> Mill. subsp. <i>racemosa</i> (Lam.) J.S.Wilson (= <i>C. racemosa</i>)	Gray Dogwood	
<i>Nyssa sylvatica</i> Marshall var. <i>sylvatica</i>	Black Gum	

Appendix D: Species Lists

Crassulaceae

<i>Sedum purpureum</i> (L.) J.A.Schultes	Purple Live-Forever
<i>Sedum spurium</i> M.Bieb.	Two-Row Stonecrop

Cruciferae (= Brassicaceae)

<i>Barbarea vulgaris</i> R.Br. in W.T.Ait.	Yellow Cress
<i>Cardamine pensylvanica</i> Muhl. ex Willd. var. <i>pensylvanica</i>	Pennsylvania Bittercress
<i>Erysimum cheiranthoides</i> L. subsp. <i>Cheiranthoides</i>	Wormseed Mustard
<i>Lepidium campestre</i> (L.) R.Br. in W.T.Ait.	Cow Cress
<i>Lepidium densiflorum</i> Schrad. var. <i>densiflorum</i>	Bird's Peppergrass
<i>Lepidium virginicum</i> L. var. <i>virginicum</i>	Wild Peppergrass

Droseraceae

<i>Drosera intermedia</i> Hayne	Narrow-Leaf Sundew
<i>Drosera rotundifolia</i> L. var. <i>rotundifolia</i>	Round-Leaf Sundew

Elaeagnaceae

<i>Elaeagnus umbellata</i> Thunb.	Asiatic Silverberry
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Ericaceae

<i>Chamaedaphne calyculata</i> (L.) Moench	Leatherleaf
<i>Epigaea repens</i> L.	Trailing Arbutus
<i>Gaultheria procumbens</i> L.	Wintergreen
<i>Gaylussacia baccata</i> (Wangenh.) K.Koch	Black Huckleberry
<i>Gaylussacia frondosa</i> (L.) Torr. & Gray var. <i>frondosa</i>	Dangleberry
<i>Kalmia angustifolia</i> L.	Sheep Laurel
<i>Kalmia latifolia</i> L.	Mountain Laurel
<i>Leucothoe racemosa</i> (L.) Gray	Swamp Sweetbells
<i>Lyonia ligustrina</i> (L.) DC. var. <i>ligustrina</i>	Maleberry
<i>Rhododendron canadense</i> (L.) B.S.P.	Rhodora
<i>Rhododendron viscosum</i> (L.) Torr. var. <i>viscosum</i>	Swamp Azalea
<i>Vaccinium angustifolium</i> Ait.	Late Lowbush Blueberry
<i>Vaccinium corymbosum</i> L. (= <i>V. atrococcum</i>)	Highbush Blueberry
<i>Vaccinium macrocarpon</i> Ait.	Large Cranberry
<i>Vaccinium oxycoccos</i> L.	Small Cranberry
<i>Vaccinium vacillans</i> Torr. var. <i>vacillans</i>	Early Lowbush Blueberry

Euphorbiaceae

<i>Acalypha rhomboidea</i> Raf. Rhombic	Three-Seeded Mercury
<i>Euphorbia cyparissias</i> L.	Cypress Spurge
<i>Euphorbia maculata</i> L. (= <i>E. supina</i> , <i>Chamaesyce maculata</i>)	Spotted Spurge

Fagaceae

Castanea dentata (Marshall) Borkh.
Fagus grandifolia Ehrh.
Fagus sylvatica L.
Quercus alba L.
Quercus bicolor Willd.
Quercus coccinea Muenchh.
Quercus ilicifolia Wangenh.
Quercus prinoides Willd.
Quercus rubra L.
Quercus velutina Lam.

American Chestnut
 American Beech
 European Beech
 White Oak
 Swamp White Oak
 Scarlet Oak
 Scrub Oak
 Dwarf Chestnut Oak
 Red Oak
 Black Oak

Gentianaceae

Bartonia virginica (L.) B.S.P.

Bartonia

Geraniaceae

Geranium maculatum L.

Wild Geranium

Guttiferae (= Hypericaceae, Clusiaceae)

Hypericum boreale (Britton) Bickn.
Hypericum canadense L.
Hypericum dissimulatum Bickn.
Hypericum ellipticum Hook.
Hypericum gentianoides (L.) B.S.P.
Hypericum mutilum L.
Hypericum perforatum L.
Hypericum punctatum Lam.
Triadenum virginianum (L.)
 Raf. (= *Hypericum virginianum*)

Northern St. John's-Wort
 Common Canadian St. John's-Wort
 Disguised St. John's-Wort
 Pale St. John's-Wort
 Pineweed
 Dwarf St. John's-Wort
 Common St. John's Wort
 Spotted St. John's Wort

 Common Marsh St. John's-Wort

Halorrhagidaceae (includes Myriophyllaceae)

Myriophyllum humile (Raf.) Morong
Proserpinaca palustris L.
 var. *crebra* Fernald & Griscom

Low Water Milfoil

 Mermaid Weed

Hamamelidaceae

Hamamelis virginiana L.

Witch Hazel

Hippocastanaceae

Aesculus hippocastanum L.

Horsechestnut

Juglandaceae

Carya glabra (Mill.) Sweet var. *glabra*
Carya ovalis (Wangenh.) Sarg. var. *ovalis*
Carya ovata (Mill.) K.Koch var. *ovata*
Juglans cinerea L.

Common Pignut Hickory
 Sweet Pignut Hickory
 Shagbark Hickory
 Butternut

Appendix D: Species Lists

Labiatae (= Lamiaceae)

<i>Ajuga reptans</i> L.	Bugle
<i>Glechoma hederacea</i> L.	Ground Ivy
<i>Lamium purpureum</i> L.	Purple Dead-Nettle
<i>Leonurus cardiaca</i> L.	Motherwort
<i>Lycopus americanus</i> Muhl. ex W.Barton	
var. <i>americanus</i>	Cut-Leaved Water Horehound
<i>Lycopus uniflorus</i> Michx.	Northern Water Horehound
<i>Lycopus virginicus</i> L.	Bugleweed
<i>Mentha arvensis</i> L. var. <i>glabrata</i> (Benth.) Fernald	
(= <i>M. arvensis</i> var. <i>villosa</i> f. <i>glabrata</i>)	Glabrate Field Mint
<i>Prunella vulgaris</i> L. subsp. <i>lanceolata</i> (W.Barton)	
Hulten (= <i>P. vulgaris</i> var. <i>lanceolata</i>)	Lanceolate Heal-All
<i>Prunella vulgaris</i> L. subsp. <i>Vulgaris</i>	
(= <i>P. vulgaris</i> var. <i>vulgaris</i>)	Common Heal-All
<i>Pycnanthemum muticum</i> (Michx.) Pers.	Short Toothed Mountain Mint
<i>Pycnanthemum tenuifolium</i> Schrad.	Narrow-Leaved Mountain Mint
<i>Scutellaria galericulata</i> L.	
var. <i>galericulata</i> (= <i>S. epilobifolia</i>)	Common Skullcap
<i>Scutellaria laterifolia</i> L.	Mad-Dog Skullcap
<i>Thymus serpyllum</i> L.	Wild Thyme
<i>Trichostema dichotomum</i> L.	Blue Curls

Lauraceae

<i>Sassafras albidum</i> (Nutt.) Nees	Sassafras
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Leguminosae (= Fabaceae; includes Caesalpiniaceae, Papilionaceae)

<i>Amphicarpaea bracteata</i> (L.) Fernald var. <i>bracteata</i>	Hog Peanut
<i>Apios americana</i> Medik. var. <i>americana</i>	Groudnut
<i>Baptisia tinctoria</i> (L.) R.Br. var. <i>tinctoria</i>	Wild Indigo
<i>Desmodium canadense</i> (L.) DC.	Giant Tick Trefoil
<i>Desmodium dillenii</i> Darl.	Dillen's Tick Trefoil
<i>Desmodium glutinosum</i> (Muhl. ex Willd.) A.Wood	Sticky Tick Trefoil
<i>Desmodium paniculatum</i> (L.) DC. var. <i>paniculatum</i>	Panieled Tick Trefoil
<i>Lespedeza capitata</i> Michx.	Round-Headed Bush Clover
<i>Lespedeza hirta</i> (L.) Hornem. subsp. <i>Hirta</i>	Hairy Bush Clover
<i>Medicago sativa</i> L.	Alfalfa
<i>Melilotus alba</i> Medik.	White Sweet Clover
<i>Robinia hispida</i> L.	Bristly Locust
<i>Robinia pseudo-acacia</i> L. var. <i>pseudo-acacia</i>	Black Locust
<i>Tephrosia virginiana</i> (L.) Pers. var. <i>virginiana</i>	Goat's-Rue
<i>Trifolium arvense</i> L.	Rabbit's-Foot Clover
<i>Trifolium aureum</i> Pollich (= <i>T. agrarium</i>)	Yellow Clover
<i>Trifolium dubium</i> Sibth.	Least Hop Clover
<i>Trifolium hybridum</i> L.	Alsike Clover
<i>Trifolium pratense</i> L.	Red Clover
<i>Trifolium repens</i> L.	White Clover
<i>Vicia cracca</i> L.	Cow Vetch

Vicia tetrasperma (L.) Moench

Lentil Vetch

Wisteria macrostachya (Torr. & Gray) Nutt.
ex B.Rob & Fernald

Kentucky Wisteria

Lentibulariaceae

Utricularia gibba L.

Cone-Spur Bladderwort

Utricularia intermedia Hayne

Flat-Leaved Bladderwort

Utricularia macrorhiza Leconte (= *U. vulgaris*)

Common Bladderwort

Utricularia purpurea Walter

Purple Bladderwort

Utricularia radiata

Small Floating Bladderwort

Lythraceae

Decodon verticillatus (L.) Elliott

Water Willow

Lythrum salicaria L.

Purple Loosestrife

Melastomataceae

Rhexia virginica L.

Meadow-Beauty

Moraceae (includes Cannabaceae)

Humulus japonicus Siebold & Zuccar.

Japanese Hops

Morus alba L.

White Mulberry

Myricaceae

Myrica asplenifolia L. (= *Comptonia peregrina*)

Sweet Fern

Myrica gale L.

Sweet Gale

Myrica pensylvanica Loiseleur

Northern Bayberry

Nymphaeaceae (includes Cabombaceae)

Brasenia schreberi J.F.Gmel.

Water Shield

Nuphar luteum L.Sibth. & J.E.Smith subsp. *variegatum*

(Engelm. ex G.W.Clinton) E.O.Beal (= *N. variegatum*)

Yellow Lotus

Nymphaea odorata Soland. in Ait. var. *odorata*

White Water Lily

Oleaceae

Forsythia viridissima Lindl.

Golden Bells

Fraxinus americana L.

White Ash

Syringa vulgaris L.

Lilac

Onagraceae

Circaea lutetiana L. subsp. *canadensis* (L.)

Aschers. & Magnus (= *C. quadrisulcata*)

Common Enchanter's Nightshade

Epilobium ciliatum Raf. subsp. *glandulosum*

(Lehm.) P.C.Hoch (= *E. adenocaulon*,

E. glandulosum)

Northern Willow-Herb

Appendix D: Species Lists

<i>Epilobium leptophyllum</i> Raf.	Narrow-Leaved Willow-Herb
<i>Ludwigia palustris</i> (L.) Elliott	Water Purslane
<i>Oenothera biennis</i> L.	Common Evening Primrose
Orobanchaceae	
<i>Orobanche uniflora</i> L. subsp. <i>uniflora</i> var. <i>uniflora</i>	One-Flowered Cancer Root
Oxalidaceae	
<i>Oxalis stricta</i> L. (= <i>O. europea</i>)	Yellow Wood Sorrel
Papaveraceae	
<i>Chelidonium majus</i> L.	Greater Celandine
Phytolaccaceae	
<i>Phytolacca americana</i> L.	Pokeweed
Plantaginaceae	
<i>Plantago aristata</i> Michx.	Bracted Plantain
<i>Plantago lanceolata</i> L.	English Plantain
<i>Plantago major</i> L. var. <i>major</i>	Common Plantain
<i>Plantago rugelii</i> Decne.	Pale Plantain
Polemoniaceae	
<i>Phlox subulata</i> L. var. <i>subulata</i>	Moss Phlox
Polygalaceae	
<i>Polygala paucifolia</i> Willd.	Fringed Milkwort
<i>Polygala sanguinea</i> L.	Field Milkwort
Polygonaceae	
<i>Polygonella articulata</i> (L.) Meisn.	Jointweed
<i>Polygonum arifolium</i> L. var. <i>pubescens</i> (R.Keller) Fernald	Halbeard-Leaved Tearthumb
<i>Polygonum aviculare</i> L.	Prostrate Knotweed
<i>Polygonum careyi</i> Olney	Carey's Pinkweed
<i>Polygonum cuspidatum</i> Siebold & Zuccar.	Japanese Knotweed
<i>Polygonum hydropiper</i> L.	Common Smartweed
<i>Polygonum hydropiperoides</i> Michx.	Mild Water Pepper
<i>Polygonum pennsylvanicum</i> L.	Pennsylvania Pinkweed
<i>Polygonum persicaria</i> L.	Lady's Thumb
<i>Polygonum punctatum</i> Elliott	
var. <i>leptostachyum</i> Small nomen superfl.	Slender-Spiked Dotted Smartweed
<i>Polygonum punctatum</i> Elliott var. <i>punctatum</i>	Common Dotted Smartweed
<i>Polygonum sagittatum</i> L.	Arrow-Leaved Tearthumb

<i>Polygonum scandens</i> L. var. <i>scandens</i>	Climbing False Buckwheat
<i>Rheum rhaponticum</i> L. (= <i>R. rhabarbarum</i>)	Rhubarb
<i>Rumex acetosella</i> L.	Sheep Sorrel
<i>Rumex crispus</i> L.	Curly Dock
<i>Rumex obtusifolius</i> L. subsp. <i>obtusifolius</i>	Bitter Dock
<i>Rumex orbiculatus</i> Gray	Great Water Dock

Primulaceae

<i>Lysimachia ciliata</i> L.	Fringed Loosestrife
<i>Lysimachia hybrida</i> Michx.	Hybrid Loosestrife
<i>Lysimachia nummularia</i> L.	Moneywort
<i>Lysimachia quadrifolia</i> L.	Whorled Loosestrife
<i>Lysimachia terrestris</i> (L.) B.S.P.	Swamp Candles
<i>Trientalis borealis</i> Raf.	Starflower

Pyrolaceae (includes Monotropaceae)

<i>Chimaphila maculata</i> (L.) Pursh var. <i>maculata</i>	Spotted Wintergreen
<i>Chimaphila umbellata</i> (L.) W.Barton	
var. <i>cisatlantica</i> Blake	Pipsissewa
<i>Hypopitys monotropa</i> Crantz	
(= <i>Hypopithys monotropa</i> , <i>Monotropa hypopitys</i>)	Pinesap
<i>Monotropa uniflora</i> L.	Indian Pipe
<i>Pyrola chlorantha</i> Swartz (= <i>P. virens</i>)	Greenish-Flowered Wintergreen
<i>Pyrola elliptica</i> Nutt.	Shinleaf
<i>Pyrola rotundifolia</i> L.	
var. <i>americana</i> (Sweet) Fernald (= <i>P. americana</i>)	Round-Leaf American Wintergreen

Ranunculaceae

<i>Anemone quinquefolia</i> L.	Wood Anemone
<i>Aquilegia canadensis</i> L. var. <i>canadensis</i>	Red Columbine
<i>Caltha palustris</i> L.	Marsh Marigold
<i>Clematis virginiana</i> L.	Virgin's Bower
<i>Coptis trifolia</i> (L.) Salisb. (= <i>C. groenlandica</i>)	Goldthread
<i>Ranunculus acris</i> L.	Common Buttercup
<i>Ranunculus bulbosus</i> L.	Bulbous Buttercup
<i>Ranunculus recurvatus</i> Poir. var. <i>recurvatus</i>	Hooked Buttercup
<i>Ranunculus septentrionalis</i> Poir.	
(= <i>R. hispidus</i> var. <i>caricetorum</i>)	Swamp Buttercup
<i>Thalictrum pubescens</i> Pursh (= <i>T. polygamum</i>)	Tall Meadow Rue
<i>Thalictrum thalictroides</i> (L.) A.Eames & B.Boivin	
(= <i>Anemonella thalictroides</i>)	Rue Anemone

Rhamnaceae

<i>Ceanothus americanus</i> L. var. <i>americanus</i>	New Jersey Tea
<i>Rhamnus cathartica</i> L.	Common Buckthorn
<i>Rhamnus frangula</i> L.	European Buckthorn

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Rosaceae

<i>Agrimonia gryposepala</i> Wallr.	Tall Hairy Agrimony
<i>Amelanchier arborea</i> (Michx.F.) Fernald (= <i>A. laevis</i>)	Shadbush
<i>Amelanchier canadensis</i> (L.) Medik.	Serviceberry
<i>Aronia melanocarpa</i> (Michx.) Elliott (= <i>Pyrus melanocarpa</i>)	Black Chokeberry
<i>Aronia prunifolia</i> (Marshall) Rehd. (= <i>Pyrus floribunda</i>)	Purple Chokeberry
<i>Crataegus flabellata</i> (Bosc ex Spach)	
K.Koch (= <i>C. macrosperma</i>)	Variable Hawthorn
<i>Crataegus succulenta</i> Schrad. ex Link	Long-Spined Hawthorn
<i>Fragaria virginiana</i> Duchesne subsp. <i>virginiana</i> (= <i>F. virginiana</i> var. <i>virginiana</i>)	Wild Strawberry
<i>Geum canadense</i> Jacq.	White Avens
<i>Malus floribunda</i> Siebold ex VanHoutte	Showy Crabapple
<i>Malus pumila</i> (L.) Mill. (= <i>Pyrus malus</i>)	Common Apple
<i>Potentilla argentea</i> L.	Silvery Cinquefoil
<i>Potentilla canadensis</i> L. var. <i>canadensis</i>	Dwarf Cinquefoil
<i>Potentilla norvegica</i> L.	Rough Cinquefoil
<i>Potentilla recta</i> L.	Sulphur Cinquefoil
<i>Potentilla simplex</i> Michx. var. <i>calvescens</i> Fernald	Balding Old-Field Cinquefoil
<i>Potentilla simplex</i> Michx. var. <i>simplex</i>	Common Old-Field Cinquefoil
<i>Prunus americana</i> Marshall	American Plum
<i>Prunus pensylvanica</i> L.F.	Pin Cherry
<i>Prunus persica</i> (L.) Batsch	Peach
<i>Prunus serotina</i> Ehrh. var. <i>serotina</i>	Black Cherry
<i>Prunus virginiana</i> L.	Choke Cherry
<i>Pyrus communis</i> L.	Domestic Pear
<i>Rosa carolina</i> L.	Pasture Rose
<i>Rosa gallica</i> L.	French Rose
<i>Rosa multiflora</i> Thunb.	Multiflora Rose
<i>Rosa palustris</i> Marshall	Swamp Rose
<i>Rosa virginiana</i> Mill.	Wild Rose
<i>Rubus allegheniensis</i> T.Porter var. <i>allegheniensis</i>	Northern Blackberry
<i>Rubus alumnus</i> L.H.Bailey	Nursling Blackberry
<i>Rubus flagellaris</i> Willd.	Prickly Dewberry
<i>Rubus hispidus</i> L. var. <i>obovalis</i> (Michx.) Fernald	Obovate Running Swamp Blackberry
<i>Rubus occidentalis</i> L.	Black Raspberry
<i>Rubus plicatifolius</i> W.H.Blanch.	Plaited-Leaved Dewberry
<i>Rubus pubescens</i> Raf. var. <i>pubescens</i>	Dwarf Raspberry
<i>Rubus strigosus</i> Michx. var. <i>strigosus</i> (= <i>R. idaeus</i> var. <i>strigosus</i>)	Red Raspberry
<i>Rubus trifrons</i> W.H.Blanch.	Three-Leaved Dewberry
<i>Sorbus aucuparia</i> L.	European Mountain Ash
<i>Spiraea latifolia</i> (Ait.) Borkh. var. <i>latifolia</i>	Meadowsweet
<i>Spiraea nipponica</i>	Nippon Spiraea
<i>Spiraea prunifolia</i> Siebold & Zuccar var. <i>prunifolia</i>	Bridal Wreath
<i>Spiraea tomentosa</i> L. var. <i>tomentosa</i>	Steeplebush

Rubiaceae

<i>Cephalanthus occidentalis</i> L.	Buttonbush
<i>Galium aparine</i> L.	Cleavers
<i>Galium asprellum</i> Michx.	Rough Bedstraw
<i>Galium circaeazans</i> Michx. var. <i>hypomalacum</i> Fernald	Wild Licorice
<i>Galium mollugo</i> L.	White Bedstraw
<i>Galium palustre</i> L.	Ditch Bedstraw
<i>Galium tinctorium</i> L. subsp. <i>Tinctorium</i> (= <i>G. tinctorium</i> var. <i>tinctorium</i>)	Wild Madder
<i>Galium triflorum</i> Michx.	Sweet-Scented Bedstraw
<i>Houstonia caerulea</i> L. var. <i>caerulea</i> (= <i>Hedyotis caerulea</i>)	Bluets
<i>Mitchella repens</i> L.	Partridgeberry

Salicaceae

<i>Populus alba</i> L.	White Poplar
<i>Populus deltoides</i> W.Bartram ex Marshall subsp. <i>Deltoides</i> (= <i>P. deltoides</i> var. <i>deltoides</i>)	Cottonwood
<i>Populus grandidentata</i> Michx.	Big-Tooth Aspen
<i>Populus nigra</i> L.	Lombardy Poplar
<i>Populus tremula</i> L. subsp. <i>tremuloides</i> (Michx.) Loeve & Loeve (= <i>P. tremuloides</i> , <i>P. tremula</i> var. <i>tremuloides</i>)	Quaking Aspen
<i>Salix bebbiana</i> Sarg.	Bebb's Willow
<i>Salix discolor</i> Muhl.	Pussy Willow
<i>Salix humilis</i> Marshall	Prairie Willow
<i>Salix nigra</i> Marshall	Black Willow
<i>Salix petiolaris</i> J.E.Smith (= <i>S. gracilis</i>)	Slender Willow
<i>Salix sericea</i> Marshall	Silky Willow
<i>Salix rigida</i> Muhl.	Stiff Willow

Santalaceae

<i>Comandra umbellata</i> (L.) Nutt. subsp. <i>umbellata</i>	Bastard Toadflax
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Sarraceniaceae

<i>Sarracenia purpurea</i> L. var. <i>purpurea</i>	Pitcher Plant
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Saxifragaceae (includes Grossulariaceae, Hydrangeaceae)

<i>Chrysosplenium americanum</i> Schweinitz	Water Carpet
<i>Ribes hirtellum</i> Michx.	Northern Gooseberry

Scrophulariaceae

<i>Agalinis paupercula</i> (Gray) Britton var. <i>paupercula</i> (= <i>Gerardia paupercula</i>)	Small-Flowered Gerardia
<i>Chelone glabra</i> L. var. <i>glabra</i>	Turtleheads
<i>Gratiola aurea</i> Pursh	Golden Hedge Hyssop
<i>Linaria canadensis</i> (L.) Dum.Cours.	Blue Toadflax
<i>Linaria vulgaris</i> Mill.	Butter-and-Eggs

Appendix D: Species Lists

<i>Lindernia dubia</i> (L.) Pennell var. <i>dubia</i>	False Pimpernel
<i>Melampyrum lineare</i> Desr.	
var. <i>americanum</i> (Michx.) Beauverd	Cow Wheat
<i>Mimulus ringens</i> L. var. <i>ringens</i>	Common Monkeyflower
<i>Verbascum thapsus</i> L.	Common Mullein
<i>Veronica arvensis</i> L.	Corn Speedwell
<i>Veronica officinalis</i> L.	Common Speedwell
<i>Veronica scutellata</i> L.	Marsh Speedwell
<i>Veronica serpyllifolia</i> L. subsp. <i>serpyllifolia</i>	Thyme-Leaf Speedwell
Simaroubaceae	
<i>Ailanthus altissima</i> (Mill.) Swingle	Tree-of-Heaven
Solanaceae	
<i>Physalis heterophylla</i> Nees var. <i>ambigua</i> (Gray) Rydb.	Clammy Ground Cherry
<i>Solanum americanum</i> Mill. var. <i>americanum</i>	American Nightshade
<i>Solanum carolinense</i> L. var. <i>carolinense</i>	Horse Nettle
<i>Solanum dulcamara</i> L.	Bittersweet
<i>Solanum nigrum</i> L.	Black Nightshade
Styracaceae	
<i>Halesia carolina</i> L.	Silverbell Tree
Tiliaceae	
<i>Tilia americana</i> L.	American Basswood
Umbelliferae (= Apiaceae)	
<i>Cicuta bulbifera</i> L.	Water Hemlock
<i>Cicuta maculata</i> L.	Spotted Cowbane
<i>Daucus carota</i> L.	Queen Anne's Lace
<i>Hydrocotyle americana</i> L.	Pennywort
<i>Zizia aurea</i> (L.) W.Koch	Golden Alexanders
Urticaceae	
<i>Boehmeria cylindrica</i> (L.) Swartz var. <i>cylindrica</i>	False Nettle
<i>Pilea pumila</i> (L.) Gray	Clearweed
<i>Urtica dioica</i> L. subsp. <i>Dioica</i>	Stinging Nettle
Verbenaceae	
<i>Verbena hastata</i> L. var. <i>hastata</i>	Blue Vervain
<i>Verbena urticifolia</i> L. var. <i>urticifolia</i>	White Vervain
Violaceae	

<i>Viola conspersa</i> Reichenb.	Dog Violet
<i>Viola cucullata</i> Ait.	Common Violet
<i>Viola fimbriatula</i> J.E.Smith	Northern Downy Violet
<i>Viola lanceolata</i> L. subsp. <i>Lanceolata</i> (= <i>V. lanceolata</i> var. <i>lanceolata</i>)	Lance-Leaf Violet
<i>Viola pallens</i> (Banks) Brainerd (= <i>V. macloskeyi</i> var. <i>pallens</i>)	Sweet White Violet
<i>Viola pedata</i> L.	Bird Foot Violet
<i>Viola septentrionalis</i> Greene	Northern Blue Violet

Vitaceae

<i>Parthenocissus quinquefolia</i> (L.) Planch.	Virginia Creeper
<i>Parthenocissus vitacea</i> (Knerr) A.Hitchc. (= <i>P. inserta</i>)	Thicket Creeper
<i>Vitis aestivalis</i> Michx. var. <i>argentifolia</i> (Munson) Fernald	Summer Grape
<i>Vitis labrusca</i> L.	Fox Grape

681	taxa
667	species
8	State Listed species
528	Native (78%)
151	Introduced (22%)
99	Additional Species likely to occur
32	Species uncommon in E.-Central MA

References for Species Lists

- Meyer & Montemerlo 1995 Meyer, Stephen M. and Debbie (Montemerlo) Dineen. *Wildlife Species Observed on the Fort Devens Annex (South): June 24 - July 31, 1995*. Sudbury Conservation Commission.
- Preliminary Proposal 1992 Preliminary Project Proposal, Addition to Great Meadows NWR- Fort Devens Sudbury Annex Maynard, Hudson, Stow, and Sudbury, Massachusetts
- Aneptek, 1991 *Endangered Species Survey: Phase I, An Environmental Inventory of Wildlife Species and Their Habitats*. Aneptek Corporation, Contact No. DAAK6091P2517. December 1991.
- Lockwood 1999 Lockwood, Ron. 1999 Spring/Summer Bird Observations at Fort Devens Sudbury Training Annex.
- Thomas 1992 Thomas, Howard H. , PhD. *Small Mammal Surveys of the Sudbury Training Annex, Sudbury, Middlesex County, Massachusetts and Fort Devens Military Reservation, Lancaster, Worcester County, and Shirley, Middlesex County, Massachusetts*. Fitchburg State College. April - December 1992.
- Mello & Peters 1992 Mello, Mark J. and Edward Peters. Survey of Lepidoptera at Fort Devens with notes on Sudbury Annex. Lloyd Center for Environmental Studies. April - November 1992.
- Hunt 1992 Hunt, David M. *Floristic Survey with Emphasis on Rare Species of the Sudbury Annex of Fort Devens, Massachusetts. November 30, 1992*.
- Baseline Study 1993 *Biological and Endangered Species Baseline Study Fort Devens, Massachusetts*. ABB Environmental Services, Inc. August 1993.

Appendix D: Species Lists

U.S. Army, 1992 Bioaccumulation Study at Puffer Pond, Fort Devens Sudbury Training Annex, Maynard, MA. October. 1994.

Plagge 2000 Observations by Lisa Plagge During 2000 Field Season, Biological Technician at USFWS Great Meadows NWR

Lockwood 2000 Bird and other observations by Ron Lockwood 2000 at Fort Devens Sudbury Training Annex

MDFW, 1997 Massachusetts Division of Fisheries and Wildlife Assabet River Survey, July 1997.

Appendix E: RONS and MMS

The Refuge Operations Needs System (RONS) lists refuge projects over \$20,000. The Management Maintenance System (MMS) identifies maintenance needs on refuges. Projects on both lists are prioritized and initiated as funding becomes available. Funding is allocated through the Service's Northeast Regional Office and is based on Congressional appropriation to the service.

Project: this list includes projects currently in the RONS database and projects proposed in the CCP.

FTE: full time staffing equivalent. One fte equals one person working full time for one whole year; seasonal employees are considered 0.5 fte. (note: staff are often "shared" by multiple rons projects)

Cost, year 1: estimated costs incurred during the first year of a project - typically higher than recurring costs, due to construction, equipment purchase, or other start-up expenses.

Cost, recurring: estimated average annual project cost for subsequent years; includes recurring salary and maintenance costs.

Project duration: estimated length of time for each project. Since this CCP will be revised in 15 years, the "maximum project duration" is 15 years, even though some projects may continue into the next planning cycle

Table E-1: Projects Currently in the RONS Database and Proposed Projects to be included for Assabet River NWR

Project	FTE	Startup cost x1,000	Annual cost x 1,000	Duration (years)
Oversee refuge management, planning, programs, administration and maintenance	GS 11 Refuge Ops. Spec.	139	74	15
Provide wildlife and habitat management planning, implementation, and evaluation	GS 11 Wildlife Biologist	133	68	15
Collect essential biological data to efficiently manage the refuge	GS 7 Biol.	114	49	15
Develop and implement a forestry management plan	GS 11 Forester	133	68	15
Provide planning and implementation of wildlife-dependent public use programs	GS 11 Outdoor Rec. Planner	133	68	15

Appendix E: RONS and MMS

Project	FTE	Startup cost x1,000	Annual cost x 1,000	Duration (years)
Conduct interpretive and educational programs	GS 5 Park Ranger	107	42	15
Provide refuge visitor protection and law enforcement	GS 7 (LE) Park Ranger	114	49	15
Provide refuge maintenance and facilities repair	WG 8 Maint. Worker	118	53	15
Provide habitat restoration, maintenance, and facilities repair	WG 5 Main. Worker	110	45	15
Provide refuge Visitor Contact Station support, administrative programs, and visitor services	Admin Tech.	107	42	13
Equip and operate refuge Visitor Contact Station		280	30	15
Establish bat resting habitat		30	2	3
Increase accessible hunting and fishing opportunities		60	10	2
Design, construct, and maintain accessible interpretive trails, wildlife viewing platforms, and photography blinds		180	20	15
Restore and maintain wetland habitat		50	10	15
Control exotic and invasive species		118	53	5
Develop and maintain parking areas and refuge gates		108	8	14
Develop and implement FMP		76	28	10
Maintain and restore grassland habitat		80	15	15
Maintain and restore forest habitat		65	15	15
Conduct essential migratory bird surveys		30	8	15
Conduct herptile and invertebrate surveys		25	8	15
Inventory and evaluate status of key wildlife species		55	55	2
Develop Habitat Inventory and Management Plan		50	12	2
Conduct cultural resources overview of refuge		80	8	3
Construct and maintain three on-site interpretive kiosks		45	4	15
With partners, construct and maintain three off-site interpretive kiosks		25	2	15
Total		2,565	846	

Table E-2: Projects Currently Backlogged in the Maintenance Management System (MMS) for Assabet River NWR

Project # (SAMMS)	Project Name	Cost Estimate (\$1,000)
99110794	Phase II building removal	522
99104368	Remove foundations	44
01110809	Rehab military gates	43
0110808	Remove 10 acres of asphalt	264
99110807	Phase III building removal	522
00104415	Repair Patrol, White Pond, and Craven Roads	153
98104371	Replace John Deere 555 Backhoe	98
00110310	Office/Visitor Contact Station	1,357
00123749	Two parking lots	136
00123748	Two fishing piers	94
Total		3,233

Table E-3: Projects Currently Backlogged in the MMS for the Eastern Massachusetts Refuge Complex

Project # (SAMMS)	Project Name	Cost Estimate (\$1,000)
01113926	Replace 1979 tractor trailer	55
99104362	Replace 1992 S-10	32
99104364	Replace 1991 Suburban	37
00104409	Replace 17' aluminum boat	27
00104417	Replace 23' Sea Ox	42
00104412	Replace Boston Whaler	26
01111811	Replace 00 Suburban	40
01111813	Replace 00 Durango	37
02120884	Replace 01 1-ton pickup	42
02120936	Replace 19' Carolina skiff	29
02120939	Replace 02 crew cab pickup	28
02120942	Replace 01 ½ ton pickup	25
00110311	Visitor center phase I	522
00110344	Visitor center phase II	908
00110539	Visitor center phase III	5,386
Total		7,026

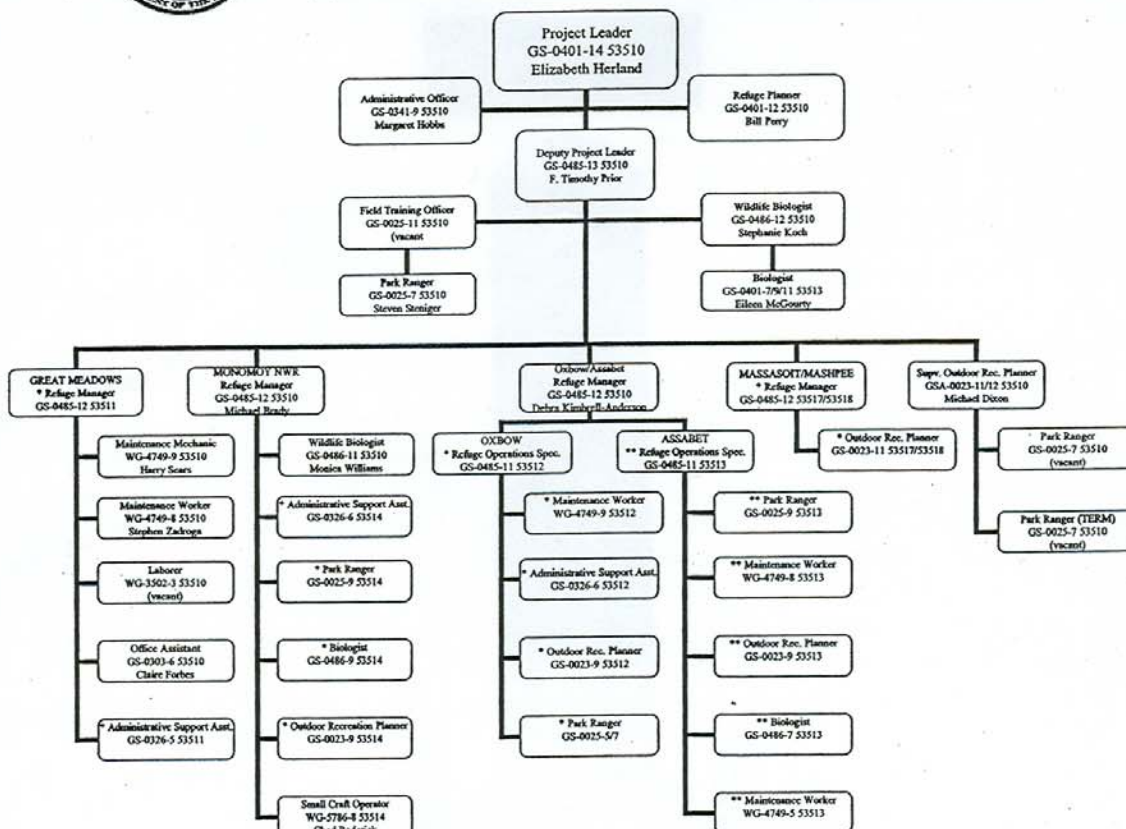
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**Appendix F: Existing and Proposed Staffing Charts for Assabet River,
Great Meadows, and Oxbow NWRs**

Appendix F: Staffing Charts



U.S. Fish and Wildlife Service Northeast Region Regional Chief, National Wildlife Refuge System Eastern Massachusetts National Wildlife Refuge Complex (Assabet River/Great Meadows/Mashpee/Massasoit/Monomoy/Nantucket/Nomans Land Island/Oxbow)



Refuge Manager

Date

Anthony D. Leger 11/3/2004

Regional Chief NWRS

Date

* Essential Staff

** New/Expanded Staff

Refuge Supervisor

Date

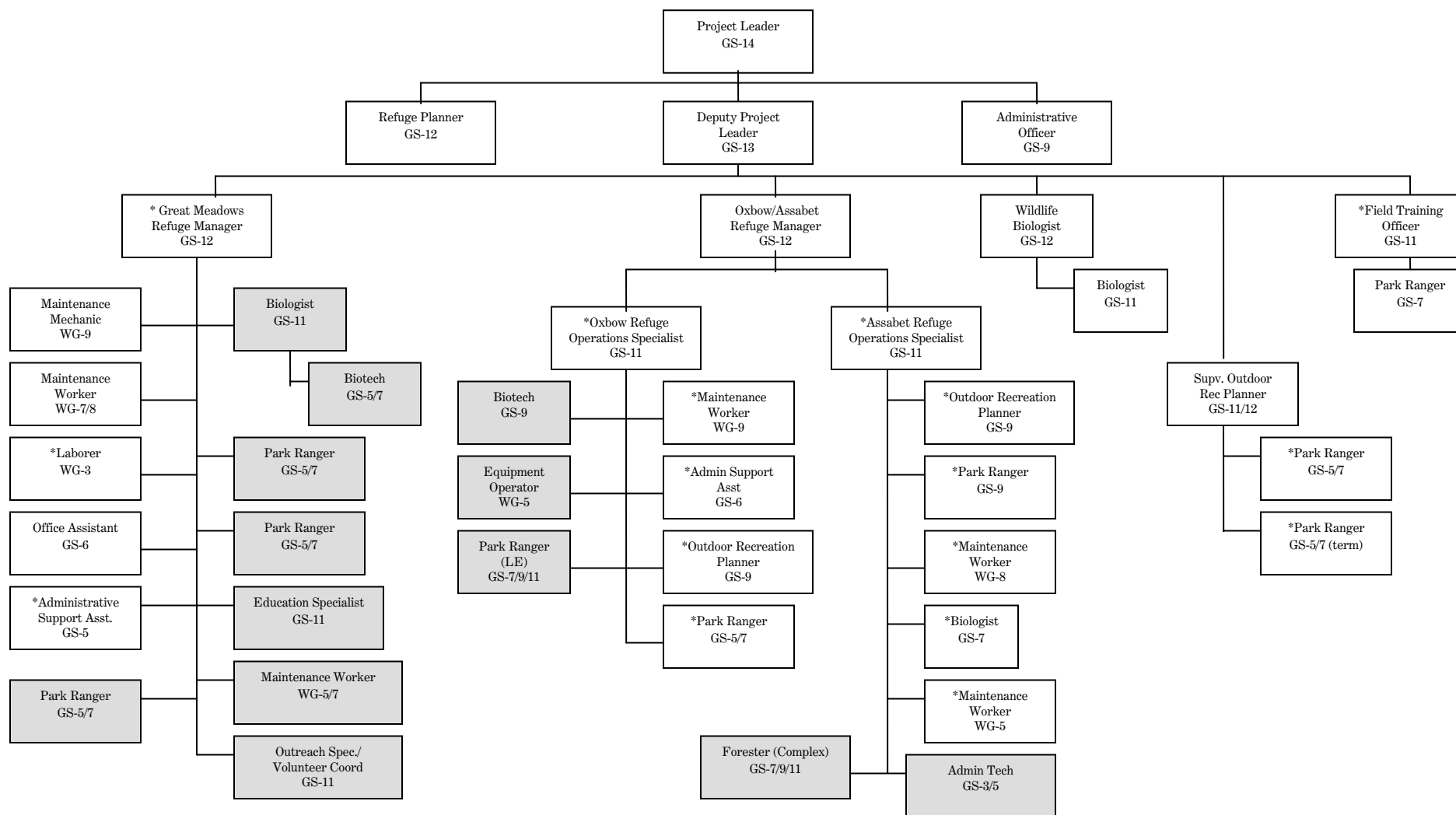
Richard W. Dyer 11/2/04

Regional Director

Date

11-12-04

Eastern Massachusetts National Wildlife Refuge Complex
Assabet River, Great Meadows, and Oxbow National Wildlife Refuges
Proposed Staffing Chart



Highlighted boxes show proposed positions.

This chart does not depict additional staff for Mashpee, Massasoit, Monomoy, Nomans Land Island, and Nantucket NWRs

* Positions that are currently vacant.

Appendix F: Staffing Charts

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Appendix G: Final Compatibility Determinations

Compatibility Determination

Use: Cultural History Tours

Refuge Name: Assabet River National Wildlife Refuge

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose: “...particular value in carrying out the national migratory bird management program.” (16 U.S.C. 667bd, as amended)

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

(a) What is the use? Is the use a priority public use?

This activity consists of a group of people with a leader or guide walking or driving on the refuge to learn about its cultural history, including Revolutionary War ties, farming communities and the former military presence. This is not a priority public use.

(b) Where would the use be conducted?

Cultural history tours would occur only on established refuge trails or roads.

(c) When would the use be conducted?

Cultural history tours would be conducted only during hours when the refuge is open, generally ½ hour before sunrise to ½ hour after sunset.

(d) How would the use be conducted?

Cultural history tours would occur either by foot or motor vehicle.

(e) Why is this use being proposed?

Cultural history tours offer an opportunity to expose visitors to the Refuge and the mission of the National Wildlife Refuge System. In addition to learning about the history and culture of the area, participants will have the opportunity to observe wildlife and gain an appreciation for the National Wildlife Refuge System.

Availability of Resources: Before groups may conduct tours on the refuge they must obtain a special use permit. The cost of preparing special use permits for the cultural history tours will be minimal. Maintenance of the trails and facilities in areas not normally open to the public may incur some slight additional cost, but would be offset by the benefit to refuge staff having easier access to the refuge for wildlife management purposes.

Anticipated Impacts on Refuge Purpose: The impacts associated with this activity are trampling of vegetation, littering, and temporary disturbance to wildlife in the area of the

group. These impacts are minor in light of the appreciation and knowledge gained by participants in these activities. The known presence of a threatened or endangered species will preclude the use of an area until the Refuge Manager determines otherwise.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations X .

The following stipulations are required to ensure compatibility: Special use permits will be issued to the organization conducting the cultural history tours. A fee may be charged for the special use permit. The areas used for such tours will be closely monitored to evaluate the impacts on Refuge resources; if adverse impacts appear, the activity will be moved to secondary locations or curtailed entirely. Specific conditions may apply depending upon the requested activity and will be addressed through the special use permit.

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: environmental education, interpretation, hunting, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Cultural history activities allow visitors to both learn about the prior historical/cultural uses of an area and hopefully gain an appreciation for the refuge purpose and lands on which these activities take place. Impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about refuge resources.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 10-year Reevaluation Date: December 27, 2014

Compatibility Determination

Use: Environmental Education and Interpretation

Refuge Name: Assabet River National Wildlife Refuge

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Purpose: Assabet River NWR's purpose is its "...particular value in carrying out the national migratory bird management program." (16 U.S.C. 667b-d, as amended)

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use: Environmental education includes activities which seek to increase public knowledge and understanding of wildlife and the importance of habitat protection and management. Typical activities include teacher or staff-guided on-site field trips, off-site programs in classrooms, and nature study, such as teacher and student workshops and curriculum-structured instruction, and interpretation of wildlife resources. The refuge also supports an Urban Education program which offers these programs to students from the Boston and Worcester schools.

Interpretation includes those activities and supporting infrastructure that explain management activities, fish and wildlife resources, ecological processes, and cultural history among other topics to public users. Programs and activities may be developed, sponsored and supervised by the Friends of Assabet River NWR.

Access to the refuge for these activities is achieved through walking, snowshoeing or cross-country skiing.

On and off site environmental education programs and interpretive programs, assistance with teacher workshops, and informational kiosks would be offered at Assabet River NWR. The proposed action also includes interpretive materials on the trails. A visitor contact station would be built to support refuge programs.

Availability of Resources: Environmental education and interpretation occur through the use of existing staff, resources, and facilities. Existing resources include staff, interpretive kiosks and displays, environmental education programs carried out through extensive help of volunteers, displays, and trails. The amount and character of environmental and interpretive programming will be a direct reflection of the refuge's staff and funding levels. The following components of an environmental education and interpretation program will need to be developed to fully implement the program outlined in the Comprehensive Conservation Plan. Additional components may be added at later dates. Specific costs will be determined as implementation of specific programs occurs.

- Construction of visitor contact station
- Provision of Visitor Contact Station support, administrative programs and services
- Construction and maintenance of three new kiosks (plus three off-site kiosks)
- Additional staffing

Anticipated Impacts of the Use: On-site activities by teachers and students using trails and environmental education sites may impose low-level impacts such as trampling of vegetation, removing vegetation, littering and temporary disturbance to wildlife. In the event of persistent disturbance to habitat or wildlife, the activity will be restricted or discontinued.

Placement of kiosks may impact small areas of vegetation. Kiosks will be placed where minimal disturbance will occur.

Providing additional interpretive and educational brochures and materials may result in increased knowledge of the refuge and its resources. This awareness and knowledge may improve the willingness of the public to support refuge programs, resources, and compliance with regulations.

There will be impacts from building a new visitor contact station. These impacts will be analyzed in an appropriate NEPA compliance document after potential sites for a building are determined.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Additionally, Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations X.

The following stipulations are required to ensure compatibility:

Activities will be held in areas where minimal impact will occur. Additional funding will be necessary to fully implement the environmental education and interpretation program outlined in the CCP. The level of implementation will be determined by the amount of funding allocated to the refuge over the next 15 years. Periodic evaluation of sites and programs will be conducted to assess if objectives are being met and to prevent site degradation. If evidence of unacceptable adverse impacts appear, the location(s) of activities will be rotated with secondary sites, curtailed or discontinued. The known presence of a threatened or endangered species will preclude the use of an area until the Refuge Manager determines otherwise.

Appendix F: Staffing Charts

Special use permits will be issued to organizations conducting environmental education or interpretive tours or activities. A fee may be charged for the special use permit. The areas used by such tours will be closely monitored to evaluate the impacts on the resource; if adverse impacts appear, the activity will be moved to secondary locations or curtailed or discontinued. Specific conditions may apply depending upon the requested activity and will be addressed through the special use permit.

Guidelines to ensure the safety of all participants will be issued in writing to the teacher or group leader responsible for the activities and will be reviewed before the activity begins.

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: environmental education, interpretation, hunting, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Environmental education and interpretation activities generally support Refuge purposes and impacts can largely be minimized (Goff et al., 1988). The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about refuge resources. Environmental education is a public use management tool used to develop a wildlife conservation ethic within society. While it targets school age children, it is not limited to this group. This tool allows us to educate refuge visitors about endangered and threatened species management, wildlife management and ecological principles and communities. A secondary benefit of environmental education is that it instills an 'ownership' or 'stewardship' ethic in visitors and most likely reduces vandalism, littering and poaching; it also strengthens Service visibility in the local community. Environmental education (outdoor classroom) is listed in the Refuge Manual (U.S. Fish and Wildlife Service, 1985) as the highest priority visitor use activity throughout the National Wildlife Refuge System.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 15-year Reevaluation Date: December 27, 2019

Compatibility Determination

Use: Fishing

Refuge Name: Assabet River National Wildlife Refuge

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose:

Assabet River NWR's purpose is its "...particular value in carrying out the national migratory bird management program." (16 U.S.C. 667b-d, as amended)

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use: Fishing activities include shore or bank fishing and fishing from a boat or canoe. Access to the refuge for this activity is achieved through walking or by non-motorized boat. Fishing at Assabet River NWR is allowed only in Puffer Pond. Anglers at Assabet River NWR will be required to practice catch and release and not use live bait until we have determined that fish populations are sustainable. Ice fishing is not permitted on the refuge. Fishing will be in compliance with all State regulations. Up to four designated areas for fishing on Puffer Pond will be identified and at least one of the four sites will be accessible to handicapped anglers. Wetland pools are closed to public access.

Availability of Resources: This program can be run with existing staff, although the hiring of additional public use and law enforcement staff would assist in managing the program and ensuring compliance. Maintenance costs for this activity are small. Costs which may occur include maintenance costs to trails and access areas. Existing refuge staff will need to prepare a fishing program and annual fishing plans. Estimated cost for developing accessible hunting and fishing opportunities: \$60,000

Anticipated Impacts on Refuge Purpose: The designated areas for fishing may need stabilization to prevent erosion before being opened and or to curb erosion after use of these areas has begun. Potential and actual refuge impacts include trampling vegetation, creation of unauthorized trails and subsequent erosion or over-harvesting. Some disturbance of roosting and feeding birds will probably occur (Burger, 1981) but is considered minimal. Discarded fishing line and other fishing litter can entangle migratory birds and cause injury and death (Gregory, 1991). Additionally, litter impacts the visual experience of refuge visitors (Marion and Lime, 1986). Anticipated law enforcement issues include illegal taking of fish, littering, illegal fires at night, fishing without a license, and disorderly conduct.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations X.

The following stipulations are required to ensure compatibility:

The designated areas for fishing may need stabilization to prevent erosion before being opened and or to curb erosion after use of these areas has begun.

Enforcement will be conducted to help curb illegal fires, disorderly conduct and littering. Enforcement will also help to ensure that fishing regulations are observed, reduce creation of unauthorized trails and serve as a direct contact to the fishing public. Public meetings with local fishing clubs and interested parties will also be required to reinforce refuge regulations. If these measures do not curb unauthorized activities, other measures will be implemented to control activities and fishermen.

Law enforcement patrol of public use areas should minimize the above-mentioned types of violations. The current "Refuge open ½ hour before sunrise to ½ hour after sunset" regulation restricts entry after daylight hours, and should be maintained along with "Public Use Restricted to Trails Only".

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: fishing, environmental education, interpretation, hunting, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Fishing is a wildlife-oriented activity that provides substantial recreational opportunities to the public (U.S. Fish and Wildlife Service, 1992 and U.S. Fish and Wildlife Service, 1997). Fishing is a traditional form of outdoor recreation.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Literature Cited:

Burger, J. 1981. The Effect of Human Activity on Birds at a Coastal Bay. *Biol. Conserv.* 21:231-241.

Gregory, M.R. 1991. The Hazards of Persistent Marine Pollution: Drift Plastics and Conservation Islands. *J. Royal Soc. New Zealand.* 21(2):83-100.

Appendix G: Final Compatibility Determinations

Marion, J.L. And D.W. Lime. 1986. Recreational Resource Impacts: Visitor Perceptions and Management Responses. pp. 239-235. Kulhavy, D.L. and R.N. Conner, Eds. in Wilderness and Natural Areas in the Eastern United States: A Management Challenge. Center for Applied Studies, Austin State Univ., Nacogdoches, TX. 416pp.

U.S. Fish and Wildlife Service. 1992. Fisheries USA. The Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Wash, D.C., U.S. Gov't Printing Office.

U.S. Fish and Wildlife Service. 1997a. Recreation Fee Programs Frequently Asked Questions.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 15-year Reevaluation Date: December 27, 2019

Compatibility Determination

Use: Hunting – Big Game , Upland Game, and Migratory Bird

Refuge Name: Assabet River National Wildlife Refuge

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose: Assabet River NWR's purpose is its "...particular value in carrying out the national migratory bird management program." (16 U.S.C. 667b-d, as amended)

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Proposed Use:

Migratory Game Bird Hunting

This activity involves the taking of American woodcock on portions of the refuge north of Hudson Road.

Big Game Hunting

This activity involves the taking of white-tailed deer and turkey. Archery, shotgun and primitive firearm deer hunting opportunities will be provided on portions of the refuge. Only portable stands are allowed and no tree spiking is permitted.

For the section of the refuge north of Hudson Road and inside of the Patrol Road, white-tailed deer may be taken by shotgun, archery and primitive firearms. For the section of the refuge outside of the Patrol Road and for the area to the south of Hudson Road, white-tailed deer may be taken only by archery.

For the section of the refuge north of Hudson Road and inside of the Patrol Road, turkey may be taken by bow and arrow or shotgun. Lead shot will be allowed. Turkey hunters may use only bow and arrow outside the Patrol Road and south of Hudson Road.

Upland Game

This activity involves the taking of gray squirrel, cottontail rabbit, and ruffed grouse. These animals are taken with shotguns only; non-toxic shot is required. Hunting will be limited to the area north of Hudson Road and inside the Patrol Road.

All applicable Federal (50 CFR Part 32) and State hunting regulations will be in force on the refuge, including the discharge of firearms or arrows across or within 150 feet of any

highway and the possession or discharge of any firearm or arrow within 500 feet of any dwelling or building in use. The use or possession of alcoholic beverages while hunting will be strictly prohibited. Hunting will occur within designated State seasons but could be restricted by time or day if determined necessary by the Refuge Manager to address resource or visitor use issues. All hunters will be required to obtain a permit from the refuge prior to scouting or hunting. The permit could contain both refuge-specific information, maps, and/or additional refuge requirements for hunter compliance. This may be modified on an annual basis if necessary. A fee will be charged for the permit.

Access to the refuge for all hunt seasons is through walking or snowshoeing. Cutting of vegetation is prohibited.

Limited special seasons will be provided for physically handicapped hunters. Selected roads on the refuge will remain open for restricted vehicle traffic. Some of these roads will allow us to provide handicapped accessible hunting opportunities.

Availability of Resources: Hunting on the refuge will be by annual permit. The refuge will be collecting an annual fee of \$20 for all hunting seasons on the refuge. One fee is valid for Assabet River, Great Meadows, and Oxbow NWRs only for the seasons that are allowed at each NWR. Fee money collected will help recover costs for funding the program. The Comprehensive Conservation Plan estimates that the cost of starting a hunt program will be \$60,000 with an annual recurring cost of \$10,000. These resources are available as the program will be managed by existing refuge staff.

Anticipated Impacts on Refuge Purpose: The impacts of allowing hunting may include disturbance of non-target species in the course of tracking prey, trampling of vegetation, possible creation of unauthorized trails by hunters, littering and possible vandalism and subsequent erosion. These impacts are not anticipated to be significant.

White-tailed deer number about 90,000 in Massachusetts. In some areas, deer density is as high as 25-30 deer per square mile. Many landowners suffer landscape damage due to deer on a regular basis, transmission of Lyme disease becomes a significant issue with large numbers of deer, starvation is a possibility when deer numbers are high as food supplies dwindle in bad weather and deer-vehicle collisions become more common and problematic.

During the hunting season, non-hunters may limit refuge visits to Sundays or to the area south of Hudson Road, which will be open only for archery hunting during the turkey and deer seasons, or they may avoid the refuge altogether.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations. Many people wrote in to express opposition to hunting in general. Others recommended hunting be restricted to archery deer hunting. Others either supported hunting opportunities specifically or supported the preferred alternative, which included establishing the hunt programs.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations _X_.

The following stipulations are required to ensure compatibility:

- All hunters must obtain all necessary State, Federal, and refuge permits.
- Hunters must abide by all applicable refuge, State, and Federal regulations.
- Refuge staff will develop a Hunt Plan and amend the Code of Federal Regulations before permitting hunting on the refuge.
- Staff will monitor hunting activities to determine any adverse impacts to refuge resources and adjust the hunt program as necessary.

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: hunting, environmental education, interpretation, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Hunting of white-tailed deer and turkey, upland game (rabbit, squirrel and ruffed grouse) and woodcock on Assabet River NWR is justified within refuge objectives by providing wildlife-oriented recreation and promoting appreciation of wildlife and the outdoors. Recreational hunting is also a valid means of population control and can serve to keep wildlife populations in check.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 15-year Reevaluation Date: December 27, 2019

Compatibility Determination

Use: Natural History Tours

Refuge Name: Assabet River National Wildlife Refuges

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 200) under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose: Assabet River NWR's purpose is its "...particular value in carrying out the national migratory bird management program." (16 U.S.C. 667b-d, as amended)

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

(a) What is the use? Is the use a priority public use?

This activity consists of a group of people with a leader or guide walking or driving on refuge property to learn about plant and wildlife species, natural processes and wetlands and other habitats. Natural history tours will facilitate wildlife observation and photography, environmental interpretation and education, which are priority public uses of the refuge.

(b) Where would the use be conducted?

Natural history tours would normally occur on established refuge trails or roads. However, tours could be conducted in other areas of the refuge with approval from the refuge manager.

(c) When would the use be conducted?

Natural history tours would normally be conducted during hours when the refuge is open, generally ½ hour before sunrise to ½ hour after sunset. Activities held at night, such as an owl prowl, would require approval from the refuge manager.

(d) How would the use be conducted?

Natural history tours would occur either by foot or motor vehicle.

(e) Why is this use being proposed?

Natural history tours offer an opportunity to expose visitors to the Refuge purposes and Refuge System Mission. Some of the tours may also be birding trips. Participants gain an extra understanding and appreciation for the Refuge and the environment.

Availability of Resources: Before groups may conduct tours on the refuge they must obtain a Special Use Permit (SUP). The cost of preparing the SUPs for natural history tours will be minimal. Maintenance of trails and facilities will be encompassed in costs associated with routine refuge operations and maintenance activities.

Anticipated Impacts on Refuge Purpose: The impacts associated with this activity are trampling of vegetation, littering, possible vandalism and temporary disturbance to wildlife in the area of the group. These impacts are minor in light of the appreciation and knowledge gained by participants in these activities. The known presence of a threatened or endangered species will preclude the use of an area until the refuge manager determines otherwise.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations X.

The following stipulations are required to ensure compatibility: An SUP will be issued to the organization conducting the tours. A fee may be charged for the special use permit. The areas used by such tours will be closely monitored to evaluate the impacts on the resource. If adverse impacts appear, the activity will be moved to secondary locations or curtailed entirely. Specific conditions may apply depending upon the requested activity and will be addressed through the SUP.

Law enforcement patrol of public use areas should minimize the above-mentioned types of violations. The current “Refuge open ½ hour before sunrise to ½ hour after sunset” regulation restricts entry after daylight hours, and should be maintained along with “Public Use Restricted to Trails Only”, unless specifically authorized by an SUP.

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: environmental education, interpretation, hunting, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Natural history activities generally support refuge purposes and impacts can largely be minimized. The minor resource impacts attributed to these activities are generally outweighed by the benefits gained by educating present and future generations about refuge resources. Natural history activities are a public use management tool used to develop a resource protection ethic within society. This tool allows us to educate Refuge visitors about endangered and threatened species management, wildlife management and ecological principles and communities. A secondary benefit of natural history activities is that it instills an ‘ownership’ or ‘stewardship’ ethic in visitors and most likely reduces vandalism, littering and poaching. It also strengthens Service visibility in the local community.

Appendix G: Final Compatibility Determinations

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 15-year Re-evaluation Date: December 27, 2019

Compatibility Determination

Use: Non-motorized Boating

Refuge Name: Assabet River National Wildlife Refuges

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose: "...particular value in carrying out the national migratory bird management program" (16 U.S.C. 667b-d, as amended).

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

(a) What is the use? Is the use a priority public use?

Non-motorized boating consists of the use of canoes, kayaks, row boats or other human powered watercraft across open water. The use is not a priority public use, but would facilitate participation in a variety of priority wildlife-dependent activities, including fishing, wildlife observation and wildlife photography.

(b) Where would the use be conducted?

Non-motorized boating would be conducted only on Puffer Pond, not in refuge wetland pools or other ponds.

(c) When would the use be conducted?

Non-motorized boating would occur during times when the refuge is open and access is provided.

(d) How would the use be conducted?

Access would be provided at a designated launch site on the pond. Parking near the site would be provided but boats would be hand-carried into the pond.

(e) Why is this use being proposed?

Non-motorized boating will facilitate participation in priority wildlife-dependent recreation.

Availability of Resources: The costs of infrastructure associated with facilitating non-motorized boating are discussed in the compatibility determinations for the respective wildlife dependent public uses. Existing and new facilities at Assabet River NWR would be used. Minor improvements and maintenance would be accomplished by refuge staff and volunteers.

Anticipated Impacts on Refuge Purpose: Non-motorized boating at Assabet River NWR will be monitored to ensure the activity will not have adverse impact on wildlife habitat, or the management of migratory birds and other wildlife species. This activity will facilitate wildlife-dependent recreation.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations X.

The following stipulations are required to ensure compatibility: Non-motorized boaters will utilize only established established access areas open to the public and not venture into closed areas. A “Refuge open ½ hour before sunrise to ½ hour after sunset” regulation which restricts entry after daylight hours should be established as well as a “Public Use Restricted to Trails Only” regulation.

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: environmental education, interpretation, hunting, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Non-motorized boating is to be used only as a means to facilitate the priority public uses identified above.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 10-year Reevaluation Date: December 27, 2014

Compatibility Determination

Use: Scientific Research

Refuge Name: Assabet River National Wildlife Refuge

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose: "...particular value in carrying out the national migratory bird management program." (16 U.S.C. 667b-d, as amended).

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use:

(a) What is the use? Is the use a priority public use?

The use is research conducted by non-Service personnel. The purposes of research conducted on the refuge are to further the understanding of the natural resources and to improve the management of such resources on the refuge or within the National Wildlife Refuge System (Refuge System). Priority will be given to research which is applicable to wildlife, habitat, or public use management on and near the refuge. Research conducted by non-Service personnel is not a priority public use of the Refuge System.

(b) Where would the use be conducted?

The location of the research will vary depending on the individual research project that is being conducted. The entire refuge may be made available for specific scientific research projects. However, an individual research project is usually limited to a particular habitat type, plant or wildlife species. On occasion research projects may encompass an assemblage of habitat types, plants or wildlife. The research location will be limited to only those areas of the refuge that are necessary to conduct any specific, approved research project.

(c) When would the use be conducted?

The timing of the research will depend on the individual research project that is being conducted. Scientific research may be allowed to occur on the refuge throughout the year. An individual research project could be short-term in design, requiring one or two visits over the course of a few days. Other research projects could be multiple-year studies that require daily visits to the study site. The timing of each individual research project will be limited to the minimum required to complete the project. If a research project occurs during a refuge hunting season, special precautions or limitations may be required to ensure the safety of researchers or staff.

(d) How would the use be conducted?

The methods of a research project will depend on the individual project that is being conducted. The methods of each research project will be evaluated before it will be allowed to occur on the refuge. No research project will be allowed to occur if it does not have a study plan approved by the refuge manager, or if the refuge manager determines the project may adversely affect wildlife, wildlife habitat, on-going or planned refuge management activities, previously approved research programs, approved priority public uses, or public health and safety.

(e) Why is this use being proposed?

Research by non-Service personnel is conducted by colleges, universities, Federal, State, and local agencies, non-governmental organizations, and qualified members of the general public. The purposes of research conducted on the refuge are to further the understanding of the natural resources and to improve the management of such resources on the refuge or within the National Wildlife Refuge System. Priority will be given to research which is applicable to wildlife, habitat, or public use management on and near the refuge.

Most research projects on the refuges comprising the Eastern Massachusetts NWR Complex examine management of avian resources, various public uses, and rare, threatened or endangered species. Currently, research by non-refuge staff is concentrated on 5 of the refuges in Eastern Massachusetts NWR Complex: Great Meadows, Assabet River, Oxbow, Monomoy, and Massasoit. Much of the research is focused on management of migratory birds, or resident herptiles and mammals, but other more specific research projects have also been implemented. In addition, much of the research conducted at the refuges is part of larger, landscape based projects. At Great Meadows NWR, Special Use Permits (SUP) have been issued for research which has included: investigating deer populations and movements, particularly in the winter months; investigating Blanding's turtle populations, movements, and habitat occupancy during the non-nesting season; mapping the spread of West Nile Virus; and evaluating mercury contamination in the Sudbury and Concord Rivers. At Assabet River and Oxbow NWRs, research activities have included establishing presence, documenting habitat use, and monitoring impacts to productivity of Blanding's Turtles, Spotted Turtles, Box Turtles, and Wood Turtles. At Monomoy NWR, research has covered the breadth of biological resources including: neurological studies involving horseshoe crabs; movement patterns and use of the Refuge by grey and harbor seals; and tern phenology, behavior, and productivity on Monomoy (a control site for oil spill studies occurring in Buzzards Bay). At Massasoit NWR, research has focused on the natural history of the federally listed Northern red-bellied cooter. Although no SUPs have been issued to date for biological research on Nomans Land Island, Mashpee, and Nantucket NWRs, it is likely that research will occur on these sites in the future.

The Service will encourage and support research and management studies on refuge lands that improve and strengthen natural resource management decisions. The refuge manager will encourage and seek research relative to approved refuge objectives that clearly improves land management and promotes adaptive management. Information that enables better management of the Nation's biological resources and is generally considered important to agencies of the Department of Interior, including the U.S. Fish

and Wildlife Service, the Refuge System, and State Fish and Game Agencies, and/or that addresses important management issues or demonstrate techniques for management of species and/or habitats, will be the priority.

The refuge may also consider research for other purposes which may not be directly related to refuge-specific objectives, but would contribute to the broader enhancement, protection, use, preservation and management of populations of fish, wildlife and plants, and their natural diversity within the region or flyway. These proposals must comply with the Service's compatibility policy.

The refuge may develop a list of research needs that will be provided to prospective researchers or organizations upon request. Refuge support of research directly related to refuge objectives may take the form of funding, in-kind services such as housing or use of other facilities, direct staff assistance with the project in the form of data collection, provision of historical records, conducting of management treatments, or other assistance as appropriate.

Availability of Resources: The bulk of the cost for research is incurred in staff time to review research proposals, coordinate with researchers, write SUPs, and review the research results. In some cases, a research project may only require one day of staff time to write a SUP. In other cases, a research project may require weeks of staff time. Currently, a senior refuge biologist spends an average of seven weeks a year working full time on research projects conducted by outside researchers. At an hourly wage of approximately \$30 (for a GS-12), this adds up to about \$8,500 annually for resources spent on outside research.

Anticipated Impacts of the Use: Disturbance to wildlife and vegetation by researchers could occur through observation, a variety of wildlife capture techniques, banding, and accessing the study area by foot or vehicle. It is possible that direct or indirect mortality could result as a by-product of research activities. Mist-netting or other wildlife capture techniques, for example, can cause mortality directly through the capture method or in-trap predation, and indirectly through capture injury or stress caused to the organism. Overall, however, allowing well designed and properly reviewed research to be conducted by non-Service personnel is likely to have very little impact on refuge wildlife populations. If the research project is conducted with professionalism and integrity, potential adverse impacts are likely to be outweighed by the knowledge gained about an entire species, habitat or public use.

Public Review and Comment: The draft compatibility determination was available for public review and comment by 1) a notice posted on the Great Meadows NWR kiosk bulletin boards for a period of thirty days, 2) notice included in a planning update that was sent to all of the individuals on the comprehensive conservation plan mailing list, and 3) posted on the refuge website. The comment period was from June 21, 2004 to July 20, 2004.

Determination (check one below):

☐ Use is Not Compatible

☒ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility: All researchers will be required to submit a detailed research proposal following Service Policy (FWS Refuge Manual Chapter 4 Section 6, as may be amended). The refuge must be given at least 45 days to review proposals before initiation of research. If collection of wildlife is involved, the refuge must be given 60 days to review the proposal. Proposals will be prioritized and approved based on need, benefit, compatibility, and funding required.

An SUP will be issued for all research conducted by non-Service personnel. The SUP will list the conditions that the refuge manager determines to be necessary to ensure compatibility. The SUP will also identify a schedule for progress reports and the submittal of a final report or scientific paper.

Regional refuge biologists, other Service Divisions, State agencies or non-governmental organizations and biologists may be asked to provide additional review and comment on any research proposal.

All researchers will be required to obtain appropriate State and Federal permits.

All research related SUPs will contain a statement regarding the Service's policy regarding disposition of biotic specimen. The current Service policy language in this regard (USFWS, 1999) is, *"You may use specimens collected under this permit, any components of any specimens (including natural organisms, enzymes, genetic material or seeds), and research results derived from collected specimens for scientific or educational purposes only, and not for commercial purposes unless you have entered into a Cooperative Research and Development Agreement (CRADA) with us. We prohibit the sale of collected research specimens or other transfers to third parties. Breach of any of the terms of this permit will be grounds for revocation of this permit and denial of future permits. Furthermore, if you sell or otherwise transfer collected specimens, any components thereof, or any products or any research results developed from such specimens or their components without a CRADA, you will pay us a royalty rate of 20 percent of gross revenue from such sales. In addition to such royalty, we may seek other damages and injunctive relief against you."*

Any research project may be terminated at any time for non-compliance with the SUP conditions, or modified, redesigned, relocated or terminated, upon a determination by the refuge manager that the project is causing unanticipated adverse impacts to wildlife, wildlife habitat, approved priority public uses, or other refuge management activities.

Justification: The Service encourages approved research to further understanding of refuge natural resources. Research by non- Service personnel adds greatly to the information base for refuge managers to make proper decisions. Research conducted by

Appendix F: Staffing Charts

non-Service personnel will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 10-year Re-evaluation Date: December 27, 2004

Literature Cited:

U.S. Fish and Wildlife Service. 1985. Refuge Manual. Washington, D.C.: U.S. Government Printing Office.

U.S. Fish and Wildlife Service. 1999. Director's Order No. 109: Use of Specimens Collected on Fish and Wildlife Lands. March 30, 1999.

Compatibility Determination

Use: Snowshoeing and cross country skiing

Refuge Name: Assabet River National Wildlife Refuge

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose: “...particular value in carrying out the national migratory bird management program.” (16 U.S.C. 667b-d, as amended).

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use: These uses are not priority public uses, but would facilitate wildlife observation, wildlife photography, and interpretive programs, which are priority public uses, during winter months. The trail systems are not plowed, because of the cost and because of the habitat disturbance plowing would entail. The use simply involves foot-travel over the surface of the snow with the use of snowshoes and cross country skis on the refuge trail systems.

Availability of Resources: The cost of trail and facilities maintenance are not directly related to snowshoeing or cross country skiing. Costs for activities that are facilitated by these methods of locomotion are discussed under their respective compatibility determinations.

Anticipated Impacts on Refuge Purpose: Snowshoeing and cross country skiing as conducted on Assabet River NWR have no adverse impact on the management of migratory birds or other wildlife species. These activities will only be done in coordination with wildlife-dependent recreation. These will likely create similar disturbances as people walking on the trails.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations X .

The following stipulations are required to ensure compatibility:

Snowshoers and cross country skiers will utilize only established trails and other areas open to the public and not venture into closed areas. The current “refuge open ½ hour

Appendix F: Staffing Charts

before sunrise to ½ hour after sunset” regulation restricts entry after daylight hours, and should be maintained along with “Public Use Restricted to Trails Only”.

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: environmental education, interpretation, hunting, fishing, wildlife observation and wildlife photography. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

Snowshoeing and cross country skiing are to be used only as a means to facilitate the priority public uses identified above.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 10-year Reevaluation Date: December 27, 2014

Compatibility Determination

Use: Wildlife Observation and Photography

Refuge Names: Assabet River National Wildlife Refuge

Establishing Authority: Assabet River National Wildlife Refuge (NWR) was established in 2000 under an Act Authorizing the Transfer of Certain Real Property for Wildlife, or Other Purposes. (16 U.S.C. 667b).

Refuge Purpose: Assabet River NWR's purpose is its "...particular value in carrying out the national migratory bird management program." (16 U.S.C. 667b-d, as amended)

National Wildlife Refuge System Mission: To administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans.

Description of Use: Access to the Refuge for this activity will be achieved through walking, snowshoeing or cross-country skiing. Wildlife observation and photography include walking on open and established trails to observe and/or photograph the natural environment.

Plans for Assabet River NWR include opening approximately 15 miles of trails for wildlife observation, photography and interpretive opportunities. These trails are being opened in phases. Additionally, a wildlife viewing platform and photo blind will be constructed. Photography conducted on parts of the refuge open to the general public will not require a special use permit.

Availability of Resources: Wildlife observation and photography occur through the use of existing staff, resources, and facilities. Existing resources for wildlife observation include trails. The amount and character of these opportunities will be a direct reflection of the refuge's staff and funding levels. The following components of a wildlife observation and photography program will need to be developed to fully implement the program outlined in the Comprehensive Conservation Plan. Additional components may be developed at a later date. Specific costs will be determined as implementation of the program occurs. Some of these projects are either underway or have been completed. Projects completed in part or in whole by volunteers require less fiscal resources.

- Construct, Improve and Maintain Accessible Visitor Trails
- Wildlife Viewing Platforms, Photography Blinds
- Rehabilitate Gates
- Repair Roads
- Remove Obstacle Course
- Develop and maintain parking areas and gates

Anticipated Impacts on Refuge Purpose: We predict that the impacts of wildlife observation and photography uses will be minimal. Possible impacts include disturbing

wildlife, removing or trampling of plants, littering, vandalism and entrance into closed areas. We will not be creating new trails, rather improving existing trails. There will be some removal of vegetation to place the observation platforms and photo blinds. In the event of persistent disturbance to habitat or wildlife the activity will be restricted or discontinued. Little energy will be expended by wildlife leaving areas of disturbance.

Public Review and Comment: The compatibility determination was included in the Draft CCP/EA. The Draft CCP/EA was available for comment from July 20 through September 3, 2003. Refuge staff held four public meetings to collect public comments, written and verbal, on the draft CCP/EA, including all compatibility determinations.

Determination:

Use is not compatible ____.

Use is Compatible with the following stipulations X.

The following stipulations are required to ensure compatibility:

Additional funding will be necessary to fully implement the wildlife observation and photography program outlined in the CCP. The level of implementation will be determined by the amount of funding allocated to the refuge over the next 15 years.

Law enforcement patrol of public use areas should minimize the above-mentioned types of violations. The current "Refuge open ½ hour before sunrise to ½ hour after sunset" regulation restricts entry after daylight hours, and should be maintained along with "Public Use Restricted to Trails Only".

Special use permits are required for organizations conducting wildlife observation and photography activities on the refuge. A fee may be charged for the special use permit. The areas used by such tours will be closely monitored to evaluate the impacts on the resource; if adverse impacts appear, the activity will be moved to secondary locations or curtailed entirely. Specific conditions may apply depending upon the requested activity and will be addressed through the special use permit.

Commercial photography is subject to a special use permit and commercial photographers will be charged a fee. The fee is dependent on size, scope and impact of the proposed activity.

Periodic evaluations will be done on trails to assess visitor impacts on the habitat. If evidence of unacceptable adverse impacts occurs, these uses will be curtailed, relocated or discontinued. Refuge regulations will be posted and enforced. Closed areas will be established, posted and enforced. The known presence of any threatened or endangered species likely to be disturbed by trail activity will preclude use of that site as a trail.

All photographers must follow refuge regulations. Photographers in closed areas must follow the conditions outlined in the special use permit which normally include notification of refuge personnel each time any activities occur in closed areas. Use of a closed area should be restricted to inside blinds to reduce disturbance to wildlife. No baits or scents may be used. At the end of each session, the blind must be removed. All litter will be removed daily.

Justification: The National Wildlife Refuge System Improvement Act of 1997 (P.L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: wildlife observation and wildlife photography, environmental education, interpretation, hunting, and fishing. These priority public uses are dependent upon healthy wildlife populations. Where these uses are determined to be compatible, they are to receive enhanced consideration over other uses in planning and management.

The majority of visitors to the refuge are there to view the wildlife and upland, wetland, and grassland habitat areas. Some visit to develop an understanding of natural or cultural history. This visitation is in accordance with a wildlife-oriented activity and is an acceptable secondary use. There will be some visitor impacts from this activity, such as trampling vegetation (Kuss and Hall, 1991) and disturbance to wildlife near trails (Klein, 1993 and Burger, 1981), but the knowledge, appreciation and understanding of management gained by visitors will provide support for the Service. The long-term benefits gained through wildlife observation and photography activities outweigh the impacts listed above.

These activities will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

Literature Cited:

Burger, J. 1981. The Effect of Human Activity on Birds at a Coastal Bay. *Biol. Conserv.* 21:231-241.

Klein, M.L. 1993. Waterbird Behavioral Response to Human Disturbances. *Wildl. Soc. Bull.* 21:31-39.

Kuss, F.R. and C.N. Hall. 1991. Ground Flora Trampling Studies: Five Years After Closure. *Environ. Manage.* 15(5):715-727.

Signature - Refuge Manager: /s/ Elizabeth A. Herland 12/21/2004
(Signature and Date)

Concurrence - Regional Chief: /s/ Anthony D. Léger 12/27/2004
(Signature and Date)

Mandatory 15-year Reevaluation Date: December 27, 2019