U.S. Fish & Wildlife Service

Silvio O. Conte National Fish and Wildlife Refuge

Comprehensive Conservation Plan

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Volume 2A (Appendix A)

Front and back cover:

Connecticut River
USFWS

Front cover insets:

Hunting on the refuge
USFWS

Conducting research on puritan tiger beetles
USFWS

Canoeing on the Connecticut River
Kristen Sykes

Enjoying the universally accessible trail on the refuge's Fort River Division, Massachusetts
USFWS

Fishing along the Connecticut River near Hartford, Connecticut
USFWS

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

The U.S. Fish and Wildlife Service is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, plants, and their habitats for the continuing benefit of the American people. The Service manages the National Wildlife Refuge System comprised of over 150 million acres including over 565 national wildlife refuges, thousands of waterfowl production areas, and marine national monuments. The Service also operates national fish hatcheries and ecological services field stations. The agency enforces Federal wildlife laws, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, administers the Endangered Species Act, and helps foreign governments with their conservation efforts. It also oversees the Federal Assistance Program which distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state wildlife agencies.

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

Appendix A

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Youth Conservation Corps, at Nulhegan Basin

Conservation Focus Areas and Refuge Units—Resources Overview and Management Direction, Including Goals, Objectives, and Strategies

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Paul Erickson

Fly fishing at Black Branch on the Nulhegan River

Introduction

Introduction

This is appendix A to the comprehensive conservation plan (CCP) for the Silvio O. Conte National Fish and Wildlife Refuge (Conte Refuge, refuge). It supplements chapter 4 of the CCP which identifies broad, strategic habitat conservation direction for the Connecticut River watershed, in the form of watershed-wide goals, objectives, and strategies, and describes how the U.S. Fish and Wildlife Service and Conte Refuge staff (we) will work with partners throughout the watershed to achieve those goals, objectives, and strategies. This appendix steps down that direction to show how we will specifically manage refuge lands within approved Conte Refuge Conservation Focus Areas (CFAs) over the next 15 years.

Background Information and Definitions

We briefly describe below the distinction between existing refuge divisions and units, Conservation Partnership Areas (CPAs) and CFAs. Our definition of CPAs and CFAs are a construct specifically tied to this CCP only. Map A.1 shows general locations of CPAs and CFAs in the watershed. CPAs and CFAs will form the geographic framework for implementing strategic habitat conservation. This appendix primarily focuses on CFAs included in the final management direction selected for implementation in the Record of Decision (ROD). The ROD adopted alternative C (the Service-preferred alternative) in the final CCP/EIS. Table A.1 below lists all of the CFAs and how much land is approved for acquisition in each. We also provide maps showing each of the CPAs and CFAs.

Conservation Partnership Areas (CPAs): CPAs are primarily based on one or more subwatersheds using 12-digit hydrologic unit codes (HUCs; USGS). We focus on these areas within the watershed because our State and other conservation partners identified an interest in pursuing conservation activities on these lands and requested Service involvement, coupled with our own assessment that the Service could make an important contribution to conserving Federal trust resources in these areas. In CPAs, the Service will actively facilitate and support conservation, environmental education, and recreation actions, in partnership with others across all ownerships, to contribute toward Conte Refuge's legislated purposes (see chapter 1). In CPAs, we have the authority to acquire 10% of our target acreage (see CFA discussion below).

Conservation Focus Areas (CFAs): CFAs are areas nested within CPAs. These are areas where the Service is approved to acquire additional refuge lands due to the concentration and high value of resources important to Federal trust resources. Some CFAs encompass existing refuge lands which will serve as an anchor for additional refuge acquisition, and whose current resource values will be further enhanced by additional acquisition. Specifically, CFAs include lands we feel will be best protected, managed, and conserved by the Service. The CFA boundaries define where the Service has authority to pursue a refuge expansion and acquire a fee or easement interest from willing sellers in areas that are not otherwise permanently protected. Each CFA has a discreet and defined boundary that is based on meeting specific conservation objectives (defined further in this appendix), with some refinements to accommodate ownership parcel lines where those adjustments do not diminish achieving our objectives. We did not redefine ownership parcel lines; entire parcels are included even if they only partially overlap priority habitats. Once land is acquired for the refuge, we will administratively call the CFA a refuge "division." For example, if we acquire land in the Maromas CFA, we will then call those refuge lands the Maromas Division of Conte Refuge.

The land protection plan included in the CCP represents the number, size, and distribution of CPAs and CFAs. The selection of final CCP/EIS alternative C for implementation resulted in a refuge expansion of 99,507 acres and a sum total of 197,337 refuge acres. Approximately, and on average, 90% of the acreage acquired will lie within the CFAs; the remaining 10% will occur in CPAs (e.g., area outside of CFAs). Our recommendations for managing these lands is included in this appendix A, while the design, strategy, and priority for acquiring those lands is further detailed in CCP Appendix C, "Land Protection Plan (LPP)." A summary of the criteria and considerations for defining CFAs is presented below.

Conserves Priority Conservation Targets. We worked with the States and conservation organizations to compile known information on Federal trust resource occurrences and associated important habitat areas. In general, each CFA includes a core biological area that is based on the needs of identified priority resources. In each individual CFA description that follows, we identify the priority refuge resources of concern that will guide future management of those lands under Service ownership.

Provides Habitat Connections. We worked with the States and conservation organizations to ensure habitat connections for Federal trust species and other respective state species of concern within the existing and planned conservation landscape. Each of the States and several conservation organizations have identified target or focal areas for additional conservation, and we discussed with them ways to complement their efforts. Collectively, we considered habitat connectivity in area (size), elevation, latitude, aspect, and natural processes (e.g., hydrological flow, groundwater recharge, etc.).

Incorporates Adaptation Strategies for Predicted Climate and Land Use Changes. We also considered in our distribution of CFAs how connections to other existing conserved lands will promote representation, redundancy, and overall resiliency within the watershed, allowing us to be better prepared for changes in land use and climate. We considered North Atlantic LCC modeling results depicting indexes of ecological integrity, and results from The Nature Conservancy resiliency mapping. We considered how our contribution to the conserved lands network could also facilitate near and long term desirable outcomes for species migration and emigration under predicted land use and climate changes. For example, the barrier-free segment near the Connecticut River's mouth creates opportunities, over time, for the landward migration of the coastal wetland complex from the Long Island Sound which can be enhanced through the strategic placement of CFAs in this reach of the river.

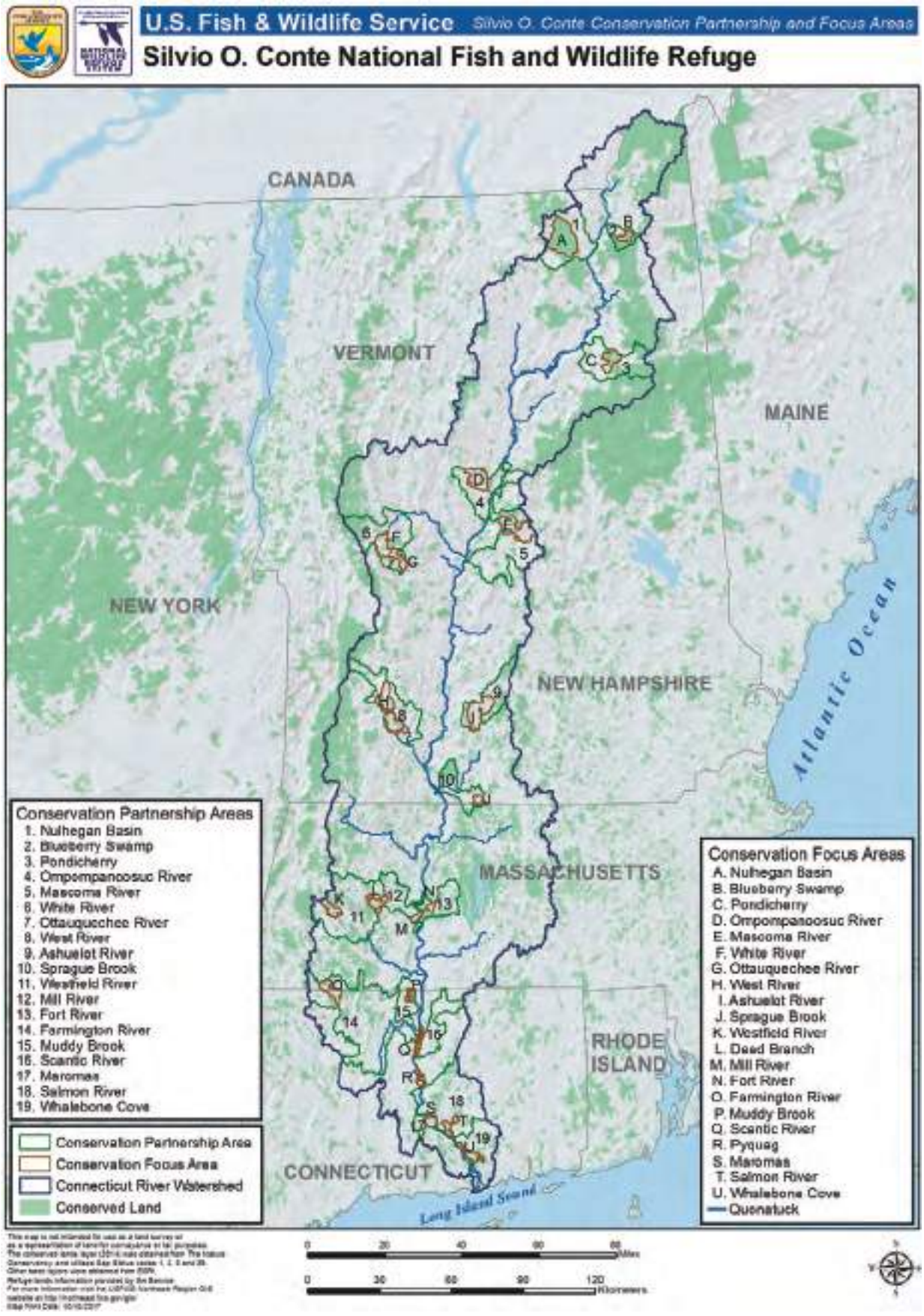
Incorporates Administrative Efficiencies. CFAs are primarily based on the ecological criteria and considerations above; however, the final boundary includes refinements or adjustments to establish a more accessible and operationally efficient "administrative line" that follows prominent features within the landscape that secures public and administrative access, Service visibility, and the cost of land stewardship in perpetuity.

In some instances, the exterior administrative line follows transportation corridors, waterways, or other more recognized and predictable configurations. The administrative line is intended to reduce the impact from adjacent uses, promote access and visibility of refuge lands, and conserve operational funding through reductions in maintenance and administrative costs.

Refuge Divisions: Refuge divisions are an administrative subdivision of an existing refuge; they are not stand-alone, official refuges in themselves, although they may have a large enough land base that separate plans and programs are developed. There are currently 10 divisions on Conte Refuge. Since all 10 have an approved expansion under the CCP, we refer to them as CFAs in this appendix to minimize confusion. However, lands approved for acquisition in CFAs will either become incorporated into an existing refuge division or a new refuge division will be created once land is acquired.

Refuge Units: Refuge units are discreet parcels of existing refuge lands acquired for a specific purpose. There are currently 11 units on Conte Refuge; all are small isolated parcels acquired because they were identified as special focus areas in the 1995 Final Environmental Impact Statement establishing the refuge. Some may be administratively included in refuge divisions.

Map A.1. Conservation Partnership Areas and Conservation Focus Areas



The primary purpose of this appendix is to explain the importance of existing refuge lands (refuge divisions and units) and approved future refuge lands (CFAs) in meeting the goals and objectives we identified in the CCP, and to detail how we will manage these lands into the future. In our explanation that follows, we focus on how these lands help conserve Federal trust species and other resources of concern and their habitats (goal 1); how conservation education and outreach could be enhanced (goal 2), the potential for providing compatible, public use opportunities (goal 3), and opportunities to further develop and promote meaningful partnerships (goal 4).

Specifically, we describe the resources of interest and concern for each of the 22 CFAs and 11 refuge units in the watershed and detail our management objectives and strategies for these areas. After this introduction, we have organized the body of this appendix into four State sections, one for each of the four States in the watershed. Each State section is further subdivided into a presentation on individual CFAs or refuge units. The information we provide for each CFA or refuge unit includes:

- An "overview" sheet with highlights of each area.
- Maps of the CPA and CFA for the area, including a delineation of existing refuge lands and conservation lands, as appropriate.
- A map of general habitat types within the larger CPA area.
- A table of acres by general habitat type.
- A table of species and habitats of conservation concern for the area, including the priority refuge resources for refuge management.
- A description of management objectives and strategies for both existing refuge lands and those that we acquire in the future. This management direction tiers directly to each of the four goals and respective objectives in chapter 4.

We have two exceptions to the organization we describe above. In the Massachusetts section, we also include an overview for the Great Falls Discovery Center which is located in Turners Falls, Massachusetts. The Great Falls Discovery Center is not a CFA or unit, but rather a partnership facility for environmental education and interpretation of the Connecticut River watershed. This overview includes background information, a general locator map, and a description of the management objectives and strategies for the center.

The second exception to our organization is the information we provide on the Quonatuck CFA, which spans all four States in the watershed. The Quonatuck CFA includes the lands adjacent to the Connecticut River main stem and major river tributaries, although we are approved to acquire only 8,000 acres in this CFA. Because this CFA spans all four States, we present its overview separately at the beginning of the appendix.

Landscape Perspective

Expanding the refuge to a sum total of 197,337 acres will be an important contribution to the conserved lands network in the 7.2 million-acre watershed. Our plan focuses on protecting core habitats of significance to Federal trust resources and promoting strategic habitat connections with other conserved lands in collaboration with our partners. Additionally, this plan builds on the 1995 EIS goals to protect federally listed threatened, endangered, and candidate species; rare or exemplary natural communities; important fisheries habitat; important and vulnerable wetlands; and landbird and waterbird breeding and migratory stopover habitat.

The expansion will contribute to a variety of ecoregional landscape plans and partnership initiatives that include the North Atlantic Landscape Conservation Cooperative (LCC), the North American Waterfowl Management Plan, the Atlantic Coast Joint Venture, the Northern Atlantic Regional Shorebird Plan, the Black Duck Joint Venture Strategic Plan, the Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes Region, the Bird Conservation Region (BCR) 14 and 30 Plans, the *Connect the Connecticut* Landscape Conservation Design project (*http://connecttheconnecticut.org/*), and the four States' respective Wildlife Action Plans. More than 200 species identified as a conservation priority in State Wildlife Action plans will benefit from this plan.

The LPP (CCP appendix C) provides details on how we identified CFAs, the natural resource values in these areas, and why, in our judgment, those lands will be best protected, managed and conserved in Federal fee ownership or under a Federal conservation easement. The LPP also provides more detailed information on our land protection strategies, including the various options for acquiring and protecting lands from willing sellers by the Service within CFAs. For example, the refuge will seek fee title acquisition of approximately 65 percent of the lands it acquires, and will acquire interests via conservation easements on approximately 35 percent. However, the actual percentage will depend on individual landowner preferences.

The following table (A.1) lists all the CPAs, existing and approved refuge divisions (e.g. CFAs), refuge units, and the approved acquisition acreages.

Table A.1. Existing and Approved Refuge Ownership

State(s)	Conservation Partnership Area (CPA)	Conservation Focus Area (CFA)	Refuge Unit[1]	Acres Currently Owned by Service[2]	Acres Approved for Service Ownership[3]
CT/MA/NH/VT	~	Quonatuck CFA (Connecticut River main stem and 13 major tributaries)	~	0	8,000
CT/MA	Farmington River CPA	Farmington River CFA	~	0	7,661
CT	Maromas CPA	Maromas CFA	~	0	3,935
CT	Muddy Brook CPA	Muddy Brook CFA	~	0	2,661
CT	~	Pyquag CFA	~	0	3,329
CT	Salmon River CPA	Salmon River CFA	~	468	4,455
CT	Scantic River CPA	Scantic River CFA	~	0	4,144
CT	Whalebone Cove CPA	Whalebone Cove CFA	~	116	3,930
CT	~	~	Deadman Swamp Unit	31	31
CT	~	~	Roger Tory Peterson Unit	56	56
MA	Fort River CPA	Fort River CFA	~	261	1,660
MA	Mill River CPA	Mill River CFA	~	249	2,300
MA	Westfield River CPA	Westfield River CFA	~	125	6,177
		Dead Branch CFA	~	98	5,186
MA	~	~	Fannie Stebbins Unit	98	98
MA	~	~	Hatfield Unit	19	19
MA	~	~	Honeypot Road Wetlands Unit	21	21
MA	~	~	Mount Toby Unit	30	30
MA	~	~	Mount Tom Unit	141	141
MA	~	~	Third Island Unit	4	4
MA	~	~	Wissatinnewag Unit	21	21

State(s)	Conservation Partnership Area (CPA)	Conservation Focus Area (CFA)	Refuge Unit[1]	Acres Currently Owned by Service[2]	Acres Approved for Service Ownership[3]
NH	Ashuelot River CPA	Ashuelot River CFA	~	0	17,860
NH	Blueberry Swamp CPA	Blueberry Swamp CFA	~	1,166	4,636
NH	Mascoma River CPA	Mascoma River CFA	~	761	20,593
NH	Pondicherry CPA	Pondicherry CFA	~	6,443	10,249
NH	Sprague Brook CPA	Sprague Brook CFA	~	0	3,016
NH	~	~	Saddle Island Unit	2	2
VT	Nulhegan Basin CPA	Nulhegan Basin CFA	~	26,605	32,779
VT	Ompompanoosuc River CPA	Ompompanoosuc River CFA	~	0	15,072
VT	Ottauquechee River CPA	Ottauquechee River CFA	~	0	5,985
VT	West River CPA	West River CFA	~	0	22,947
VT	White River CPA	White River CFA	~	0	10,054
VT	~	~	Putney Mountain Unit	285	285
			Totals	**37,000**	**197,337**

1 *Refuge Units may be assigned to a CFA in the future.*

2 *Total as of February 2016.*

3 *Includes acres currently owned by Service. These totals represent the estimated maximum acreage the Service would conserve. As detailed in CCP appendix C, we have the authority to acquire approximately 90% of total acreage, on average, within CFAs, and the remaining 10% in surrounding CPAs (see maps in chapter 4). We only purchase lands from willing sellers and do not expect to purchase any lands already permanently conserved by others, except under extenuating circumstances.*

USFWS

Connecticut River from Mount Sugarloaf overlook

Connecticut River Main Stem and Major Tributaries

Quonatuck Conservation Focus Area

Quonatuck Conservation Focus Area

Along the main stem of the Connecticut River and major tributaries in Vermont, New Hampshire, Connecticut, and Massachusetts

Conservation Focus Area (CFA) — Acreage Profile	Acres
Total Acres in CFA*	8,000

* These 8,000 acres are not tied to any specific parcels. The Service does not plan to acquire existing conserved lands along the Connecticut River main stem or its tributaries and will only acquire lands from willing sellers. Existing refuge units along the main stem or major tributaries will be administratively assigned to the Quonatuck CFA, but their acreages are additive to this total. Also, other approved CFAs in the final CCP that occur along the main stem are in addition to the Quonatuck CFA.

What specific criteria and/or considerations drove the selection of this CFA?

The Quonatuck CFA is conceived as 8,000 acres of priority habitat along the main stem of the Connecticut River and major tributaries (see map A.2 below). The CFA's boundary approximates the 100-year floodplain, as defined by the Federal Emergency Management Agency (FEMA; *http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping#2;* accessed August 2016), for the main stem and major tributaries. The map is an approximation of the tributaries that will be considered. The 8,000 acres targeted for this CFA are in addition to the acreage identified for several other CFAs and existing refuge units that occur within the 100-year floodplain of the Connecticut River and its tributaries.

The Quonatuck CFA represents approximately 1,500 acres of tidal marsh and floodplain habitat along the mouth and lower extremities of the river in Connecticut, approximately 1,500 acres of floodplain forest along the river and major tributaries in Massachusetts, and approximately 5,000 acres of floodplain forest along the upper portion of the river and major tributaries and distributed evenly between New Hampshire and Vermont.

Our priority will be conserving floodplain forests and wetlands, as well as tidal (salt, brackish, and freshwater) wetlands, and any occupied or potential habitat for federally listed or candidate species. We will seek to protect all of these habitats where they currently occur, where they can be restored, and/or where they are projected to migrate in the future due to climate change. We will particularly focus on conserving ownerships that include river frontage.

What are the priority habitat types within the CFA?

The priority habitats within the Quonatuck CFA are tidal (salt, brackish, and freshwater) wetlands, floodplain forests, riparian areas, and any occupied or potential habitat for federally listed or candidate species along the main stem of the Connecticut River and its major tributaries.

What are the resources of conservation concern for the CFA?

1. **Federally Listed Threatened and Endangered Species**
   At least fifteen federally threatened and endangered species, including those that have been petitioned for listing, occur in the Quonatuck CFA. These include northern long-eared bat, tricolored bat, roseate tern, northeastern bulrush, Canada lynx, small whorled pogonia, shortnose sturgeon, dwarf wedgemussel, Atlantic sturgeon, Puritan tiger beetle, Jesup's milk-vetch, piping plover, Indiana bat, yellow banded bumble bee, monarch butterfly, regal fritillary, wood turtle and red knot.

   This CFA will contribute to the conservation of the federally endangered dwarf wedgemussel. Very little is known about the habitat requirements of dwarf wedgemussel, whose stronghold is the Connecticut River, although early investigations hypothesized it requires stable bank conditions and high water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000). This mussel is threatened by habitat loss, fragmentation and altered river processes (Nedeau 2009).

   Shortnose sturgeon and Atlantic sturgeon use habitats in the lower portion of the Connecticut River. Sections of the main stem in Massachusetts are important migrating habitat for shortnose sturgeon,

while certain sections in Connecticut are critical spawning and overwintering habitat for this species. Juvenile Atlantic sturgeon were recently documented in the lower portion of the Connecticut River (S. Gephard, CTDEEP, personal communication 2015). This Federally endangered species is also a species of greatest conservation need in Connecticut, and were once considered extirpated in the Connecticut River as reproduction no longer occurred in the main stem (Sprankle personal communication 2014). The documentation of juveniles provides a higher probability that there are opportunities to recover this species in the Connecticut River.

The remaining listed species occur in habitats directly adjacent to the river and its tributaries. The federally threatened Puritan tiger beetle occur in two populations along the Connecticut River—one in Massachusetts owned by the City of Northampton and Massachusetts Division of Fisheries and Wildlife (MADFW) and another partially occurring on the refuge's Dead Man's Swamp Unit in Connecticut. The Recovery Plan for this species was issued in 1993 (USFWS 1993b). The recovery plan called for a minimum of three metapopulations established or maintained along the species historic range along the Connecticut River. The 2007 5-year review recommended that a high priority be given to identifying private landowners that would be willing to enter into conservation easements for the protection and management of Connecticut River shoreline habitat supporting beetles (USFWS 2007).

The only three known populations of the endangered plant Jesup's milk-vetch occur along the main stem in New Hampshire and Vermont, all in the Quonatuck CFA. These plants rely on the riverside rock outcrops and ledges of the Connecticut River. The Recovery Plan for this species was issued in 1989 (USFWS 1989b). The protection of the populations was a high priority in the recovery plan. The 5-year review in 2008 stated that the plant continued to experience a high degree of threat and that the three populations along the Connecticut River should be permanently protected by acquisition/conservation easements or through long-term management agreements. The 2009 spotlight action plan specifically highlights land acquisition by the refuge as part of the Service's role and responsibility in the species' protection and recovery (USFWS 2009).

The northeastern bulrush occurs within various wetlands in the CFA. This species has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

Small-whorled pogonia occurs in very few locations in the watershed. This plant inhabits upland sites in maturing stands of deciduous or mixed deciduous and coniferous forests with sparse-to-moderate ground cover (due to nutrient poor soils), a relatively open understory, and proximity to persistent openings in the forest canopy, such as logging roads and streams. Permanent protection through land acquisition and conservation easements, consistent monitoring of known populations and a better understanding of habitat management techniques required to maintain viable populations are some of the criteria needed to delist the species (USFWS 2008).

Canada lynx, a federally threatened species, have been documented within the spruce-fir forests of northeastern Vermont and New Hampshire. Lynx were confirmed breeding within the Nulhegan Basin CFA in the winters of 2012 and 2013. Conservation efforts for this species will be done at the landscape scale, since no single landowner is likely to support enough habitat for this species. Additional information is necessary to evaluate the importance of the Connecticut River watershed for Canada lynx and to determine what measures are needed to ensure their persistence within northern Vermont and New Hampshire. We will continue to monitor Canada lynx populations in the Nulhegan Basin CFA, and work with partners to develop a regional lynx management plan.

This CFA is within the range of the northern long-eared bat and tri-colored bat. During summer nights, these bats forage on insects within wetlands and forested habitats, and roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day. These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

The grassland habitat within this CFA is important for pollinators, such as the yellow banded bumble bee, regal fritillary and monarch butterfly. These species, as well as many other pollinator populations, have been declining due to habitat loss, pesticide use, competition with non-native species and disease. The yellow banded bumble bee, fritillary, and monarch butterfly have experienced drastic declines, and the Service has been petitioned to list them under the Endangered Species Act.

Wood turtle, a species under review for federal listing, may occur in this CFA. This species uses aquatic and adjacent terrestrial habitats throughout the year. Wood turtles are thought to be experiencing population declines exceeding 50% over the past 100 years. Populations live primarily in and around river habitats which are often heavily impacted by human development. Habitat degradation, fragmentation and destruction are the main causes for population declines (van Dijk and Harding, J. 2016).

Also, the federally threatened piping plover nests along a 1-mile sand spit owned by The Nature Conservancy at the mouth of the Connecticut River. Red knot and roseate terns are known to use habitat at the mouth of the Connecticut River for stop-over habitat.

2. **Migratory Birds**
The floodplain forest, fresh and tidal wetlands, and riparian habitats along the main stem of the Connecticut River are especially important to migrating birds, such as waterfowl, rails, raptors, and songbirds (Dreyer and Caplis 2001). Species that use these habitats include American black duck, American bittern, snowy egrets, marsh wrens, willow flycatchers and semipalmated sandpiper.

This CFA will also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

A study of spring stopover habitat use by Neotropical migrant birds within the Connecticut River Valley (*http://www.science.smith.edu/stopoverbirds/index.html;* accessed March 2015) conducted by Smith College through funding by the Service provides indications of the importance of the Connecticut River watershed to migrating birds. During a 3-year study (1996 to 1998), observers conducted 8,640 point count surveys and counted a total of 102,259 birds. The results demonstrated that spring migrant birds using the Eastern Flyway reach the southern portions of the Connecticut River watershed in large numbers, then disperse throughout the watershed and beyond as they continue north. Almost half (47 percent) of the birds counted within the defined count circles were at sites along the main stem of the Connecticut River. This trend was even more pronounced along the Connecticut and Massachusetts portions of the river and during the early periods of spring migration. Forested wetlands and shrub swamps are likely to be particularly valuable habitats along the main stem of the river because they provide more food and protection earlier in the spring migratory period due to warmer air and water temperatures and earlier tree leaf-out. Overall density of birds observed decreased by about half from south to north, as birds dispersed away from the main stem of the river as they moved north. The mouth and lower main stem of the Connecticut River may serve as a landscape feature used by many Eastern Flyway migrants to orient north after reaching the southern New England coast. The results of this study suggest that habitat protection within the Connecticut River watershed will have significant benefits for supporting neotropical migrants during the spring migratory period, especially forest and shrub wetlands along the southern third of the main stem.

3. **Waterfowl**
The lower Connecticut River has abundant waterfowl year-round and has some of the highest and most significant concentrations of black duck in the Northeastern United States (Dreyer and Caplis 2001). The freshwater and tidal wetlands along the Connecticut River, particularly in the lower portion of the watershed, provide important stopover habitat during both spring and fall migrations for waterfowl, such as American black duck. The habitats most important to black duck are the tidal wetlands along the main stem, as well as the tidal wetlands and bays along the coast. In the winter, the river provides relatively ice-free open water habitat providing access to submerged aquatic vegetation, invertebrates and high-calorie wetland vegetation. Many waterfowl also nest along the river, including mallards, black duck, Canada goose, green-winged teal, and gadwall.

Further north in the watershed, many migrating ducks use flooded agricultural fields, floodplains, emergent wetlands, shrub swamps, and backwater areas along the Connecticut River for stopover habitat. In fact, the Connecticut River is a waterfowl focus area under the Atlantic Coast Joint Venture for New Hampshire and Vermont, highlighting the importance of the river habitats to breeding and migrating waterfowl (ACJV 2005, NHFG 2006). Species such as Canada geese, teals, mergansers, American black ducks, mallards, wood duck, and some sea ducks use the river corridor during spring and fall migration. The river provides prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. Other species nest along the river, but are less common.

4. **Diadromous fish and other aquatic species**
   In addition to the aquatic species mentioned above under "Federal Threatened and Endangered Species," the Connecticut River is home to a variety of anadromous fish and other aquatic species including alewife, blueback herring, Atlantic salmon, American eel, sea lamprey, and American shad. Brook trout are also present, but use cold water tributaries and are more common in the northern portion of the watershed. This high number of priority aquatic species is an indication of the diversity of habitats provided by the Connecticut River and its extensive tributaries. One of the major threats to these species is the large number of dams along the Connecticut River and its tributaries, which are obstacles to migratory fish and other aquatic species passage.

5. **Wetlands**
   There is a large diversity of important wetlands along the Connecticut River main stem and its tributaries. These include floodplain and riparian forests that improve water quality for plants, fish, wildlife, and a very large urban and suburban human population. These riparian wetlands are also important for absorbing impacts from more frequent storm events where coastal and inland flooding can negatively impact habitats and human infrastructure. The protection and restoration of these habitats is critical to becoming more resilient to climate change.

   Other wetlands of significance include the tidal wetlands complex in southern Connecticut which was designated "Wetland of International Importance" by the Ramsar Convention. The Ramsar designation is used for wetland complexes that have international significance in terms of ecology, botany, zoology, limnology, or hydrology. The Connecticut River designated area contains 20,570 acres and consists of 20 discreet major wetland complexes. The lower tidal wetlands complex is considered the best example of this type anywhere in the Northeastern United States and is the most pristine large river marsh system in the Northeast.

6. **Other**
   New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts. Due to the loss of early successional forest and natural shrubland habitats to development and forest maturation, this species occupies less than a fifth of its historical range (Fuller and Tur 2012). New England cottontail is no longer sustaining a viable population, and given this conservation urgency, a range-wide New England cottontail Initiative was established. This initiative involves collaboration from multiple agencies to address cottontail conservation on a landscape scale. Focus areas were identified within its historical range in New England as locations to manage and restore habitat for New England cottontail. Other wildlife species associated with this habitat type have experienced similar declines, and the New England cottontail has been identified as a surrogate for this suite of shrubland-dependent species.

What habitat management activities will be a priority on refuge lands within the CFA?

Our major habitat management will be habitat restoration and conservation, particularly restoring and maintaining floodplain forest, tidal wetlands, and forested buffers along the river and its tributaries.

What public use opportunities will be a priority on refuge lands within the CFA?

We will seek to provide recreational access to the river for priority public uses (hunting, fishing, wildlife observation and photography, interpretation, and environmental education) consistent with the applicable final compatibility determinations.

Does the CFA have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

In addition to the Ramsar designation mentioned above, the Connecticut River is designated as National Blueway and an American Heritage River. There are also at least five Important Bird Areas (IBAs) in the Connecticut River watershed: Lower Connecticut River Valley IBA, Station 43 IBA, Herrick's Cove IBA, Barton's Cove—Poet's Seat IBA, and Longmeadow Flats IBA.

How will increased land protection within this CFA help the Service and other conservation landowners adapt and respond to climate change? For example, do these lands significantly contribute to representation, resiliency, and connectivity across the watershed?

The Connecticut River is a free-flowing river for its entire extent in the State of Connecticut. The first dam on the main stem is located in Holyoke, Massachusetts. Its head of tide, the point within the river system where the daily flushing of the tides does not affect the level, is located near Hartford, Connecticut. The barrier-free segment of the river in the State of Connecticut creates opportunities for the emigration of the coastal wetland complex from the Long Island Sound. This CFA is strategically placed to allow that migration to occur. Tidal salt, brackish, and freshwater wetlands along with other floodplain wetlands and forests will be a priority for protection within this CFA. As the sea level changes, the tidally influenced coastal wetland complex will have room to move inland, given suitable soils slopes and other factors.

A major goal is to work with the rest of the conservation community to promote, maintain, and/or enhance both terrestrial and aquatic ecosystems connectivity. Critical connections exist not only between aquatic systems, but also between the Connecticut River uplands, lowlands, and floodplain. This CFA facilitates that connectivity and provides more flexibility to adapt to land use and climate change. Strategically protecting land within this CFA can promote near- and long-term opportunities for adaptation, such as corridors for species' migration.

Map A.2. The Quonatuck CFA (approximately based on the 100-year floodplain along main stem and major tributaries)

Goals, Objectives, and Strategies for Refuge Lands in the Quonatuck CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for migrating landbirds, potential connectivity corridors for Canada lynx, roosting habitat for bat species, early successional habitat for New England cottontail and mature stands with appropriate microhabitat for small whorled pogonia.

Rationale:
We envision healthy forests within the Quonatuck CFA where a diverse seral structure provides suitable habitat conditions for a suite of wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010). This sub-objective assumes the forests of the Quonatuck are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Foster et al. 1998; Foster 2000; Goodburn and Lorimer 1998; Cogbill 2002; Bellemare et al. 2002; Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

For many species, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Quonatuck will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. The USFWS New England cottontail initiative has identified focus areas along the lower Connecticut River, where the decline in early successional habitats is a particular problem for the New England cottontail. New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of fifteen or more habitat patches, several of which are 25 acres or more. Each habitat patch being one mile or less from each other to aid in New England cottontail movement between patches (Fuller et al 2012). Early successional management within the Quonatuck CFA will occur adjacent to existing acceptable habitat patches to benefit New England cottontail.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Petit 2000; Moore et al. 1990; Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Noss 1991; Moore et al. 1990). Clearly, structurally complex habitats will not be suitable for all migratory species,

but our conservation goal is to provide those areas used most frequently by migrating birds, suggesting relatively tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990; Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. Our management goals for hardwood forests in this CFA will be to provide a diversity of age classes supporting a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al 2004).

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. In order to support the foraging needs of the greatest diversity of bird species, hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991; DeGraaf et al. 2006). Small-whorled pogonia, a federally threatened species also inhabits mature forests within the CFA. This species occurs in very few locations in the watershed and tends to occupy persistent open canopy sites that have soils with a pan layer and slopes with 11 to 17 percent gradient. On-going research in the northern portion of the species range is obtaining a better understanding of the habitat management techniques required to maintain viable populations (USFWS 2008).

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater than dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the sharp-shinned hawk and as roosting sites for bats such as federally listed northern long-eared and Indiana bats. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that, when near open bodies of water, are utilized by bald eagles and osprey. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, barred owls, and woodpeckers, like the northern flicker.

Canada lynx, a federally threatened species, have been documented within the spruce-fir forests of northeastern Vermont and New Hampshire. Lynx were confirmed breeding within the Nulhegan Basin CFA in the winters of 2012 and 2013. Conservation efforts for this species will be done at the landscape scale, since no single landowner is likely to support enough habitat for this species. Additional information is necessary to evaluate the importance of the Connecticut River watershed for Canada lynx and to determine what measures are needed to ensure their persistence within northern Vermont and New Hampshire. We will continue to monitor Canada lynx populations in the Nulhegan Basin CFA, and work with partners to develop a regional lynx management plan.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan (HMP).

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure.

- Work with partners and adjacent landowners to identify areas appropriate for New England cottontail management. Plan to manage approximately 100 acres of shrubland habitat for New England cottontail in the CFA. This approximation of the amount and distribution of acreage over the next 15 years assumes we will have a large enough land base to manage. Our target acreage may also be refined once site conditions are verified and a HMP is completed.

- Work with partners and the USFWS New England Field Office to develop a lynx management plan for northern Vermont and New Hampshire, and evaluate the importance and role of habitats in the Quonatuck CFA to lynx populations in the southern portion of their range.

- Work with partners, including the states in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map vernal pools and seeps.

- Conduct forest and wildlife inventories including bat inventories and migratory and breeding landbird surveys.

- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1b. (Hardwood Swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, as well as wintering habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Quonatuck Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer.

Hardwood swamp occurrences within the Quonatuck CFA with more alkaline soils are often found along riparian and floodplain areas in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the water table drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Quonatuck will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in a landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA may also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the four state's wildlife agencies in support of their respective state wildlife action plan, to ensure management on Service lands complements adjacent land management objectives.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve forest structure, species composition, and/or ecological function.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including surveys for rusty blackbirds during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, improve landscape connectivity to aid in climate change adaptation and provide habitat for migrating landbirds, wintering rusty blackbirds, breeding wood turtles and migrating, breeding, and wintering waterfowl.

Rationale:
Shrub swamps and floodplain forests are often found within the floodplain of rivers and streams. Though, shrub swamps also occur in isolated pockets within poorly drained areas and small seepage zones that are not part of a floodplain system (Gawler 2008). Many shrub-dominated swamp communities are maintained through flooding, and will likely persist for centuries. Floodplain forests occur within the floodplains of major river systems, including the Connecticut River and many of its tributaries. These forests were a common occurrence until the middle of the 1800s, when floodplain communities were converted to agricultural use or urban areas. Floodplains

are still valuable for agriculture today, and only fragments of floodplain forest remain within the watershed (Marks et al. 2011, Thompson and Sorenson 2000).

Shrub swamp and floodplain forest communities provide important habitat for migratory landbirds. A study of spring stopover habitat use by neotropical migrant birds within the Connecticut River Valley (*http://www.science.smith.edu/stopoverbirds/index.html*; accessed August 2013) conducted by Smith College through funding by the Service provides indications of the importance of the Connecticut River watershed to migrating birds. During a 3-year study (1996 to 1998), observers conducted 8,640 point count surveys and counted a total of 102,259 birds. The results demonstrated that spring migrant birds using the Eastern Flyway reach the southern portions of the Connecticut River watershed in large numbers, then disperse throughout the watershed and beyond as they continue north. Almost half (47%) of the birds counted within the defined count circles were at sites along the main stem of the Connecticut River. This trend was even more pronounced along the Connecticut and Massachusetts portions of the river and during the early periods of spring migration. Forested wetlands and shrub swamps are likely to be particularly valuable habitats along the main stem of the river because they provide more food and protection earlier in the spring migratory period due to warmer air and water temperatures and earlier tree leaf-out. Overall density of birds observed decreased by about half from south to north, as birds dispersed away from the main stem of the river as they moved north. The mouth and lower main stem of the Connecticut River may serve as a landscape feature used by many Eastern Flyway migrants to orient north after reaching the southern New England coast. The results of this study suggest that habitat protection within the Connecticut River watershed will have significant benefits for supporting neotropical migrants during the spring migratory period, especially forest and shrub wetlands along the main stem of the river.

This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Wood turtle, petitioned for federal protection in 2012, uses aquatic and adjacent terrestrial habitats within the Connecticut River watershed. Wood turtles are thought to be experiencing population declines exceeding 50% over the past 100 years. Populations live primarily in and around river habitats which are often heavily impacted by human development. Habitat degradation, fragmentation and destruction are the main causes for population declines (van Dijk and Harding, J. 2016). The shrub swamp and floodplain forest communities along the Connecticut River also provide stopover and breeding habitat for migrating and breeding waterfowl. The Connecticut River is a waterfowl focus area for New Hampshire and Vermont under the Atlantic Coast Joint Venture, highlighting the importance of the river habitats to breeding and migrating waterfowl (ACJV 2005, NHFG 2006). Species such as Canada geese, teal, mergansers, American black ducks, mallards, wood duck, and some sea ducks use the river corridor during spring and fall migration. The river provides prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. The lower Connecticut River supports waterfowl year-round with some of the highest and most significant concentrations of American black duck, a priority refuge resource of concern species, in the Northeastern United States (Dreyer and Caplis 2001).

Floodplains are not only important to species of conservation concern, but also to provide resilience to climate change. Storms are predicted to become more frequent and capable of producing more coastal and inland flooding. These storms are, and can continue to, negatively impact habitats and human infrastructure. Intact and connected floodplain habitats will slow down and contain floodwaters decreasing damage to watershed ecosystems and human infrastructure. It is critical that these habitats are protected and restored throughout the watershed.

Due to our unfamiliarity with habitat conditions in the CFA, management of these wetland communities will first require a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of these wetlands at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Work with partners to restore degraded habitats, particularly floodplain forests.
- Work with partners, including the four state's wildlife agencies in support of their state wildlife action Plans. to ensure management on Service lands complement adjacent land management objectives.
- Control invasive plant species following best management practices. Invasive plant priorities include:
  - ✓ Removing invasive Oriental bittersweet using a combination of pulling smaller plants, cutting larger stems, and treating with herbicides to protect valuable canopy trees and young floodplain forest trees.
  - ✓ Removing Norway maple, Japanese knotweed and Japanese stiltgrass to protect floodplain forest.
  - ✓ Control Amur corktree and other new, small infestations of invasive plants able to withstand flooding.
- Work with local Conservation Commissions on preferred herbicide use measures and ensure our invasive plant control complies with state wetlands protection acts.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including waterfowl surveys, migrating landbird surveys and surveys for rusty blackbirds for winter use.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marsh communities to support natural and rare ecological communities, and provide breeding, wintering, and stopover habitat for waterfowl.

Rationale:
Freshwater marshes along the Connecticut River are often part of the floodplain community, though they also occur in isolated pockets within poorly drained areas and small seepage zones outside the floodplain system. These habitats provide important stopover and breeding habitat for waterfowl and waterbirds. The Connecticut River is a waterfowl focus area for New Hampshire and Vermont under the Atlantic Coast Joint Venture, highlighting the importance of the river habitats to breeding and migrating waterfowl (ACJV 2005, NHFG 2006). Species such as Canada geese, teal, mergansers, American black ducks, mallards, wood duck, and some sea ducks use the river corridor during spring and fall migration. The river provides prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. Freshwater marshes provide calorie-rich aquatic and emergent vegetation, and invertebrates for these waterfowl species. Rails, bitterns, egrets, and herons also use freshwater marsh habitats for breeding and stopover foraging opportunities. Shorebirds will use tidal mudflats of freshwater tidal wetlands for foraging in the southern portion of the watershed.

The northeastern bulrush, a wetland plant, occurs within various beaver wetlands in the CFA. This species is federally listed, and has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

The 1993 Recovery Plan for the species called for protection measures such as land acquisition and conservation easements (USFWS 1993). The 5-year review echoed these recommendations, stating that the highest priority actions are to resurveying populations that have not recently been surveyed, securing protection on public and private lands, conducting periodic surveys of populations to determine trends and threats, and implementing management tools to reduce threats and monitor effectiveness of these actions (USFWS 2008).

Freshwater marsh communities are identified as having high ecological and functional importance within the state wildlife action plans. Also within these plans, a common concern exists for the health and proliferation of these habitats. Development, invasive species, contamination, altered hydrology, dredging, and sedimentation are a few of the threats that are damaging these ecosystems.

Due to our unfamiliarity with habitat conditions in the CFA, management of these wetland communities will first require a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of these wetlands at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Use state best management practices within or adjacent to active agricultural fields that are located along the perimeter of marsh habitats.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife use of existing wetlands.
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Where appropriate, restore pasture, hay, and grasslands to floodplain forest communities and provide a forested buffer along the Connecticut River. Also, if and where appropriate, maintain a contiguous block of grassland habitat for breeding and migrating grassland bird species and pollinators.

Rationale:
These habitat types are primarily the result of agricultural production activities. Agricultural lands occupy roughly 8.5 to 12 percent of the watershed's landbase, of which one-half to one-third, approximately 229,000 acres, is prime agricultural land. Most of the quality agricultural lands are in the broad Connecticut River Valley (Clay et al. 2006) and often within the floodplain of the Connecticut River.

Floodplain forests occur along medium to large rivers, and include a matrix of upland and wetland habitats. Common habitats in floodplains are silver maple stands, herbaceous sloughs, and shrub wetlands. Most areas are underwater each spring; micro-topography determines how long the various habitats are inundated. Associated trees include red maple and American hornbeam and on terraces or in more calcium rich areas, sugar maple or red oak may be locally prominent, with yellow birch and ash, black willow is characteristic of the levees adjacent to the channel. Common shrubs include silky dogwood and viburnum. The herb layer in the forested portions often features abundant spring ephemerals, giving way to a fern-dominated understory in many areas by mid-summer (Gawler 2008). Within the Connecticut River watershed, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions and soil compaction remain as threats.

Our conservation efforts within the Quonatuck CFA will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Intact floodplain forests in the Quonatuck CFA will provide high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Species such as wood thrush, veery, and black-throated green warbler with a preference for forest habitats during migration will benefit (McCann et al. 1993). Restoration of floodplain forest communities will restore forest connectivity, providing travel corridors for wildlife. Increased water quality will also result as erosion and siltation will decrease, and a restored canopy will provide shade for aquatic species.

During European settlement millions of hectares of forests were cleared for agriculture in the eastern U.S. creating habitat for grassland dependent birds. As agricultural activities declined, open areas dominated by herbaceous vegetation began to convert back to forests, causing a drastic decline in grassland species in the region. Prior to European settlement, Native Americans also cleared and maintain some amount of grassland habitat. Naturally occurring grassland ecosystems were not uncommon in the eastern U.S., but, were often found closer to the coast rather than inland (Brennan et al. 2005). These grassland ecosystems have since been impacted by development and fragmentation.

The major river valleys and coastal areas likely contained most of the natural grasslands (Dettmers and Rosenberg 2000). Today, little historic natural grassland remains. Potentially suitable lands, such as pastures and hayfields, are increasingly being converted into residential developments. The highest quality habitats for grassland birds in the Watershed typically are in conservation areas or airports which delay mowing until the middle of July to allow the ground-nesting birds to fledge their young.

Some level of grassland conservation and, where appropriate, restoration, is warranted based on the historic evidence and the desirability of retaining grassland species (often state-listed) in each state. The Partners in Flight plan for the Southern New England Physiographic region set a broad level goal of protecting 25,000 to 38,000 acres of grassland, to produce 250 breeding pairs of upland sandpipers, 800 pairs of grasshopper sparrows, and 15,000 pairs of bobolinks. In Connecticut, Connecticut Audubon recommended a 5,000-acre network of grasslands in patches at least 500 acres in size, 3,500 acre late harvest working hayfields (greater than 25 acre blocks), and giving priority to currently existing grasslands (Comins et al. 2005).

Grassland habitat is also important for pollinators, such as the yellow banded bumble bee, regal fritillary and monarch butterfly. These species, as well as many other pollinator populations, have been declining due to habitat loss, pesticide use, competition with non-native species and disease. The yellow banded bumble bee, fritillary and monarch butterfly have experienced drastic declines, and the Service has been petitioned to list them under the Endangered Species Act.

Due to our unfamiliarity with the habitat conditions in the CFA, a comprehensive, multi-scale habitat and wildlife inventory will be necessary to implement refuge strategies. This inventory will need to encompass all habitats within the CFA and associated landscape. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Assess the condition of pasture, hay and grassland habitats, as well as the overall size and location in the CFA, and proximity to other forest openings, to inform more detailed management strategies in an HMP.

- Explore research opportunities with academic partners to determine if floodplain forest restoration techniques are effective in establishing appropriate forest conditions and successful in meeting wildlife objectives.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water and River Shore)
In collaboration with partners, identify and implement habitat restoration opportunities within the Quonatuck CFA and Connecticut River to benefit priority refuge resources of concern including American shad, shortnose sturgeon, alewife, blueback herring, Atlantic salmon, dwarf wedgemussel, wood turtle, Jessup's milk-vetch and Puritan tiger beetles.

Rationale:
The Quonatuck CFA provides habitat for a diversity of aquatic and river shoreline species. The Connecticut River and associated tributaries provides migration and feeding habitat for American shad, shortnose sturgeon, American eel, blueback herring, Atlantic sturgeon and Atlantic salmon. The main stem shoreline within the CFA supports populations of the federally listed Puritan tiger beetles, which require sandy beaches, as well as three populations of Jessup's milk-vetch, which require river outcrops and ledges. Dwarf wedge mussel, another federally listed species, also occurs in the main stem and tributaries of the Quonatuck CFA.

Shortnose sturgeon and Atlantic sturgeon, federally listed species, use habitats in the lower portion of the Connecticut River. Sections of the main stem in Massachusetts are important migrating habitat for shortnose sturgeon, while certain sections in Connecticut are critical spawning and overwintering habitat for this species. Juvenile Atlantic sturgeon were recently documented in the lower portion of the Connecticut River (S. Gephard, CTDEEP, personal communication 2015). This Federal endangered species and a species of greatest conservation need in Connecticut, were once considered extirpated in the Connecticut River, as reproduction no longer occurred in the main stem (Sprankle personal communication 2014). The documentation of juveniles provides a higher probability that there are opportunities to recover this species in the Connecticut River.

Atlantic salmon use habitats in the lower portion of the Connecticut River, while blueback herring, American shad and American eel use the main stem and tributaries. Another species of conservation concern worth mentioning is sea lamprey. Sea lamprey enters the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

Wood turtle may also use the clear, hard-bottom streams and rivers, as well as adjacent forested habitat within this CFA. This species was petitioned for federal protection in 2012. They are thought to be experiencing population declines exceeding 50% over the past 100 years. Populations live primarily in and around river habitats which are often heavily impacted by human development. Habitat degradation, fragmentation and destruction are the main causes for population declines (van Dijk and Harding, J. 2016).

The federally threatened Puritan tiger beetle occur in two populations along the Connecticut River—one in Massachusetts owned by the City of Northampton and Massachusetts Division of Fisheries and Wildlife and another partially occurring on the refuge's Dead Man's Swamp Unit in Connecticut. The Recovery Plan for this species was issued in 1993 (USFWS 1993b). The recovery plan called for a minimum of three metapopulations established or maintained along the species historic range along the Connecticut River. The 2007 5-year review recommended that a high priority be given to identifying private landowners that would be willing to enter into conservation easements for the protection and management of Connecticut River shoreline habitat supporting beetles (USFWS 2007).

The endangered Jesup's milk-vetch is restricted to three locations of the Connecticut River in central New Hampshire and Vermont. Jesup's milk-vetch requires open areas with very little competition from other plants to germinate. This habitat is provided by frequent ice scours and spring flooding. Native and non-native invasive plants are altering the habitat suitability at all three sites. Intensive invasive species management efforts have been on-going since 1998 and have kept invasive populations at low levels, but long-term management strategies to control or eliminate invasive plants needs to be developed and implemented. Changes in weather patterns including unusual flooding events, lack of ice-scour and drought in recent years may impact Jesup's milk-vetch reproduction and ability to compete with other species for available habitat. Long-term investigations on impacts from these changes are needed to determine what impacts weather events are having on populations.

Introduction efforts of Jesup's milkvetch to other locations on the Connecticut River main stem have occurred intermittently since 2009. One site has proven successful with over 35% survival of planted seedlings the first year, and over 45% of those seedlings producing fruit the second year (Popp personal communication 2016).

Recovery of this species will be a long-term commitment. Efforts include annual monitoring of established and introduced populations, management of invasive plants, continued introduction of new sub-populations, and conservation of all sites.

This CFA will contribute to the conservation of the federally endangered dwarf wedgemussel. This species requires stable bank conditions and high water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000). This mussel is threatened by habitat loss, fragmentation and altered river processes (Nedeau 2009).

Restoring and maintaining the ecological integrity of upland and wetland habitats of the CFA will have positive impacts on water quality of the Connecticut River, and other aquatic systems in the CFA. Baseline information on the condition of the water resources, and associated upland and wetland habitats in the CFA will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to maintain open channels from the Connecticut River to open water coves.
- Work with adjacent landowners to eliminate barriers to aquatic species passage.
- Work with partners to develop and begin implementation of actions to conserve the existing Puritan tiger beetle metapopulation that includes the Deadmans Swamp unit. This should include identifying potentially suitable sandy beach habitat, land protection options for suitable habitats, actions that will contribute to recovery, and management of Service lands to complement tiger beetle recovery efforts.
- Work with partners to manage beach habitats to benefit Puritan tiger beetles which includes hand-pulling or herbicide application to encroaching vegetation in puritan tiger beetle larval habitat.
- Continue to support puritan tiger beetle research opportunities.
- Work with partners to monitor puritan tiger beetle populations.
- Work with partners to educate the general public about recreational use impacts on puritan tiger beetle populations using outreach, visitor contact, restricted access and other tools, as warranted.
- Partner with CT DEEP and other partners to establish two additional puritan tiger beetle meta-populations as called for in the Recovery Plan.
- Work with partners to secure existing Jessup's milk-vetch populations. Actions may include herbicide and mechanical treatment of encroaching vegetation and monitoring species status using a standardized approach.
- Work with partners to establish additional Jessup's milk-vetch populations on public and conserved lands along the Connecticut River main stem.
- Work with partners to develop a long-term management plan for Jesup's milk-vetch.
- Support long-term research for Jesup's milk-vetch including investigations on impacts from climate change and genetic studies.
- Work with partners to continue monitoring dwarf wedge mussel populations, and educate adjacent landowners on land use impacts to the species.
- Work with partners to develop comprehensive resource protection, monitoring and management plans for dwarf wedgemussels and puritan tiger beetles within the CFA boundary.

Within 10 years of land acquisition and CCP approval:

- Work with partners to protect and increase "hard bottom" (e.g., gravel, cobble, or bedrock) for spawning aquatic species.
- Work with partners to reduce combined sewer overflow.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Sub-objective 1.4a. (Dunes and Maritime Grasslands)
Protect and manage dunes and maritime grassland habitats to support species of conservation concern and natural and rare ecological communities.

Rationale:
These habitats include the Atlantic coastal plain northern dune and maritime grassland, and heathland and grassland community types. These systems are restricted to the coast of Connecticut, and are therefore rare in the watershed. Coastal dunes and grasslands are generally small, in good to fair condition, and often located

along Long Island Sound adjacent to low energy beaches (CT 2005). The grasses and shrubs that dominate are influenced by the maritime environment, including frequent salt spray, saltwater overwash, and sand movement (Gawler 2008).

The coastal plain heathland and grassland communities are related to dune grasslands but occur on sandplains, not dunes. These communities may occur as heathlands, grasslands, or support a patchwork of grass and shrub vegetation. Sandplain grasslands are one of the most impacted terrestrial habitats in Connecticut, and the condition of the habitat is considered poor (CT 2005). Coastal plain heathland and grassland community vegetation is maintained by fire, though in the absence of disturbance (fire, grazing, mowing), coverage by pitch pine and scrub oak can increase, creating vegetation similar to a pitch pine—scrub oak barren; or in some cases, a tall-shrub community can develop in the absence of fire (Gawler 2008).

These communities are fragile habitats that support priority species in need of protection from human development and disturbances. They protect salt marsh from storms and provide nesting and feeding habitat for piping plovers, roseate terns and American oystercatchers. The most challenging issues facing dune habitat are recreational activities, oil spills, and rising sea level resulting from climate change (CT 2005).

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including state wildlife agencies, in support of state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives
- Work with partners to monitor and protect breeding populations of piping plover, as well as populations of migrating roseate terns.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.4b. (Biological Integrity, Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the watershed.

Rationale:
Refuge managers are required to manage for the "biological integrity, diversity, and environmental health" (BIDEH) of the Refuge System pursuant to the National Wildlife Refuge System Improvement Act of 1997. This mandate is a cornerstone of Refuge System philosophy and management. The framework for fulfilling the mandate is provided in Refuge System Policy 601 FW 3, which calls for the maintenance of "historic conditions," which are defined in policy as "composition, structure, and functioning of ecosystems resulting from natural processes that we believe, based on sound professional judgment, were present prior to substantial human related changes to the landscape." In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010).

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987; Hunter 1991; Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and slow moving streams and pools in wetland ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer & Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Quonatuck CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger upland and wetland matrix, and providing additional structural and species diversity to the matrix. Rocky shorelines along large river systems, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or a nutrient rich site for benthic organisms. One could make the case that these rocky shorelines are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including state wildlife agencies, in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Sub-objective 1.5a. (Salt Marsh)
Protect and manage salt marsh habitats to support species of conservation concern, and natural and rare ecological communities.

Rationale:
The name Connecticut is the French corruption of the Algonquin word "quinetucket" meaning *long tidal river*. The second largest group of wetlands in the Watershed is estuarine wetlands or tidal wetlands which are located in the lower part of the main stem of the Connecticut River. Estuarine wetlands are influenced by both tidal and freshwater flows. The lower part of the Connecticut River is considered the most pristine large–river tidal marsh system in the Northeast (USFWS 1994). The wetlands at the mouth of the Connecticut River are intertidal marshes vegetated by grasses such as smooth cordgrass, saltmeadow cordgrass or hay grass, salt or spike grass, saltmeadow rush or black grass, and other salt–tolerant plants. Salt marshes are among the most productive ecosystems in the world.

Further upstream, the Connecticut River has extensive, high-quality freshwater and brackish tidal wetland systems which provide habitat for several federally listed species, species at risk and globally rare species,

including wintering bald eagles, shortnose sturgeon, and Puritan tiger beetles. This area also provides significant American black duck habitat for breeding, wintering, and migration. It serves as an important movement corridor for migratory birds, especially waterfowl, rails, many species of neotropical migrants, and raptors. Within this group of wetlands, wild rice marshes are considered rare and valuable and function as significant resting and feeding areas for waterfowl, shorebirds, and especially the sora rail.

The lower Connecticut River tidal wetlands complex has been designated a "Wetland of International Importance" by the multi-national Convention on Wetlands of International Importance (aka Ramsar Convention). The Ramsar Project area contains 20,570 acres and consists of 20 discrete major wetland complexes (USFWS 1994). The Ramsar designation is used for wetland complexes that have international significance in terms of ecology, botany, zoology, limnology, or hydrology. The lower Connecticut River tidal wetlands complex is considered the best example of this type in the northeastern United States.

Tidal wetlands provide foraging habitat for a variety of shorebirds, including willet, various species of sandpipers, ruddy turnstone, red knot, and whimbrel. These wetlands also support migrating and wintering waterfowl, various marsh birds, sparrows, bald eagles, and osprey. Its tidal marshes and mudflats support significant concentrations of waterfowl and shorebirds, as well as nesting habitat for global significant species such as the salt marsh sharp-tailed sparrow (Atlantic Coast Joint Venture 2005). This habitat is also important as nursery areas for a variety of aquatic species.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including state wildlife agencies in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.
- Identify and prioritize wetland restoration or enhancement projects that benefit species of conservation concern.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories particularly to determine the status, abundance, and distribution of priority resources of concern such as salt marsh sharp-tailed sparrows, and American black duck.
- Map natural communities; protect rare or exemplary examples.
- Identify and map estuarine habitats, particularly spawning and nursery habitats.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to: develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively towards solutions; model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Quonatuck CFA as an outdoor classroom.

Rationale:
Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to "provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access."

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Quonatuck CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Quonatuck CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Quonatuck CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Quonatuck CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
Interpretation is an important tool that can be used to spread the refuge message to private residents and visitors to the refuge. With an ADA-compliant trail planned for the site, the Quonatuck CFA is well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge, and the Quonatuck CFA's habitats, wildlife, and cultural resources.

Management Strategies:
Within 5 years of acquiring sufficient land:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Quonatuck CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, print and social media, signs, and exhibits) when creating programming for natural and cultural resource interpretation.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members and the general public, with priority given to refuge affiliates.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Quonatuck CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge Web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures (e.g., general brochure and bird checklist) that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self-guided interpretive messages and use state-of-the-art, as well as traditional media (e.g., pamphlets, signs, etc.).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Quonatuck CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Quonatuck CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
Hunting is one of the six priority, wildlife-dependent recreational uses for the Refuge System. Hunting is generally allowed on national wildlife refuges, as long as it is found to be a compatible use. We will plan to open portions of the Quonatuck CFA to hunting, assuming it is found compatible and we acquire sufficient land to support hunting. Allowing hunting opportunities at this unit conforms to historic use on the nearby state wildlife management areas. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the states' population management objectives.

Management Strategies:
Within 1 year of acquiring sufficient land to support hunting seasons:

- Consult with state wildlife agencies to evaluate the suitability of new acquisitions to support a safe, manageable hunt programs.
- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal division open hours, as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with state wildlife agencies to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with state wildlife agencies to evaluate the effectiveness and success of a refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes to access the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, Web site pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce hunt brochure(s) that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Quonatuck CFA kiosks, through a friends group, and in local businesses.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with state wildlife agencies to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Quonatuck CFA after completing all administrative procedures to officially open refuge lands to fishing, based on state regulations and CFA-specific regulations, if necessary.

Rationale:
Fishing is one of the six priority, wildlife-dependent recreational uses for the Refuge System. The principal fishing resources on this CFA are the Connecticut River and its major tributaries. Our management will focus on providing river access to anglers, where compatible fishing opportunities exist.

Management Strategies:
Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.

Within 5 years of acquiring land with fishable waters:

- Work with state wildlife agencies to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired and fishing is determined to be compatible, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
Within 1 year of acquiring land with fishable waters:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at the CFA kiosk, through friends groups, and in local businesses.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new division to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
Within 1 year of acquiring land:
- Allow public access from 30 minutes before sunrise to 30 minutes after sunset for wildlife observation and photography.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:
- Develop a public access strategy and required planning (e.g., NEPA compliance and compatibility determinations) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:
- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of acquiring land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, boat access, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Develop compatible opportunities on Quonatuck CFA that promote state and watershed-wide initiatives that facilitate wildlife observation and photography, such as the Connecticut River Birding Trail and state roadside wildlife viewing areas, and which raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
Watershed-wide recreational trails and initiatives give individuals opportunities to view and photography wildlife throughout the Connecticut River watershed. Examples include the Connecticut River Birding Trail, the Connecticut River Byway, the Connecticut River Paddler's Trail, and the newly designated Connecticut River Watershed Blueway. Where appropriate, we will work with these partners to promote, and distribute information about these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- Work with partners to support and promote watershed-based wildlife observation and photography opportunities, such as the Connecticut River Birding Trail.
- Make guides and published materials supporting the Connecticut River Byway and the Connecticut River Watershed Blueway available at the visitor contact station.

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Quonatuck CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River Birding Trail, the Connecticut River Byway, the Connecticut River Paddler's Trail, and the newly designated Connecticut River Watershed Blueway. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- Work with partners to support and promote regional water-based trail initiatives.
- Work with public and private partners to determine whether and what roles this CFA might contribute to a Connecticut River waterway route.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Quonatuck CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
Within 1 year of acquiring land:

- Allow hiking, snowshoeing, and cross-country skiing in designated areas.
- Allow petwalking; pets must be on a leash no longer than 6 feet long and must be under the control of their owners/handlers to avoid posing a threat to other visitors, staff, or wildlife.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Consider providing boat access (e.g., trails to water, boat launches for motorized boats and canoes and kayaks).

Friends of Conte Refuge

Pine Brook on the Proposed Salmon Brook Division, Connecticut

State of Connecticut

- **Farmington River Conservation Focus Area**
- **Maromas Conservation Focus Area**
- **Muddy Brook Conservation Focus Area**
- **Pyquag Conservation Focus Area**
- **Salmon River Conservation Focus Area (Existing Refuge Division)**
- **Scantic River Conservation Focus Area**
- **Whalebone Cove Conservation Focus Area (Existing Refuge Division)**
- **Deadman Swamp Unit (Existing Refuge Unit)**
- **Roger Tory Peterson Unit (Existing Refuge Unit)**

Farmington River Conservation Focus Area

Colebrook, Connecticut and Sandisfield, Massachusetts

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	7,661	77 %
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*7,661*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	2,277	23 %
Total Acres in CFA[2, 4]	9,938	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Farmington River was a Special Focus Area (SFA) in the 1995 FEIS. The Farmington River CPA (map A.3) encompasses the Farmington River CFA (map A.4) which is located in an area identified by the State of Connecticut as a priority for conservation. The CFA is surrounded by a network of existing conserved lands including Tunxis State Forest (CT), Algonquin State Forest (CT), Granville State Forest (MA), Sandisfield State Forest (MA), Connecticut Metropolitan District Commission's Farmington River Watershed lands, and numerous other privately conserved lands. Much of the Farmington River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional land protection by the Service in this area will help better connect these conserved lands. The area's habitat is currently structurally and functionally sound and is projected to be resilient to climate change.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 80.7%
- Freshwater Marsh – 0.6%
- Shrub swamp and floodplain forest – 0.8%

For more information on habitats in the CFA, see map A.5 and table A.2.

What are the resources of conservation concern for the CFA?

As noted in table A.3 below, there are nine priority refuge resources of concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA, including a Federal candidate species. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (≥ 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor for birds. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem. Migrants are also known to use habitats beyond the Connecticut River main stem within the watershed, though in lower concentrations (Smith College 2006). The Farmington River CFA is less than 20 miles from the Connecticut River and contains large tracts of forested and riparian habitat. These habitats provide stopover areas for a diversity of species including wood thrush, Canada warbler, black-throated blue warbler, black-throated green warbler, red-eyed vireo, American redstart, and yellow-bellied sapsucker (Smith College 2006). This CFA also provides breeding habitat for a diversity of bird species.

   The PRRC bird species for the Farmington River CFA includes wood thrush, chestnut-sided warbler and Canada warbler. This CFA is located within their core breeding range, and the contiguous forests provide breeding habitat for these and other priority conservation concern species. Habitats also support nesting and migrating bald eagle populations, which is another PRRC species.

3. **Waterfowl**
   Potential breeding and foraging habitat for American black duck (a PRRC species), wood duck, Canada geese, and other waterfowl species within wetlands adjacent to slow moving streams and open water habitats.

4. **Diadromous fish and other aquatic species**
   PRRC species in the Farmington River CFA include American eel, a species petitioned for listing under the Endangered Species Act, and Eastern brook trout. These species are also State SGCN and a conservation priority for the Service's northeast region. The Farmington River supports the highest diversity of mussels in the Connecticut River watershed, though the majority of these occurrences are in the lower reaches. The West Branch of the Farmington River occurs along the eastern boundary of the Farmington River CFA. This branch was damned by the Army Corps of Engineers for flood control, creating Colebrook Lake Reservoir and West Branch Reservoir. These reservoirs are stocked with trout to complement the occurrence of bass, pickerel, perch, brown bullhead, and bluegill. The CTDEEP also stocks Atlantic salmon fry into Sandy Brook, which is within the CFA, as part of its Atlantic Salmon Legacy Program. Future restoration of other diadromous species, such as sea lamprey is being proposed by CTDEEP once aquatic species passage is provided at the Collinsville dams.

5. **Wetlands**
   The Farmington River CFA contains 175 acres of hardwood swamp, 90 acres of conifer swamp, 81 acres shrub-swamp and floodplain forest, and 63 acres of freshwater marsh. Many of these wetlands occur along slow moving streams or small ponds. Habitat patches range from 2 acres to 63 acres in size.

6. **Other**
   New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts. Due to the loss of early successional forest and natural shrubland habitats to development and forest maturation, this species occupies less than a fifth of its historical range (Fuller and Tur 2012). New England cottontail is no longer sustaining a viable population, and given this conservation urgency, a range-wide New England cottontail Initiative was established. This initiative involves collaboration from multiple agencies to address cottontail conservation on a landscape scale. Focus areas were identified within its historical range in New England as locations to manage and restore habitat for New England cottontail. Other wildlife species associated with this habitat type have experienced similar declines, and the New England cottontail has been identified as a surrogate for this suite of shrubland-dependent species.

What habitat management activities will be a priority on refuge lands within the CFA?

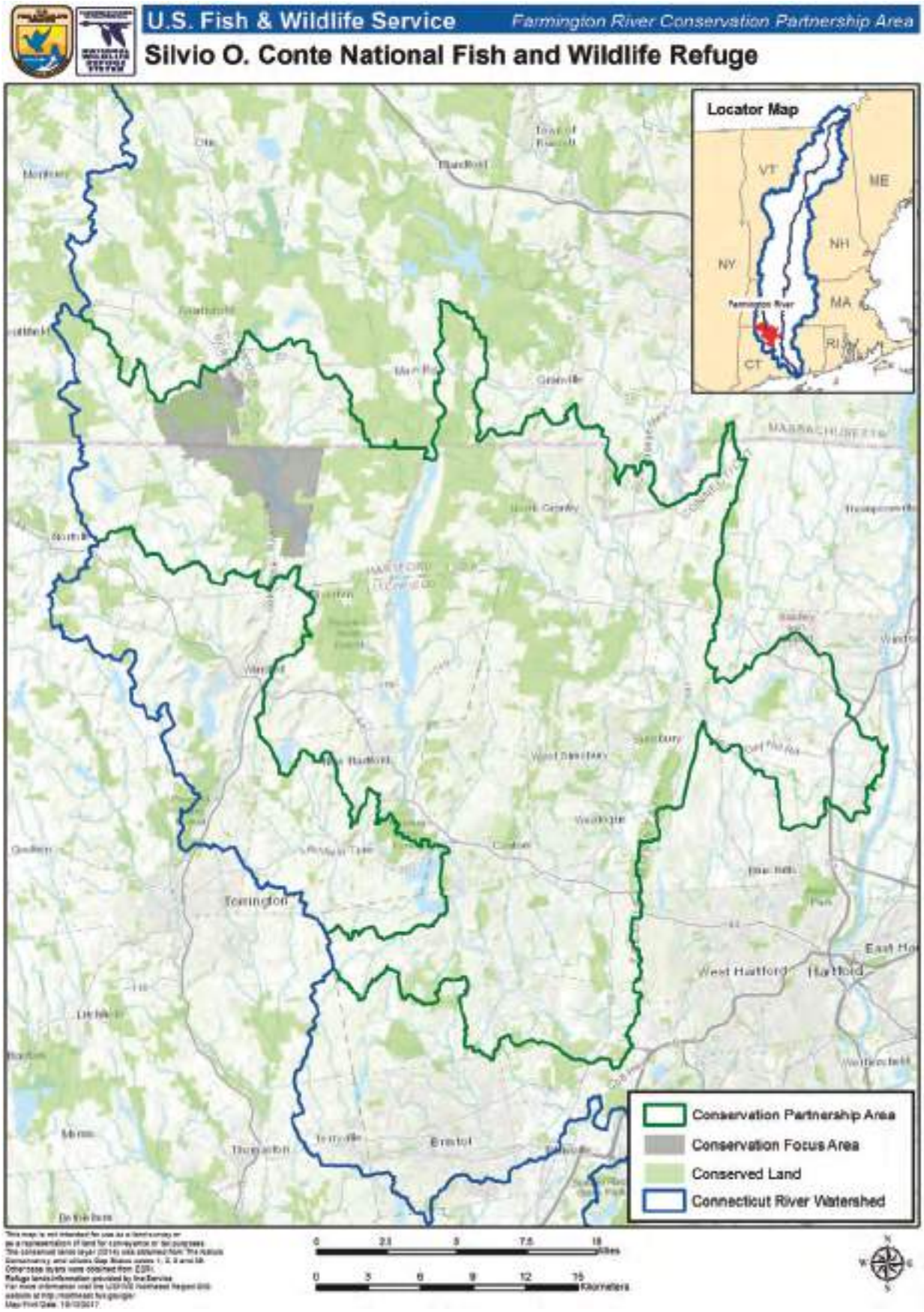
We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse (different size classes) and native species will dominate. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- Open water (i.e., stream, rivers, and ponds) will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

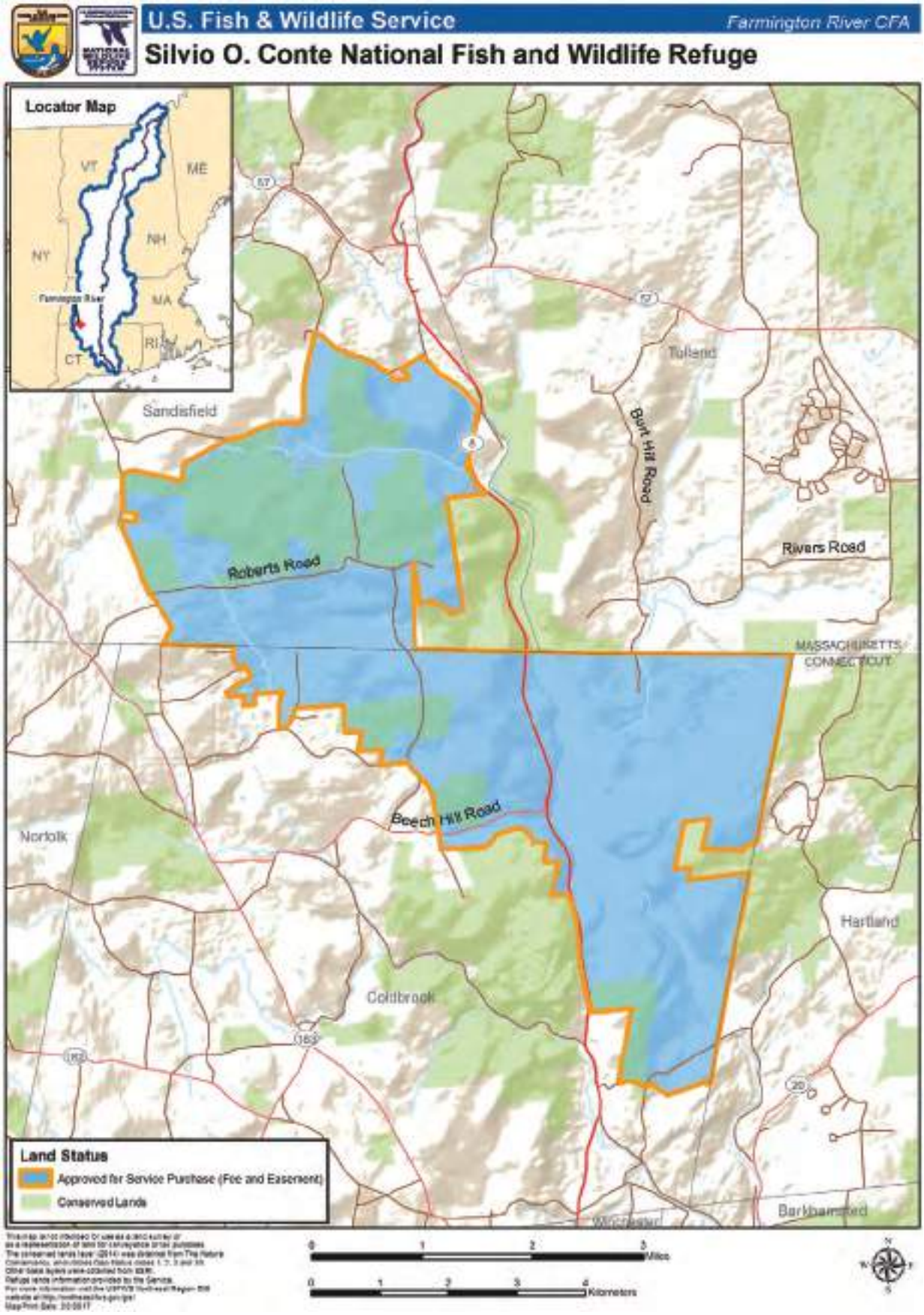
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

Map A.3. Farmington River CPA.



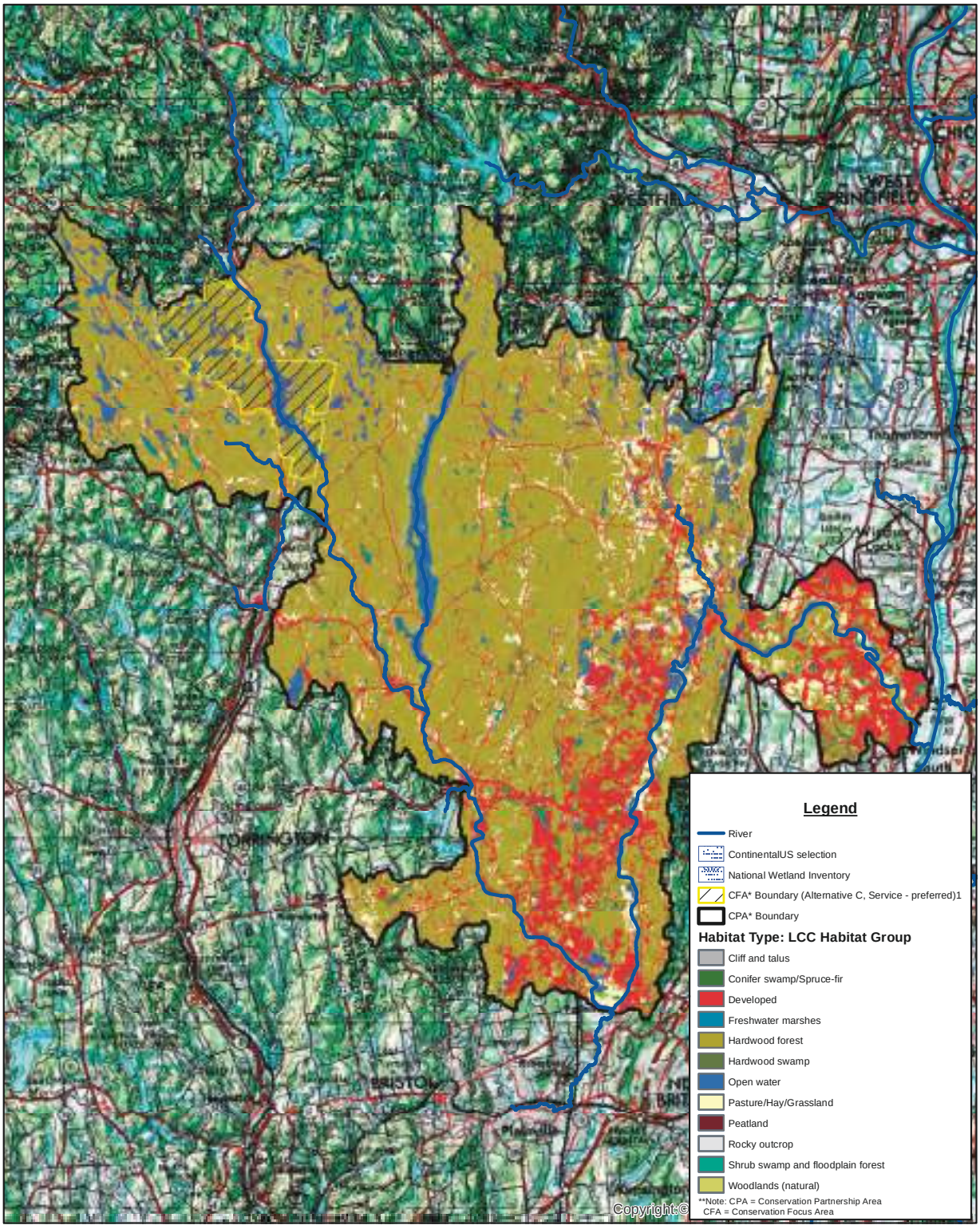
Map A.4. Farmington River CFA – Location.



Map A.5. Farmington River CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Farmington River CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes. For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 3 6 9 12 Miles

0 4.5 9 13.5 18 Kilometers

N W E S

Table A.2. Farmington River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	369	0.2%	91	64	0	0.9%	24.7%
Hardwood forest	156,369	68.7%	8,017	2,038	0	80.7%	5.1%
Hardwood swamp	9,159	4.0%	174	87	0	1.8%	1.9%
Shrub swamp and floodplain forest	1,508	0.7%	81	9	0	0.8%	5.4%
Woodlands (natural)	537	0.2%	81	18	0	0.8%	15.0%
Forested uplands and wetlands subtotal	*167,942*	*73.8%*	*8,444*	*2,216*	*0*	*85.0%*	*5.0%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	628	0.3%	88	1	0	0.9%	14.1%
Freshwater marshes	911	0.4%	63	18	0	0.6%	6.9%
Pasture/hay/grassland	16,578	7.3%	112	20	0	1.1%	0.7%
Peatland	32	0.0%	-	0	0	0.0%	0.0%
Rocky outcrop	25	0.0%	4	0	0	0.0%	16.8%
Non-forested uplands and wetlands subtotal	*18,173*	*8.0%*	*267*	*39*	*0*	*2.7%*	*1.5%*
Inland aquatic habitats[9]							
Open Water	7,354	3.2%	886	6	0	8.9%	12.0%
Inland aquatic habitats subtotal	*7,354*	*3.2%*	*886*	*6*	*0*	*8.9%*	*12.0%*
Other							
Developed	34,100	15.0%	336	14	0	3.4%	1.0%
Other subtotal	*34,100*	*15.0%*	*336*	*14*	*0*	*3.4%*	*1.0%*
TOTAL[10]	**227,569**	**100.0%**	**9,932**	**2,275**	**0**	**100.0%**	**4.4%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from chapter 4, under "Management Goals, Objectives, and Strategies"

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.3. Farmington River CFA – Priority Refuge Resources of Concern

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] – 8,021 acres		
Wood Thrush[A,B,C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	American Redstart[A,J] Black-billed Cuckoo[A,I,J] Broad-winged hawk[I,J,K] Eastern Wood-pewee[A,I,J] Sharp-shinned Hawk[I,J] **Eastern Red Bat**[K] **Ovenbird**[A] Red-shouldered Hawk[J] Barred Owl[I] Eastern Box Turtle[I] Blue-headed Vireo[I] Scarlet Tanager[I,J] Black-and-white Warbler[I,J] Baltimore Oriole[I,J] Jefferson Salamander[I,J,K] Northern Flicker[A,I,J] Rose-breasted Grosbeak[A,I] Black-throated Blue Warbler[A,I] Black-throated Green Warbler[A,I] Black Bear[I,K] Prairie Warbler[I] Ruffed Grouse[A,I,K] Eastern Towhee[I] **Louisiana Waterthrush**[I,K] Yellow-bellied Sapsucker[A,I] Little Brown Bat[J,K] Brown Thrasher[K]
Canada Warbler[A,B,C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
New England Cottontail[B]	Year round habitat includes dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within 1 km of each other (Arbuthnot 2008, DeGraaf et al. 2001).	
Chestnut-sided Warbler[A,B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Bald Eagle[C, G]	Breeding habitat includes large bodies of water with little human disturbance, and large canopy trees or other elevated sites for nesting, perching, and roosting (DeGraaf et al. 2001).	
Hardwood Swamp[5] – 175 acres		
Canada Warbler[A,B,C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	**Northern Waterthrush** Red-shouldered Hawk[J] Veery[A,I,J] White-eyed Vireo[J] Wood Duck[A] Northern Parula[A,I,K] Black-throated Green Warbler[A,I] Purple Finch[A,I] Blackburnian Warbler[A,I]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Conifer Swamp[5] – 90 acres		
Canada Warbler[A,B,C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	Red-shouldered Hawk[I,J] Veery[A,I,J] White-eyed Vireo[J] Wood Duck[A] Northern Parula[A,I,K] Black-throated Green Warbler[A,I] Purple Finch [A,I] Blackburnian Warbler[A,I]
Shrub Swamp and Floodplain Forest[5] – 81 acres		
American Black Duck [A,B,C,G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Chestnut-sided Warbler[A,B] Ruffed Grouse[A, I, K] Eastern Ribbon Snake[K] **Warbling Vireo**[I] **Spotted Turtle**[K] American Redstart[A, J] Eastern Kingbird[I,J] Gray Catbird[I,J] Eastern Towhee[I,K] White-throated Sparrow[K] Wood Duck[A] **Willow Flycatcher**[I] Black Racer[K] American Woodcock[A,I,J]
New England Cottontail[B]	Year round habitat includes shrub swamps of at least 25 acres that are within 1 km of other shrub swamps, and early successional forest patches (Arbuthnot 2008, DeGraaf et al. 2001).	
Woodlands (natural)[5] – 80 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] – 63 acres		
American Black Duck[A,B,C,G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**Marsh Wren**[K] **American Bittern**[A,I,K] Eastern Ribbon Snake[I,K] Northern Harrier[A,I,J,K] Spotted Turtle[I,K] Bridle Shiner[I,K] Canada Goose[A,J] Wood Duck[J]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Pasture/Hay/Grassland[5] – 112 acres		
New England Cottontail[B]	Year round habitat includes pastures, abandoned fields, and dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within 1 km of each other (Arbuthnot 2008, DeGraaf et al. 2001).	Field Sparrow[I,J,K] Northern Harrier[A,I,J,K] **Grasshopper Sparrow**[I] Prairie Warbler[I,K] **Bobolink**[A,I] **Eastern Meadowlark**[I] American Woodcock[A,I,J]
Cliff and Talus[5] – 88 acres		
North-central Appalachian acidic cliff and talus[H] North-central Appalachian circumneutral cliff and talus[H]	The *North Central Appalachian acidic cliff and talus system* comprises sparsely vegetated to partially wooded cliffs. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. Vegetation in seepage areas tends to be comparatively well-developed and different from the surrounding dry cliffs. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places. Eastern red cedar is a characteristic tree species, poison ivy a characteristic woody vine, and common polypody a characteristic fern. Substrates within the *circumneutral cliff and talus system* include limestone, dolomite and other rocks. The vegetation varies from sparse to patches of small trees, in places forming woodland or even forest vegetation. Ash, basswood, and American bladdernut are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., yellow jewelweed, purple cliffbrake, ebony spleenwort, or bluntlobe cliff fern (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Rocky Outcrop[5] – 4 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	The *Northern Appalachian-Acadian rocky heath outcrop* system occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including Sheep laurel, Low-bush blueberry, Black huckleberry, and Black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 884 acres		
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/ streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Burbot[I,K] Eastern Silvery Minnow[K] Longnose Dace[I,K] Longnose Sucker[I,K] Creek Chubsucker[I,K] Harpoon Clubtail[I,K] Rapids Clubtail[I,K] Riverine Clubtail[I,K]
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	
Atlantic Salmon[B,F,G]	Spawn in cold freshwater moving streams w/coarse clean gravel and adequate food/ cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 Connecticut Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

K: 2015 Massachusetts Comprehensive Wildlife Conservation Strategy

4 CCP Objectives from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Farmington River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, chestnut-sided warbler, Canada warbler, New England cottontail, bald eagle, and northern long- eared bat and tricolored bat (if appropriate).

Rationale:
We envision healthy forests within the Farmington River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Connecticut and Massachusetts wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Farmington River CFA hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is certainly available within the CFA. To date our review of the Farmington River CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to use characteristics common to these habitats. Our understanding of the forest structure within the Farmington River CFA comes exclusively from a reading of forest history in New England — a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Farmington River are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003).Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For many woodland species, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within the Farmington River CFA will contain a variety of patches in different size classes and developmental stages; it is not uniform throughout. This diversity of size classes provides a variety of species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve size class diversity through the creation of early-successional forests— habitat in decline in portions of the watershed. The USFWS New England cottontail initiative has identified focus areas, including the Farmington River CFA, where the decline in early successional habitats is a particular problem for the New England cottontail. New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of 15 or more habitat patches, several of which are 25 acres or more. Each habitat patch should be one mile or less from each other to aid in New England cottontail movement between patches (Fuller et al 2012). Approximately, 375 acres of forest will be managed in early successional habitat in support of New England cottontail in the CFA. Another species of conservation concern that will use these habitat patches is American woodcock. High quality woodcock habitat includes young forest patches within a mile of feeding areas. New England cotton tail habitat patches will be placed in the vicinity of shrub wetlands, where feasible, to benefit this species. If early successional habitat is lacking within the landscape, we will provide other strategically located patches with these conditions to support other species of conservation concern such as chestnut-sided warbler, brown-thrasher, eastern towhee, black and white warbler, blue-winged warbler, eastern red bat, and ruffed grouse (DeGraaf et al. 2006).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Farmington River's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance to species like Canada warbler. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003) And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who dwell in the upper canopies of conifers, and are thought to be strongly associated with the hemlock forests within Farmington River. Blackburnian warblers have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and—along rocky bottomed streams—Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches of greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that, when near the open bodies of water within the Farmington River CFA, are used by bald eagles. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that use large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014).). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the northern flicker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners and adjacent landowners to identify areas appropriate for New England cottontail management. Plan to manage approximately, 375 acres of forest in early successional habitat for New England cottontail in the CFA. This approximation of the amount and distribution of acreage over the next 15 years assumes we will have a large enough land base to manage. Our target acreage may also be refined once site conditions are verified and a habitat management plan is completed.

- Work with partners, including the states of Massachusetts and Connecticut, in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.

- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood Swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for priority refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the Farmington River CFA, hardwood swamps have often undergone significant alteration and have great potential for restoration. This habitat type is often in basins, or on gently sloping seepage lowlands. Examples of this forest type may be found in small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the watertable and the nutrient-poor soils drive complexes of forest upland and wetland species including eastern hemlock, red maple, and black gum. Within the Connecticut River watershed, including this

CFA, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions and soil compaction remain as threats

Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Farmington River will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Many species of conservation concern use forested swamps, including northern parula, willow flycatcher, white-eyed vireo and rose-breasted grosbeak. Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well-developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Hardwood swamps in the Farmington River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Hardwood swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the CFA, and allow monitoring of population response to management actions (Dettmers personal communication 2013).

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites. Hardwood swamp stands with relatively large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the states of Massachusetts and Connecticut in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Conifer Swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the Farmington River CFA, conifer swamps have often undergone significant alteration and have potential for restoration. This habitat type is often found in small patches on mineral soils that are nutrient poor; there may be an organic layer, but generally deep peat soils are absent. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. The dynamic nature of the watertable drives complexes of forest upland and wetland species including red maple, balsam fir, red spruce, and ash species. Where soils tend more to alkaline conditions white cedar is a common tree species, and the shrub layer is generally more diverse. Within the Connecticut River watershed, and within the CFA, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions and soil compaction remain as threats.

Successional trends in conifer swamps are not well understood. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within Farmington River will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Where needed, restoration of softwood swamp habitats will create high-quality habitat for neotropical migratory birds. Closed canopy softwood forests that include white cedar and other softwoods provide important mast, food, nesting, and cover. Softwood swamp stands with large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well-developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Conifer swamps in the Farmington River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Conifer swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the CFA, and allow monitoring of population response to management actions (R. Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.

- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including the states of Massachusetts and Connecticut in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1d. (Shrub Swamps and Floodplain Forests)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide habitat for priority refuge resources of concern including American black duck and New England cottontail.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008).These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. Our coarse-scale habitat analysis of this CFA identifies a shrub swamp wetland complex in the northwestern portion of the CFA. The landscape mosaic of dense shrubs, grassy openings, flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including New England cottontail and American black duck, priority resources of concern.

New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts. The historic range of this species likely included southeastern New York, north through the Champlain Valley and into southern Vermont, New Hampshire and Maine, and statewide in Massachusetts, Connecticut and Rhode Island. Due to loss of early successional habitat to development and forest maturation, this species occupies less than a fifth of its historical range (Fuller and Tur 2012). New England cottontail is no longer sustaining a viable population, and given this conservation urgency, a range-wide New England cottontail Initiative was established. This initiative involves collaboration from multiple agencies, including the USFWS, state wildlife agencies, universities, Natural Resources Conservation Service, The Nature Conservancy, and Wildlife Management Institute, to address cottontail conservation on a landscape scale.

Focus areas were identified as locations to manage and restore habitat for New England cottontail. The Farmington River CFA was one of forty-nine focus areas in six states. Early successional management and protection of adjacent natural shrubland habitat, such as shrub swamps, will meet the conservation goals set for the New England cottontail. “A Conservation Strategy for the New England cottontail” was developed and approved in November 2012, and provides the conservation and habitat management goals and strategies for this species (Fuller and Tur 2012).

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season, and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation and

invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests in uplands or dry hummocks near wetland foraging habitat (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 30. An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for American black duck.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Incorporate shrub swamps, where appropriate, into the network of habitat patches required for New England cottontail.
- Work with partners, including the state in support of their state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife use of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1e. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach

seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Farmington River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a distinctive flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is limited. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the states of Massachusetts and Connecticut in support of their state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submerged herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrsh, jewelweed, marsh fern, water lily and narrow-leaved cattail (Gawler 2008). Our coarse-scale habitat analysis of this CFA identifies freshwater marsh habitat along Thorp Brook and around the perimeter of an unnamed pond off Roberts Road.

These wetlands are adjacent to a slow moving stream, and open water, providing foraging, and potentially breeding habitat for American black duck, and other waterfowl species. Black ducks place well-concealed nests on the ground in adjacent uplands or hummocks within wetlands, and adults and their broods feed on seeds and herbaceous vegetation, as well as invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for American black duck.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate wetland hydrology for impacts to natural flow regimes.
- Work with partners, including the states in support of their state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Inventory wetland plant communities.
- Survey wildlife use of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Provide appropriate conditions within current pasture, hay, and grassland acreage that will support New England cottontail (where appropriate) and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat, if present and appropriate.

Rationale:
Over one percent of the Farmington River is typed as pasture, hay and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support many grassland dependent species such as bobolink and grasshopper sparrow. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler, field sparrow, American woodcock, blue-winged warbler, and New England cottontail.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occur in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high

priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Another species of conservation concern that uses shrubland dominated habitat is New England cottontail. This species is New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts. The Farmington River CFA is a New England cottontail Focus Area, which are areas identified as locations to manage and restore habitat for New England cottontail. New England cottontail require early successional habitat (dense shrubs and tree saplings), and the pastures, hay fields, and grasslands in the CFA will provide this habitat with very little initial manipulation.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of fifteen or more habitat patches, several of which are 25 acres or more. Each habitat patch should be one mile or less from each other to aid in New England cottontail movement between patches (Fuller and Tur 2012).Where appropriate, pastures, hay fields, and grasslands will be incorporated into the network of patches managed for New England cottontail by allowing woody stem colonization.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species and pollinators. Current pasture, hay, and grassland acres can provide quality habitat if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
See the rationale for sub-objective 1.1e.

Habitats that occur within the Farmington River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the states of Massachusetts and Connecticut, in support of the state wildlife action plans, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout, American eel and Atlantic salmon, as well as other species of conservation concern such as sea lamprey.

Rationale:
The Farmington River supports the highest diversity of mussels in the Connecticut River watershed, though the majority of these occurrences are in the lower reaches. The West Branch of the Farmington River occurs along the eastern boundary of the Farmington River CFA. This branch has been damned by the Army Corps of Engineers for flood control, and the Colebrook Lake Reservoir and West Branch Reservoir were created. These reservoirs are stocked with trout to complement the occurrence of bass, pickerel, perch, brown bullhead, and bluegill. The CTDEEP also stocks Atlantic salmon fry into Sandy Brook, which is within the CFA, as part of its Atlantic Salmon Legacy Program. Future restoration of other diadromous species, such as sea lamprey is being proposed by CTDEEP once aquatic species passage is provided at the Collinsville dams.

Many of the small streams and brooks support Eastern brook trout. Brook trout are sensitive to extreme temperature fluctuations, and require water temperatures between 40-70 degrees Fahrenheit for spawning, growth, and survival. Forested buffers along stream edges, a structurally diverse instream habitat, with boulders and downed woody debris providing riffles and pools, and clear aquatic species passage to spawning and wintering habitat is important to maintain habitat requirements for brook trout, and other aquatic species.

American eel also occurs in this CFA. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit bays, estuaries, streams, lakes, and ponds. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

A comprehensive, multi-scale habitat and wildlife inventory will be necessary to understand aquatic and surrounding habitat conditions in the CFA. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Collaborate with partners in the Farmington River Coordinating Committee to strategically prevent and manage invasive species within the 14-mile stretch of the Upper Farmington River that is designated as Wild and Scenic River and abutting lands.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate stream and fish community health.
- Map natural communities; protect rare or exemplary examples.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education, Planning, and Training)
Encourage schools, scout groups, summer camps, and other youth educational organizations to develop curricula that use the Farmington River CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Farmington River CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Farmington River CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Farmington River CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Farmington River CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale*:*
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Farmington River CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Farmington River CFA's habitats and cultural resources.

Management Strategies:
Within 5 years of acquiring sufficient land and CCP approval:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Farmington River CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land and CCP approval:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land and CCP approval:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Farmington River CFA.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures (e.g., general brochure and bird checklist) that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land and CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Farmington River CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Farmington River CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
The Farmington River CFA is a popular area to hunt white-tailed deer, Eastern wild turkey, black bear (Massachusetts), and small game. Existing public hunting areas include Sandisfield State Forest in Massachusetts, and Algonquin and Tunxis State Forests in Connecticut. Hunting will be allowed on a newly created CFA, consistent with the final compatibility determination. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal refuge open hours (i.e., 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions in Connecticut to support a safe, manageable hunt program.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with Massachusetts Department of Fish and Game and Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disable hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Massachusetts Department of Fish and Game and Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Farmington River CFA kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Massachusetts Department of Fish and Game and Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Farmington River CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Massachusetts Department of Fish and Game and Connecticut Department of Energy and Environmental Protection regulations, and CFA-specific conditions, if necessary.

Rationale:
There are several rivers in the CFA including the West Branch of the Farmington River and Sandy Brook. Both rivers support a cold water fishery that includes Eastern brook trout. A variety of other game fish are found in streams and ponds within the CFA. Fishing is a popular activity throughout this area and will continue under Service ownership, consistent with the final compatibility determination. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk to post information on fishing seasons and other notices to visitors.

- The Farmington River CFA will be open to visitors actively engaged in fishing during the seasons and times established by the respective states in their annual fishing regulations.

Within 5 years of acquiring land:
- Produce a brochure that highlights fishing opportunities for distribution at a CFA kiosk and the refuge web site.

- Work with the Massachusetts Department of Fish and Game and Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the CFA.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. A new division in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses.)

Within 1 year of acquiring land:

- Consistent with the final compatibility determination, allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exceptions listed for hunters and anglers. The refuge manager may issue a special use permit for public uses during the closed hours.

- Install an informational kiosk to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:

- Develop a public access strategy and required planning (i.e., NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses.)

Within 1 year of acquiring land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools, groups, and environmental organizations to include wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:

- Develop a public access strategy and required planning (i.e., NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Develop compatible opportunities in the Farmington River CFA that promote state and watershed-wide initiatives that facilitate wildlife observation and photography and which raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
There are many partners active in the Farmington River watershed, including the Farmington River Watershed Committee. We will work with partners to help achieve shared conservation and recreation goals.

Management Strategies:
Within 5 years of acquiring land:

- Work with local and regional organizations that have developed conservation and recreation plans to implement these plans to the extent that they are compatible and consistent with refuge management.

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Farmington River CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- Work with public and private partners to determine whether and what roles this CFA might contribute to a Connecticut River waterway route.
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Farmington River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Farmington River CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that the use is both appropriate and compatible.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge properties.

Maromas Conservation Focus Area

Middletown, Connecticut

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	3,935	91 %
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*3,935*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	400	9 %
Total Acres in CFA[2, 4]	4,335	100 %

1 Acres from Service's Realty program (surveyed acres);

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data)

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Maromas CPA (map A.6) encompasses the Maromas CFA (map A.7) which is a large, forested upland area bounded by the main stem of the Connecticut River on two sides. Its proximity to Middletown and other urbanized areas provides an important opportunity to connect with urban audiences and contribute to the Service's Urban Refuge initiative. The CFA also lies directly across the Connecticut River from the refuge's existing Salmon River Division. Conserving these two divisions will help provide connectivity on both sides of the river. The Maromas CFA provides a connection between two undeveloped forest corridors located in the Lower Connecticut River and, further north, along the Bolton Range. These corridors have been recognized for their lack of development, and their importance to neotropical migrants (Comins 2013, personnel communication). The Bolten Range corridor extends into Massachusetts, and provides forest bird nesting habitat. Other existing conserved lands near the Maromas CFA include the Seven Falls, George Dudley Seymour, and Hurd State Parks. In addition, much of the Maromas CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 81.3%
- Shrub swamp and Floodplain Forest – 1%

For more information on the habitats in the CFA, see map A.8 and table A.4.

What are the resources of conservation concern for the CFA?

As noted in table A.5 below, there are twelve priority refuge resources of concern (PRRC); specifically, terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This section of the Connecticut River is important migratory and wintering habitat for shortnose sturgeon. This species prefers large rivers and estuaries where there is an abundance of crustaceans, mollusks and insects to feed on. They are a long-lived fish that are threatened by pollution, habitat alterations and overfishing.

   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large ($\geq$ 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Maromas CFA is situated on the Connecticut River, and the forested habitat and wetlands provide important stopover and breeding habitat for landbirds. This CFA may also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

   The Maromas CFA provides a connection between two undeveloped forest corridors located in the Lower Connecticut River and, further north, along the Bolton Range. These corridors have been recognized for their lack of development, and their importance to neotropical migrants (Comins 2013, personnel communication). The Bolten Range corridor extends into Massachusetts, and provides forest bird nesting habitat.

   The PRRC species for the Maromas CFA includes wood thrush and Louisiana waterthrush. This CFA is located within their core breeding range, and the contiguous forests provide breeding habitat for these and other forest nesting birds, many of which are priority conservation concern species. Bald eagles are also a PRRC species for this CFA. Habitats support nesting, migrating and wintering bald eagle populations.

3. **Waterfowl**
   The freshwater tidal shrub-swamp, marsh and hardwood swamp within the Maromas CFA provide breeding, stopover and wintering habitat for waterfowl. These wetland communities are used by American black duck (a PRRC species), green-winged teal, common merganser, mallards, bufflehead, and wood ducks.

4. **Diadromous fish and other aquatic species**
   The Maromas CFA is located along the Connecticut River which provides important habitat for PRRC species including American shad, shortnose sturgeon, American eel, alewife, blueback herring and Atlantic salmon. The Connecticut River is important migratory habitat for Atlantic salmon, American shad, and shortnose sturgeon (a federally listed species), and spawning habitat for river herring. This area of the Connecticut River is also important as overwintering habitat for shortnose sturgeon. American eel spend the majority of their young life in freshwater systems. Sea lamprey, another species of conservation concern, occurs in this CFA providing important ecological benefits to aquatic systems.

5. **Wetlands**
   An approximately 60 acre tidal wetland complex is located in the Maromas CFA adjacent to the Connecticut River. This wetland complex contains approximately 12 acres of emergent marsh, 5 acres of hardwood swamp and 43 acres shrub-swamp and floodplain forest. Another 20 acres of hardwood swamp is located upstream of this wetland complex, and additional smaller patches are scattered throughout the CFA.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide a structurally diverse mature forest with connectivity to other large forest blocks, and species composition will be appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

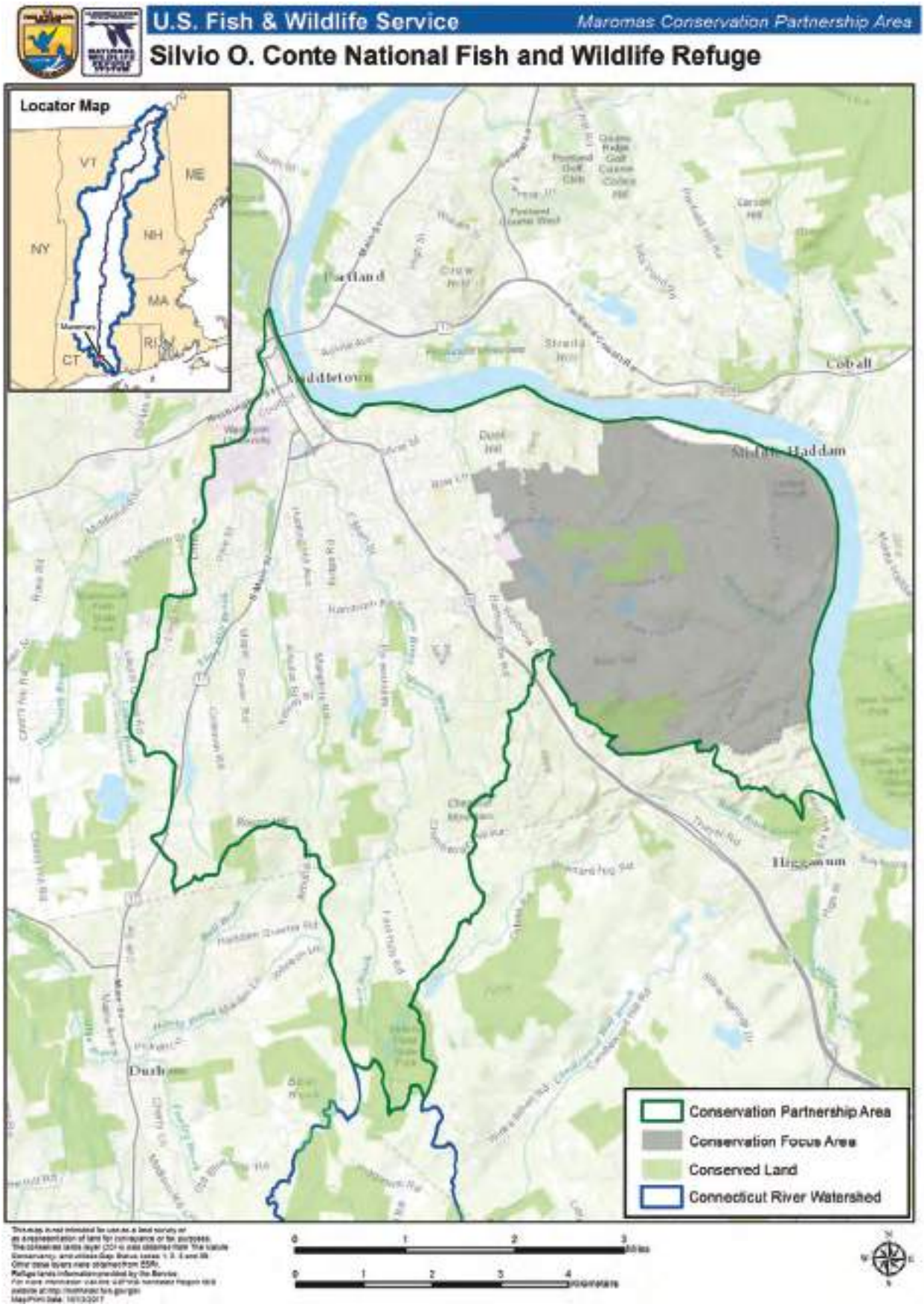
- We will also manage tidal wetland habitats, and will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (i.e., stream, rivers, and ponds) habitats, we will focus on maintaining in-stream connectivity (i.e., eliminating barriers to aquatic species passage) and water quality.

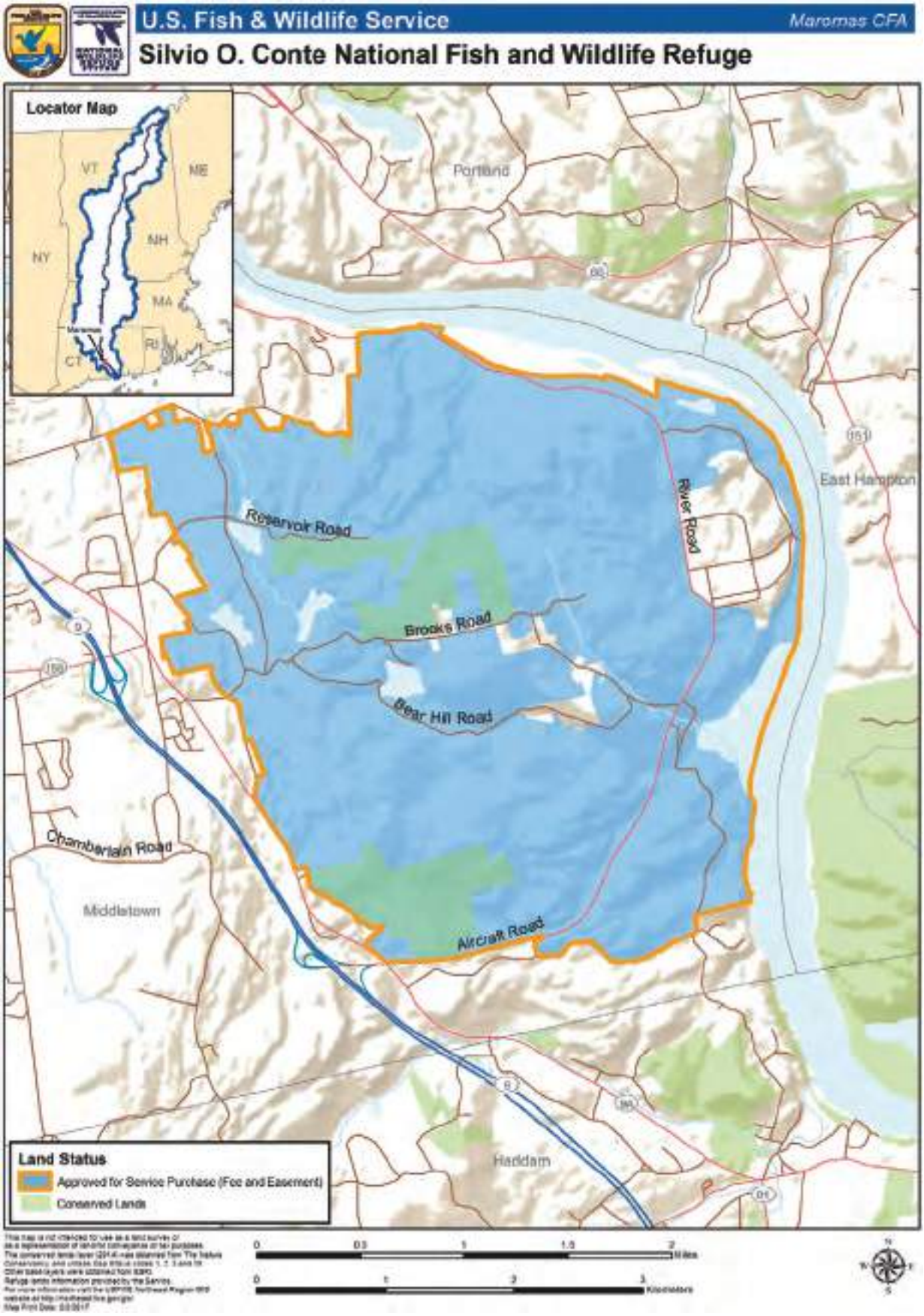
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, interpretation, and environmental education.

Map A.6. Maromas CPA.



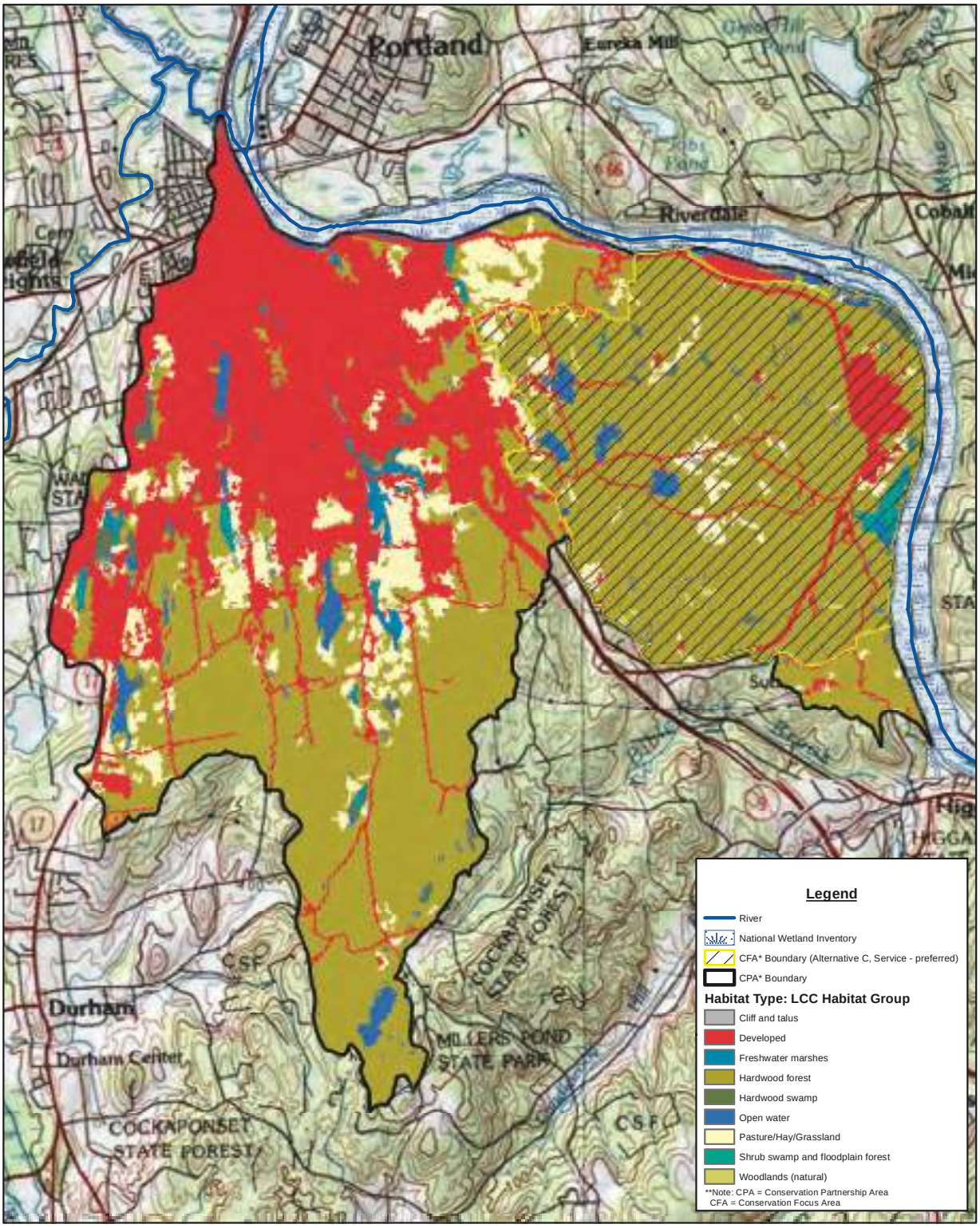
Map A.7. Maromas CFA – Location.



Map A.8. Maromas CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Maromas CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes.
For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 0.65 1.3 1.95 2.6 Miles

0 1 2 3 4 Kilometers

N W E S

Table A.4. Maromas CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Hardwood forest	8,197	56.2%	3,748	376	0	81.4%	45.7%
Hardwood swamp	146	1.0%	43	0	0	0.9%	29.2%
Shrub swamp and floodplain forest	105	0.7%	46	0	0	1.0%	43.5%
Woodlands (natural)	21	0.1%	21	9	0	0.5%	100.0%
Forested uplands and wetlands subtotal	*21*	*0.1%*	*21*	*9*	*0*	*0.5%*	*100.0%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	7	0.0%	3	3	0	0.1%	37.5%
Freshwater marshes	83	0.6%	11	0	0	0.2%	13.1%
Pasture/hay/grassland	1,253	8.6%	225	5	0	4.9%	17.9%
Non-forested uplands and wetlands subtotal	*1,343*	*9.2%*	*238*	*8*	*0*	*5.2%*	*17.7%*
Inland aquatic habitats[9]							
Open Water	292	2.0%	87	0	0	1.9%	29.8%
Inland aquatic habitats subtotal	*292*	*2.0%*	*87*	*0*	*0*	*1.9%*	*29.8%*
Other							
Developed	4,492	30.8%	420	5	0	9.1%	9.3%
Other subtotal	*4,492*	*30.8%*	*420*	*5*	*0*	*9.1%*	*9.3%*
TOTAL[10]	14,597	100.0%	4,602	397	0	100.0%	31.5%

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.5. Maromas CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] – 3,744 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	American Redstart[I,J] Black-billed Cuckoo[I,J] Broad-winged hawk[A,I,J] Eastern Hognose Snake[I] Eastern Wood-pewee[I,J] Great-crested Flycatcher[A,I] Hooded Warbler[J] Sharp-shinned Hawk[I,J] Yellow-throated Vireo[A,J] **Eastern Red Bat**[I] **Ovenbird**[J] Red-shouldered Hawk[I,J] Purple Finch[I] Little Brown Bat[I] Barred Owl[I] Eastern Box Turtle[I] Acadian Flycatcher[J] Blue-headed Vireo[I] Scarlet Tanager[A,I,J] Black-and-white Warbler[A,I,J] Baltimore Oriole[A,I,J] Jefferson Salamander[I] Worm-eating Warbler[I,J] Northern Flicker[A,I,J] Cerulean Warbler[A,I,J]
Louisiana Waterthrush[A]	Breeding habitat includes contiguous (250+ acres) mature deciduous or mixedwood forests along medium to high-gradient, first to third-order, perennial streams (Mattsson et al. 2009, DeGraaf et al., 2001).	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Bald Eagle[C, G]	Breeding, migrating and wintering habitat includes large bodies of open water with little human disturbance, and large canopy trees or other elevated sites for nesting, perching, and roosting (DeGraaf et al. 2001).	
Hardwood Swamp[5] – 46 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory Species
Shrub Swamp and Floodplain Forest[5] – 47 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**Spotted Turtle**[I] **Warbling Vireo**[I] **Willow Flycatcher**[A,I] American Redstart[J] Gray Catbird[A,I,J] Wood Duck[J] Chestnut-sided Warbler[I] Eastern Towhee[A] Brown Thrasher[A,I] Alder Flycatcher[I] Migratory Species
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Woodlands (natural)[5] – 21 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] – 12 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Pasture/Hay/Grassland[5] – 223 acres		
Where appropriate and supported by the local community, restore to forest habitat types	See species composition and structure above.	See species associated with forested habitat types above.
Cliff and Talus[5] – 3 acres		
North-central Appalachian circumneutral cliff and talus[H]	This cliff system occurs at low to mid elevations and consists of vertical or near-vertical cliffs and steep rocky slopes. Substrates include limestone, dolomite and other rocks. The vegetation varies from sparse to patches of small trees, in places forming woodland or even forest vegetation. Ash, basswood and American bladdernut are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., yellow jewelweed, purple cliffbrake, ebony spleenwort, or bluntlobe cliff fern (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 89 acres		
Alewife[B, F, G]	Spawn in ponds and slow-moving streams (USFWS 1996).	Smallmouth Bass[I] Striped Bass[I] Pumpkinseed[I] Longnose Dace[I] Yellow Perch[I]
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/ coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	
American Shad[B, F, G]	Spawn when the water temperature is above 60° F in shoal area of river and lower reaches of larger tributaries (USFWS 1996).	
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58° F (USFWS 1996).	
Shortnose Sturgeon[B, D, F, G]	Spawn in slow-moving, 48° F water of large rivers, and feed in fresh and brackish water along the river bottom (USFWS 1996).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.

I: 2015 Connecticut Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR CCP, Chapter 4, "Management Goals, Objectives, and Strategies."

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD—These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Objectives and Strategies for Refuge Lands in the Maromas CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, Louisiana waterthrush, bald eagle, and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
As a result of its history of fire, pathogens, wind events, and other meteorological disturbances and its remarkable cultural legacy of land cover transformations, the entire New England region is strongly shaped by historical processes. In the Maromas CFA, for example, although the landscape was largely forested prior to European settlement, it was highly dynamic in response to changing climatic conditions and natural disturbance processes. European settlement in the 17th and 18th centuries, including sawmills, gristmills, quarries, and shipping docks, initiated a dramatic transformation, as much of the land was deforested and farmed and the remainder was logged, grazed, or burned. More recently, agriculture and forest use have declined, forest area and age have increased, and the land has become more natural than at any time in the preceding centuries. However, despite the natural appearance of much of the Maromas CFA, a legacy of intensive past use remains in vegetation structure and composition, landscape patterns, and ongoing dynamics. This includes the decline in dominant tree species as a consequence of introduced pests and pathogens. The hemlock woolly adelgid, an introduced, aphid-like insect is spreading relentlessly across the range of eastern hemlock and causing widespread decline and mortality of this long-lived and shade tolerant species.

The forests within the CFA that have formed following agricultural abandonment are remarkably more homogeneous than those of four centuries earlier and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Foster et al. 1998). Modern forests also exhibit much weaker relationships to regional variation in physiography, climate, and soils. And at larger scales, the arrangement and structural and compositional characteristics of plant communities are largely the consequence of species-specific response to land-use histories and other edaphic (soil-related) factors (Foster 1995, Motzkin et al. 1996).

Gap dynamics were the most common natural disturbance, which led naturally to a forest structure dominated by late-successional, multi-aged stands (Foster and Zebryk 1993, Foster et al. 1996, Seymour et al. 2002). A combination of passive management and the application of silvicultural treatments designed to emulate gap dynamics will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics. Efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney and Waller 2003, Côté et al. 2004, see also Rawinski 2008). The structure and composition of late-successional forest ecosystems have been detailed in numerous publications (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010). Four important structural attributes of late-successional forests are: live large-diameter trees, standing dead trees (snags), fallen trees or logs on the forest floor, and logs in streams. Additional important elements typically include multiple canopy layers, smaller understory trees, canopy gaps, and patchy understory development. These habitat elements have importance to declining mature forest-interior species like wood thrush and Louisiana waterthrush. The wood thrush nests and feeds at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). Louisiana waterthrush are strongly associated with the swift flowing streams in the forested, steep-sided valleys within Maromas, and have been shown to decline in response to disturbance of forest cover, streambeds, and associated microhabitat features (Janssen 1987). The wood thrush and Louisiana waterthrush have significance within the Service as

NALCC representative species for hardwood forests in the southern sub-region. The occurrence and distribution of many wildlife species are related to key structural habitat features within the forested habitat matrix. High exposed perching and nesting sites often are found in old fields, riparian corridors, and stands where an overstory tree clearly stands above the other forest vegetation; supracanopy white pines and hemlock are examples. The exposed nature of these high perches makes them excellent hunting sites for raptors such as bald eagles that forage in non-forested cover types and open forests. Current breeding territory within Maromas will be managed to perpetuate supracanopy trees.

The management priorities for this habitat type include protection of a large, contiguous forested block within a highly fragmented landscape. This protection coupled with improvements in seral stage diversity will benefit other species of conservation concern like eastern hognose snake, Jefferson salamander, worm-eating warbler, red-shouldered hawk, and hooded warbler.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Reserve supracanopy trees in proximity to important habitats during management activities.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map vernal pools and seeps.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1b. (Hardwood swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, and potential winter habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Maromas Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer.

Hardwood swamp occurrences within Maromas with more alkaline soils are often found along riparian and floodplain areas in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the water table drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum. The examples identified within the Maromas CFA occur within the floodplain of the Connecticut River.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Maromas will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including surveys for rusty blackbirds during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide breeding and foraging habitat for priority refuge resources of concern including American black duck, as well as wintering habitat for rusty blackbird.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). Our coarse-scale habitat analysis of this CFA identifies a shrub swamp wetland complex adjacent to the Connecticut River. Flooding of this wetland complex during high water events provide a diversity of plant communities, and habitats for a variety of wildlife species, including American black duck, and other waterfowl species.

American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 30. Black ducks use wetlands, including shrub swamp communities, as stopover habitat during migration, and as breeding and wintering habitat. Well-concealed nests are placed on the ground in nearby uplands or hummocks in wetlands, and adults and their broods forage on seeds, aquatic vegetation, and invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). The open water habitat and the adjacent wetland complex provide excellent wintering and migrating habitat for American black ducks. And located on the Connecticut River, an important migration corridor, these wetland communities are used by other waterfowl species during migration including green-winged teal, common merganser, mallards, bufflehead and wood ducks.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including waterfowl surveys, and migratory landbird surveys that target priority resources of concern such as rusty blackbirds
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the Service has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation. Habitats that occur within the Maromas CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Pasture/Hay/Grassland)
Where appropriate, and with local support, restore historic composition and structure, and improve landscape connectivity to support forest interior species and provide migratory stopover habitat.

Rationale:
Five percent of the Maromas CFA is typed as pasture, hay, and grassland habitat. While these habitats add to the diversity in the landscape, they also fragment the relatively contiguous forest block of the CFA. Adding up to almost 4,000 forested acres, the Maromas CFA is providing unfragmented habitat on the Connecticut River that is becoming increasingly rare in the southern portion of the watershed, especially with increasing development pressures. The forests within the CFA provide habitat for forest interior species including wood thrush and Louisiana waterthrush that require large tracts of mature forest to maintain viable populations. As forests become fragmented in the landscape, decreased food availability and increased predation and nest parasitism impact forest interior species reproductive success (Wilcove 1985, Brittingham and Goodrich 2010, Richmond et al. 2011, Hagan et al. 2012, Burke and Nol 1998, 2000)

The Maromas CFA also provides a connection between two undeveloped forest corridors located in the Lower Connecticut River and, further north, along the Bolton Range. These corridors have been recognized for their lack of development, and their importance to neotropical migrants. The Bolten Range corridor extends into Massachusetts, and provides forest bird nesting habitat. It is important, therefore, to restore the fragmentation that agricultural land is creating within the Maromas CFA, and maintain the contiguous forest core that is uncommon in the landscape, and provides important wildlife habitat.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- As new pasture, hay, and/or grassland habitat is acquired, evaluate its ecological importance to determine if it should be maintained or if it should restored to native forest through tree plantings or natural succession.

Sub-objective 1.2b. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Maromas CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is limited. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, identify and implement habitat restoration opportunities within the Maromas CFA and Connecticut River to benefit priority refuge resources of concern including American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon, as well as other species of conservation concern such as sea lamprey.

Rationale:
The Maromas CFA is located along the Connecticut River which provides important habitat for American shad, shortnose sturgeon, American eel, alewife, blueback herring and Atlantic salmon. The Connecticut River is important migratory habitat for Atlantic salmon, American shad, and shortnose sturgeon (a federally listed species), and spawning habitat for river herring. This area of the Connecticut River is also important as overwintering habitat for shortnose sturgeon.

American eel spend the majority of their young life in freshwater systems. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit bays, estuaries, streams, lakes, and ponds. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

Another species of conservation concern that utilize freshwater aquatic habitats in this CFA is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

Restoring and maintaining the ecological integrity of upland and wetland habitats of the CFA will have positive impacts on water quality of the Connecticut River, and other aquatic systems in the CFA. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 10 years of approval:

- Work with partners to protect and increase “hard bottom” (e.g., gravel, cobble, or bedrock) for spawning aquatic species.

- Work with partners to reduce combined sewer overflow.

Inventory and Monitoring Strategies:
Within 5 years of approval:

- Work with partners to conduct stream assessments to evaluate stream and fish community health.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Maromas CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of CCP approval:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Maromas CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Maromas CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of CCP approval:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Maromas CFA as an outdoor classroom.

- As part of Service's Urban Refuge Initiative seek opportunities to work with partners to connect audiences from the Middletown area to nature (e.g., using Wo[W] Express, Adopt-a-Habitat).

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Maromas CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Maromas CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Maromas CFA's habitats and cultural resources.

Management Strategies:
Within 5 years of acquiring sufficient land:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Maromas CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Maromas CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Maromas CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Maromas CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
The Maromas CFA is mostly comprised of floodplain forests along the Connecticut River, and upland forests and wetlands west of the river. This area offers good hunting opportunities for small game, waterfowl, turkey, and white-tailed deer. There is a history of public hunting within the bounds of the CFA at Cockaponset State Forest and Millers Pond State Park. Additional hunting is likely allowed via landowner permission in other parts of the CFA. Hunting, consistent with the final compatibility determination, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal division open hours (i.e., 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions to support a safe, manageable hunt program.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use at the CFA.)

Within 1 year of acquiring land sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at the Maromas CFA kiosks, through a friends group, and in local businesses.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.
- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.
- Offer to host hunter education field courses.
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Maromas CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Connecticut Department of Energy and Environmental Protection regulations, and CFA-specific conditions, if necessary.

Rationale:
The principal fishing resources on this CFA are the Connecticut River, several small reservoirs and associated streams (i.e. Hubbard Brook and Reservoir Brook) that support game fish. Most people fish the Connecticut River from boats, but allowing bank fishing on a Maromas CFA will provide the public with another recreational opportunity. Fishing is a popular activity in this area and will continue under Service ownership, consistent with the final compatibility determination. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- The Maromas CFA will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.

Within 5 years of acquiring land with fishable waters:

- Work with the Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new division to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses at the CFA.)

Within 1 year of acquiring land:

- Consistent with the final compatibility determination, allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
By providing new visitors a quality experience they are more likely to return and share their experiences with others. Enhancing the opportunities for visitors to view and photograph wildlife will give them a better appreciation of the refuge, Refuge System and Service. One way to accomplish this is to offer sufficient information and aids to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses at the CFA.)

Within 1 year of acquiring land:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:
- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats, and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:
- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:
- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Maromas CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:
- Work with public and private partners to determine whether and what roles this CFA might contribute to a Connecticut River waterway route.
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Maromas CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that are part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Maromas CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that a particular use is compatible.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Allow canoeing and kayaking in acquired coves and waterways.

Within 5 years of CCP approval:

- Work with friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Muddy Brook Conservation Focus Area

Suffield, Connecticut

Conservation Focus Area (CFA) — Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	2,661	97 %
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*2,661*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	86	3 %
Total Acres in CFA[2,4]	2,747	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Muddy Brook CPA (map A.9) encompasses the Muddy Brook CFA (map A.10) which was identified by the State of Connecticut as a priority for grassland and early successional habitat restoration and management.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Swamp – 10%
- Pasture/Hay/Grassland – 50%
- Shrub Swamp and Floodplain Forest – 1.5%

For more information on habitats in the CFA, see map A.11 and table A.6.

What are the resources of conservation concern for the CFA?

As noted in table A.7 below, there are seven priority refuge resources of concern (PRRC) that rely upon habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. This includes potential for a large tract of contiguous grasslands to benefit declining grassland dependent species, and floodplain, a habitat that has undergone significant alteration within the Connecticut River watershed. Terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design are present across the southern half of the Muddy Brook CFA. The refuge will seek to protect and restore (if necessary) these, and other PRRC habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and migratory landbirds. These species and habitats are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species and other bat species.

   This CFA will contribute to the conservation of the federally endangered dwarf wedgemussel. This species requires stable bank conditions and high water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000). This mussel is threatened by habitat loss, fragmentation and altered river processes (Nedeau 2009).

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem. Migrants are also known to use habitats beyond the Connecticut River main stem within the watershed, though in lower numbers (Smith College 2006). The Muddy Brook CFA is less than 10 miles from the Connecticut River and contains large tracts of hardwood swamps and riparian habitat. These habitats provide stopover areas for a diversity of species including wood thrush, Canada warbler, black-throated blue warbler, black-throated green warbler, red-eyed vireo, American redstart, and yellow-bellied sapsucker (Smith College 2006).

3. **Diadromous fish**
   The PRRC species for Muddy Brook CFA includes American eel, a species petitioned for federal listing, and brook trout. Mountain Brook, a tributary to the much larger Muddy Brook, meanders through the Muddy Brook CFA, providing habitat for brook trout and eel.

4. **Wetlands**
   Five-hundred and thirty acres of hardwood swamp and 51 acres of shrub-swamp and floodplain forest occur in the CFA. The majority of the acreage, and large contiguous patches, are adjacent and part of the Mountain Brook floodplain. Within the Connecticut River watershed agricultural practices and selective logging have largely removed floodplain habitat from the landscape, or greatly simplified its historic species composition. Floodplain habitat in the Muddy Brook CFA has undergone significant alteration and there is great potential for restoration. Intact floodplain forests in the Muddy Brook CFA will provide high-quality habitat for neo-tropical migratory birds, restore forest connectivity, and travel corridors for wildlife, and increase water quality and shade for aquatic species.

5. **Other**
   Over fifty percent of the Muddy Brook CFA is in pasture, hay and grassland habitat, consisting mostly of large fields between 50 to almost 200 acres. Management of these fields as grassland habitat will benefit declining grassland bird species. Grasslands are a high priority habitat for the state of Connecticut. These habitats provide breeding and nesting habitat for several state threatened and endangered species, including northern harrier, upland sandpiper, barn owl, and grasshopper sparrow. Many grassland birds are area sensitive, and require large grassland acres (greater than 25 acres or 10 hectares) including grasshopper sparrows, bobolinks, eastern meadowlarks, and upland sandpiper (Vickery et al. 1994). A contiguous block of grassland habitat in the Muddy Brook CFA will benefit these species, as well as declining pollinators such as the yellow-banded bumble bee, regal fritillary and monarch butterfly, which are petitioned for listing under the ESA.

What habitat management activities will be a priority on refuge lands within the CFA?

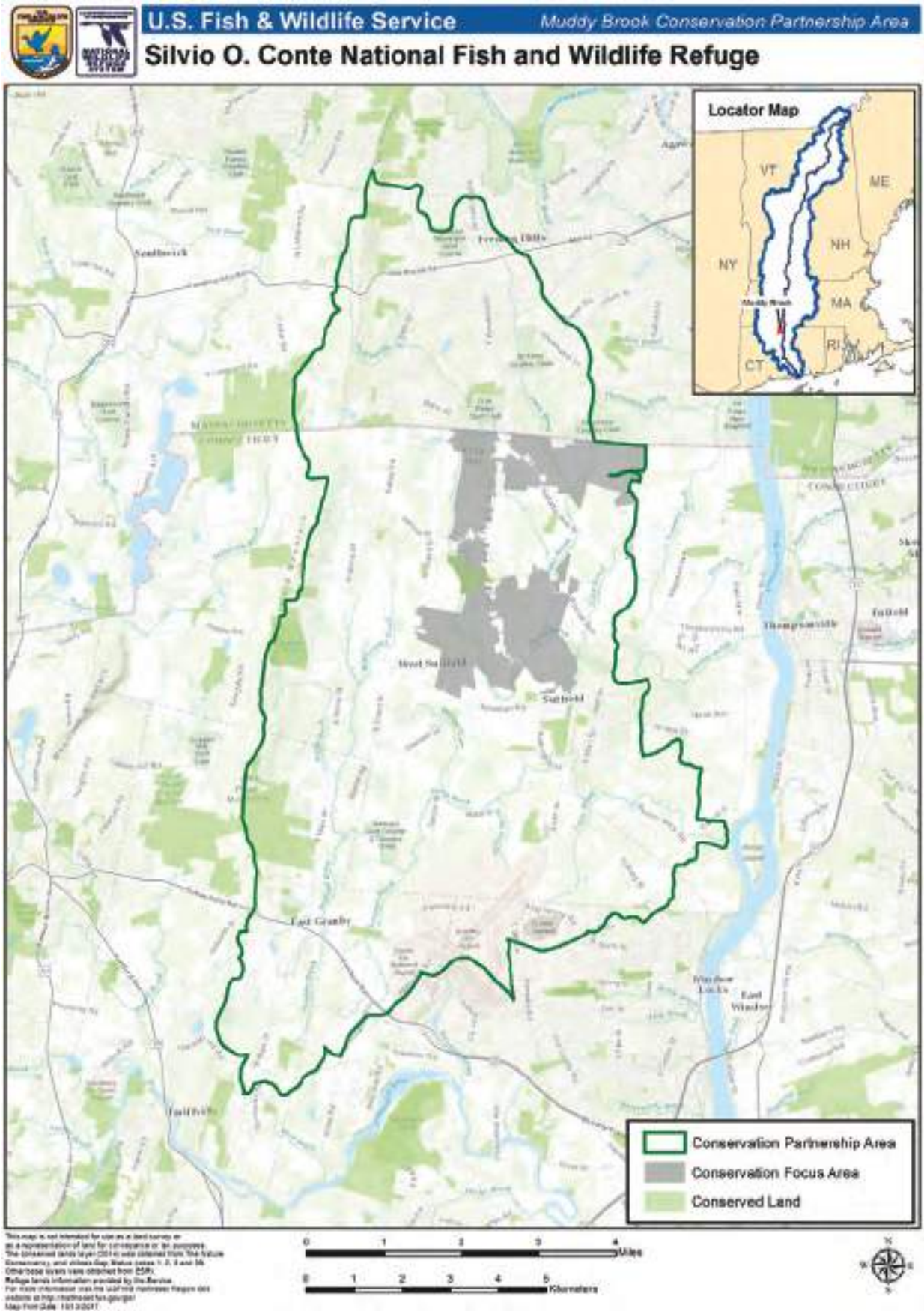
We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (ie. forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will focus on restoration of degraded floodplains, including (where appropriate) restoring the primary natural disturbance mechanism (seasonal flooding) and species composition and structure to accepted historical conditions. Management of upland forests will improve structural diversity, and emphasize species appropriate for site conditions and location.
- Where appropriate, we will maintain large contiguous acres of warm season grasses.
- Our management activities in emergent and shrub wetland habitats will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- In open water (stream, rivers, and ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

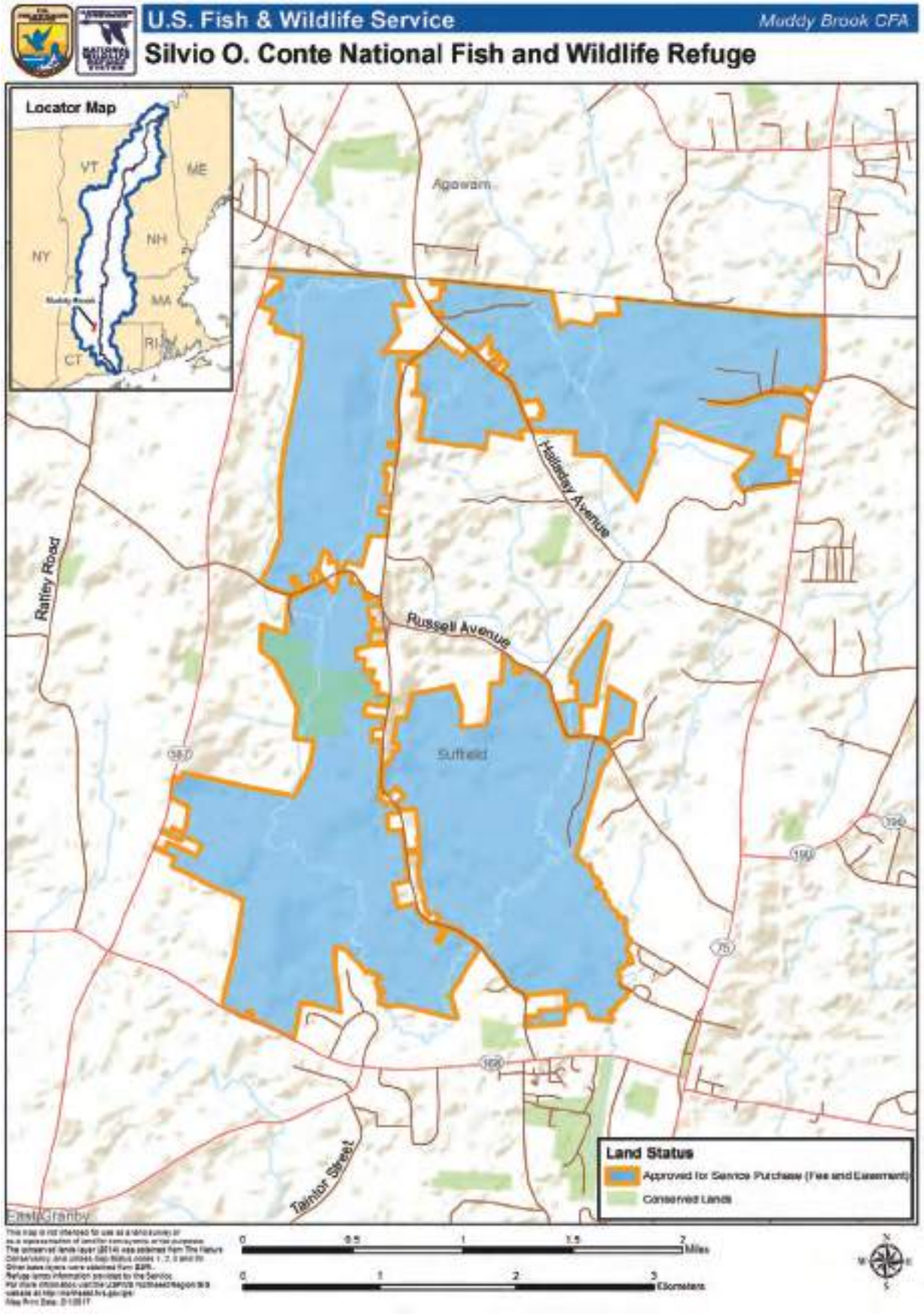
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

Map A.9. Muddy Brook CPA.



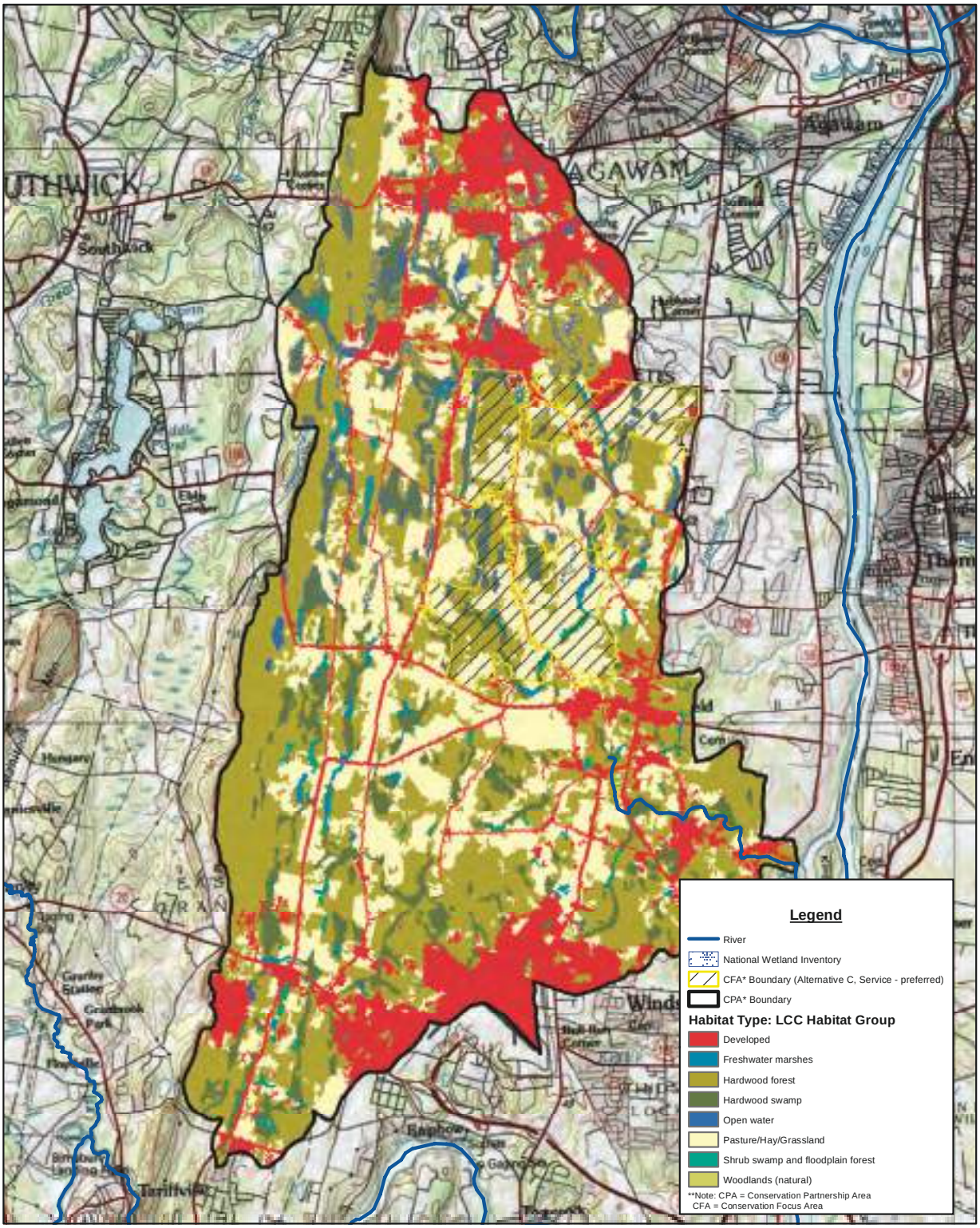
Map A.10. Muddy Brook CFA – Location.



Map A.11. Muddy Brook CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Muddy Brook CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes.
For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

Table A.6. Muddy Brook CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Hardwood forest	11,531	40.2%	913	57	0	33.2%	7.9%
Hardwood swamp	2,771	9.7%	280	28	0	10.2%	10.1%
Shrub swamp and floodplain forest	244	0.9%	40	0	0	1.5%	16.4%
Woodlands (natural)	1	0.0%	–	0	0	0.0%	0.0%
Forested uplands and wetlands subtotal	*14,547*	*50.7%*	*1,233*	*86*	*0*	*44.9%*	*8.5%*
Non-forested Uplands and Wetlands[9]							
Freshwater marshes	208	0.7%	27	0	0	1.0%	13.0%
Pasture/hay/grassland	8,361	29.1%	1,383	0	0	50.3%	16.5%
Non-forested uplands and wetlands subtotal	*8,570*	*29.9%*	*1,410*	*0*	*0*	*51.3%*	*16.5%*
Inland aquatic habitats[9]							
Open Water	92	0.3%	3	0	0	0.1%	3.4%
Inland aquatic habitats subtotal	*92*	*0.3%*	*3*	*0*	*0*	*0.1%*	*3.4%*
Other							
Developed	5,480	19.1%	101	0	0	3.7%	1.8%
Other subtotal	*5,480*	*19.1%*	*101*	*0*	*0*	*3.7%*	*1.8%*
TOTAL[10]	**28,689**	**100.0%**	**2,748**	**86**	**0**	**100.0%**	**9.6%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.7. Muddy Brook CFA – Priority Refuge Resources of Concern

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] – 913 acres		
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	Migratory Species Little Brown Bat[I]
Hardwood Swamp[5] – 280 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory species
Shrub Swamp and Floodplain Forest[5] – 40 acres		
Laurentian-Acadian wet meadow-shrub swamp[H]	This system encompasses shrub swamps and wet meadows on mineral soils and is often associated with lakes and ponds, but is also found along streams, where the water level does not fluctuate greatly. They are commonly flooded for part of the growing season but often do not have standing water throughout the season. The size of occurrences ranges from small pockets to extensive acreages. The system can have a patchwork of shrub and grass dominance; typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush. Trees are generally absent and, if present, are scattered (Gawler 2008).	Migratory species
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] – 27 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Pasture/Hay/Grassland[5] – 1,383 acres		
Where appropriate, maintain as contiguous block of grassland habitat	Grasslands include fields managed for warm season grasses, such as switch grass, Indian grass, and blue stem, hayfields/pastures that are intensively managed for cool season grasses and active pastures.	American Woodcock[A, I, J] **Bobolink**[A,I] **Upland Sandpiper**[A, I] Northern Harrier[I,J] **Grasshopper Sparrow**[I] **Eastern Meadowlark**[I] Field Sparrow[A,I] Eastern Kingbird[A,I] American Kestrel[I] Yellow Banded Bumble Bee[E] Monarch Butterfly[E] Regal Fritillary[E]
Inland Aquatic Habitats[4]		
Water[5] – 3 acres		
American Eel[E, F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	Riverine Clubtail[I] Skillet Clubtail[I] Longnose Dace[I] Cobra Clubtail[I]
Dwarf Wedgemussel[B, D, F]	Inhabits creeks and small rivers, prefers the stable bank conditions afforded by gravel or sandy substrates, and good water quality (Nedeau et al. 2000, USFWS 1993).	
Alewife[B, F, G]	Spawn in ponds and slow-moving streams (USFWS 1996).	
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58 F (USFWS 1996).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.

I: 2015 Connecticut Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Muddy Brook CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for spring and fall migrants, and potential roosting and foraging areas for the northern long-eared bat and tricolored bat.

Rationale:
We envision healthy forests within the Muddy Brook CFA where a diverse seral structure provides suitable habitat conditions for a suite of wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010).

Muddy Brook CFA hardwood forests provide a diversity of habitats for wildlife. To date our review of the Muddy Brook CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Muddy Brook comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Muddy Brook are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Moore et al. 1990, Petit 2000, Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Moore et al. 1990, Noss 1991). Clearly, structurally complex habitats will not be suitable for all migratory species, but our conservation goal is to provide those areas used most frequently by migrating birds, suggesting relatively tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990, Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. While our management goals may create a relatively old forest, hardwood forests within Muddy Brook will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated (i.e. forest-agricultural edge and suburban forest of the type within Muddy Brook) and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al. 2004).

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches of greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Live, dead or dying trees that are >3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the northern flicker.

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Muddy Brook's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of foraging opportunities. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991, DeGraaf et al. 2006). Efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney and Waller 2003, Côté et al. 2004, Rawinski 2008).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:

Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories including surveys on use by migrating landbirds.

- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map vernal pools and seeps.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1b. (Hardwood swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrant birds, as well as wintering habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Muddy Brook CFA represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer. Within the Connecticut River watershed, including the CFA, agricultural practices, development pressure, and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Muddy Brook will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories including surveys for rusty blackbirds during the migration and wintering periods.

- Map vernal pools and seeps.

- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Restore native species composition and structure, and improve the natural hydrology, as needed, to support natural and rare shrub swamp and floodplain forest ecological communities. Management will provide stopover habitat for spring and fall migrants.

Rationale:
The shrub swamps in the Muddy Brook CFA are restricted to poorly drained areas and small seepage zones primarily along Muddy Brook. These shrub swamp systems usually have a patchwork of shrub and grass dominance, and may include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). Based on our coarse-scale habitat analysis, the shrub swamps are also adjacent to agricultural land, and impacts to the wetland hydrology may be factor. Water pollution and invasive species introductions are also threats for shrub swamp communities.

Restoration of shrub swamp communities, as well as the surrounding forested habitat, will create high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Muddy Brook CFA is situated near the Connecticut River, and can provide significant stopover habitat for migrants in the spring and fall. Neo-tropical migrants typically use similar habitats during migration as they do during the breeding season (Petit 2000). Species such as gray catbird, yellow-rumped warbler, white-eyed vireo, eastern phoebe, eastern kingbird and common yellowthroat will use shrubland communities (McCann et al. 1993). Native shrubs will provide migrants with soft mast and abundant insects to replenish fat reserves, and structure to provide rest and adequate cover from predators and inclement weather.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Muddy Brook CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine

species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003)with different authors measuring fragmentation in different ways and, as a consequence, drawing different conclusions regarding both the magnitude and direction of its effects. Habitat fragmentation is usually defined as a landscape-scale process involving both habitat loss and the breaking apart of habitat. Results of empirical studies of habitat fragmentation are often difficult to interpret because (a. Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Pasture/Hay/Grassland)
Where appropriate, maintain a contiguous block of grassland habitat for breeding and migrating grassland bird species and pollinators; areas not managed for grassland birds and pollinators will be allowed to revert to natural conditions.

Rationale:
Over 50 percent of the Muddy Brook CFA is typed as pasture, hay, and grassland, consisting mostly of large fields between 50 to almost 200 acres. Management of these fields as grassland habitat will benefit declining grassland bird and pollinator species, and provide a habitat that is increasingly rare in the region.

Native grasslands were once more widespread in North America. A deterioration of rangelands, the conversion of prairies to agriculture, and afforestation of the eastern United States are significant factors to the decline of grassland bird populations. During European settlement, millions of acres of forests were cleared for agriculture in the eastern U.S., creating habitat for grassland dependent birds. As agricultural activities declined, open areas dominated by herbaceous vegetation began to convert back to forests, causing a drastic decline in grassland species in the region (Brennan and Kuvlesky Jr. 2005). Habitat loss is also a factor for declining populations of pollinator species, including the yellow banded bumble bee, regal fritillary and monarch butterfly. These species are petitioned for listing under the Endangered Species Act.

In fact, several grassland species are listed as threatened or endangered by the state of Connecticut, including northern harrier, upland sandpiper, barn owl, and grasshopper sparrow. American bumble bee, monarch, and other pollinator species are also listed as State Species of Greatest Conservation Need. Grasslands are a high priority habitat for the state, and maintaining large, contiguous acres of warm season grasses at the Muddy Brook CFA will benefit these species.

We also support the protection of high-value, productive agricultural lands identified by local communities and the State. It is not the refuge's intention to target these lands for acquisition. Instead, our priority will be to work with individual landowners, states, and other Federal agencies to protect these lands and ensure they continue

to be part of the working landscape. There are many State and Federal programs that protect agricultural lands and help promote farming practices that benefit wildlife and help protect water quality. Through our private lands program, we will help direct landowners who are interested in these programs to the proper state and Federal agencies and programs. In rare cases, we may acquire agricultural lands from willing sellers, when other options to keep the land in agricultural production are not available, or if habitats for Federal trust resources are in jeopardy from development or other land use changes.

Due to our unfamiliarity with the habitat conditions in the CFA, a comprehensive, multi-scale habitat and wildlife inventory will be necessary to implement refuge strategies. This inventory will need to encompass all habitats within the CFA and associated landscape. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners and landowners to promote farming practices (ie. haying and pastured animals) that benefit grassland birds.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Assess the condition of pasture, hay and grassland habitats, as well as the overall size and location in the CFA, and proximity to other forest openings, to inform more detailed management strategies in an HMP.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide high water quality and clear aquatic species passage that benefit priority refuge resources of concern including dwarf wedgemussel, American eel, blueback herring, and alewife.

Rationale:
The Muddy Brook CFA provides riverine habitats suitable for diadromous fish and rare mussels. Muddy Brook meanders through the agricultural lands of this CFA, and dumps into Stony Brook, a tributary of the Connecticut River. Stony Brook was once heavily dammed, but over the past 20 years many of these dams have washed out providing access to high quality habitat for diadromous fish including American eel, blueback herring and alewife. The lower reaches of Muddy Brook may also be important for these diadromous fish. There may be opportunities in the CFA to work with partners on aquatic fish passage projects to provide additional high quality habitat for these species.

Stony Brook and Muddy Brook are also important for dwarf wedgemussel, a federal listed species, as well as three state listed mussels. The dwarf wedgemussel requires stable bank conditions and high water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000). Like many aquatic species, the dwarf wedgemussel is threatened by habitat loss, fragmentation and altered river processes (Nedeau 2009). This species once occupied Philo Brook, a tributary to Muddy Brook, and habitat may also be available in other feeder streams in the CFA. This historic occurence provides restoration opportunities that may contribute toward the recovery of the dwarf wedgemussel, as well as other mussel species that occur in the CFA.

Improving water quality and native fish habitat within the Muddy Brook CFA will require a comprehensive, multi-scale habitat and wildlife inventory. Due to our lack of knowledge regarding habitat conditions in this CFA, this inventory will need to encompass all habitats within the CFA and associated landscape. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

- Work with partners to identify manmade physical barriers (e.g. impassable road crossings, culverts and dams) to the movement of fish and other aquatic organisms.

- **Inventory and Monitoring Strategies:**
- *Within 5 years of land acquisition and CCP approval:*
- Work with partners to conduct stream assessments to evaluate stream and fish community health.
- Work with partners to evaluate dwarf wedge mussel populations, and determine best management strategies for the maintenance of this species in the CFA.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Muddy Brook CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Muddy Brook CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Muddy Brook CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Muddy Brook CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Muddy Brook CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Muddy Brook CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Muddy Brook CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Muddy Brook CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Muddy Brook CFA.

- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state-of-the-art as well as traditional media e.g. pamphlets, signs, etc.

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Muddy Brook CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Muddy Brook CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
The Muddy Brook CFA is a popular area to hunt. Currently, public hunting for small game and white-tailed deer (archery only) is available on the Newgate Wildlife Management Area in East Granby. Hunting will be allowed

on a newly created CFA consistent with the final compatibility determination. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions to support a safe, manageable hunt program.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Muddy Brook CFA kiosks, through a friends group, and in local businesses.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Muddy Brook CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Connecticut Department of Energy and Environmental Protection regulations, and CFA-specific conditions, if necessary.

Rationale:
There are several streams in the CFA including Muddy Brook, East Branch Muddy Brook, Muddy Brook, and Holcomb Brook. These rivers support cold water fisheries that include Eastern brook trout. A variety of other game fish are found in streams and ponds within the CFA. Fishing is a popular activity throughout this area and will continue under Service ownership, consistent with the final compatibility determination. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk to post information on fishing seasons and other notices to visitors.

- The Muddy Brook CFA will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land:
- Produce a brochure that highlights fishing opportunities for distribution at a CFA kiosk and the refuge website.

- Work with the Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the CFA.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. A new CFA in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exceptions listed for hunters and anglers. The refuge manager may issue a special use permit for public uses during the closed hours.

- Install an informational kiosk to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses.)

Within 1 year of acquiring land:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:
- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools, groups, and environmental organizations to include wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:
- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Muddy Brook CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation.

Management Strategies:
Within 5 years of acquiring land:
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Muddy Brook CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Examples include the Metacoment-Manadnock Trail, part of the New England Trail a National Scenic Trail. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Within 5 years of acquiring land adjacent to or containing a section of the Metacomet-Monadnock (New England) Trail:

- Work with the State of Connecticut, the East Granby Land Trust, adjacent landowners, and other local interests to explore partnership opportunities related to the trail and the surrounding network of conserved lands in the CPA.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Muddy Brook CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that the use is both appropriate and compatible.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge properties.

Pyquag Conservation Focus Area

East Hartford, Wethersfield, Glastonbury, and Rocky Hill, Connecticut

Conservation Focus Area (CFA) — Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	3,329	90 %
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*3,329*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	383	10 %
Total Acres in CFA[2, 4]	3,712	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

Pyquag was a SFA in the 1995 Conte FEIS. The Pyquag CFA (map A.12) area is considered important floodplain forest by The Nature Conservancy and the CFA will allow for the restoration and conservation of the floodplain forest and associated wetland complex. Habitat conservation in this CFA will help allow for the landward migration of the coastal wetland complex (salt-, brackish-, and freshwater tidally influenced wetlands) due to climate change.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Pasture/Hay/Grassland – 29.3%
- Hardwood Swamp – 19.8%
- Freshwater Marsh – 6.2%

For more information on the habitats in the CFA, see map A.13 and table A.8.

What are the resources of conservation concern for the CFA?

As noted in table A.9 below, there are seven priority refuge resources of concern (PRRC) aquatic and terrestrial species that rely upon the open water and wetland habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. This includes floodplain habitats which have undergone significant alteration within the Connecticut River watershed. The refuge will seek to protect and restore (if necessary) these, and other PRRC habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and migratory birds. These species and habitats are discussed further below.

1. **Federal Threatened and Endangered Species**
   This section of the Connecticut River is important migratory and wintering habitat for shortnose sturgeon. This species prefers large rivers and estuaries where there is an abundance of crustaceans, mollusks, and insects to feed on. They are a long-lived fish that are threatened by pollution, habitat alterations and overfishing.

This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Pyquag CFA is situated on the Connecticut River, and the forested habitats and wetlands provide very important stopover habitat for landbirds, shorebirds, and waterbirds.

This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

3. **Waterfowl**
The freshwater marshes, hardwood swamps, and open water of the Connecticut River provide important stopover areas for migrating and wintering waterfowl. Large concentrations of American black duck (a PRRC species), green-winged teal, and mallard use habitats in this CFA. Other species include Canada geese, bufflehead, canvasback, wood duck, northern pintail, gadwall, and mergansers.

4. **Diadromous fish and other aquatic species**
The Pyquag CFA straddles the Connecticut River which provides important habitat for PRRC species including American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon. Shortnose sturgeon is also a federally listed species. Keeney and Wethersfield Coves, located in past river channels, and Crow Point (a borrow pit for I-91) are accessible from the Connecticut River and provide additional open water habitat for these species. There are also various brooks that feed into the Connecticut River and Coves that are important for river herring. Sea lamprey, another species of conservation concern, occurs in this CFA providing important ecological benefits to aquatic systems.

5. **Wetlands**
More commonly known locally as the Great Meadows, this CFA lies in a large floodplain (4,310 acres) in Wethersfield, Glastonbury and Rocky Hill plus a small portion of East Hartford (Keeney Cove). The floodplain is roughly 5 miles long and about 2 ½ miles wide. It is 4 to 5 feet above the normal river level, while the terraces where the towns are located are 20 to 30 feet above the river. Annual spring floods generally rise 10 to 15 higher than the normal river level, and flood about 2,740 acres. Although currently almost entirely in agricultural use, the floodplain will naturally support a forest of silver maple, cottonwood, sycamore, box elder and willow. A couple of floodplain forests are ranked as exemplary by the State natural heritage program.

Where older channels of the river occur, there are several marsh types present, varying from cattail marsh to shrub marsh. Several of the freshwater tidal marshes are ranked as exemplary by the State natural heritage program. The unusual plants green dragon and the golden club (State species of special concern) are both found in wetlands here.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will focus on restoration of degraded floodplains, including where appropriate, restoring the primary natural disturbance mechanism (seasonal flooding) and species composition and structure to accepted historical conditions. Management of upland forests will improve structural diversity and species composition will be appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

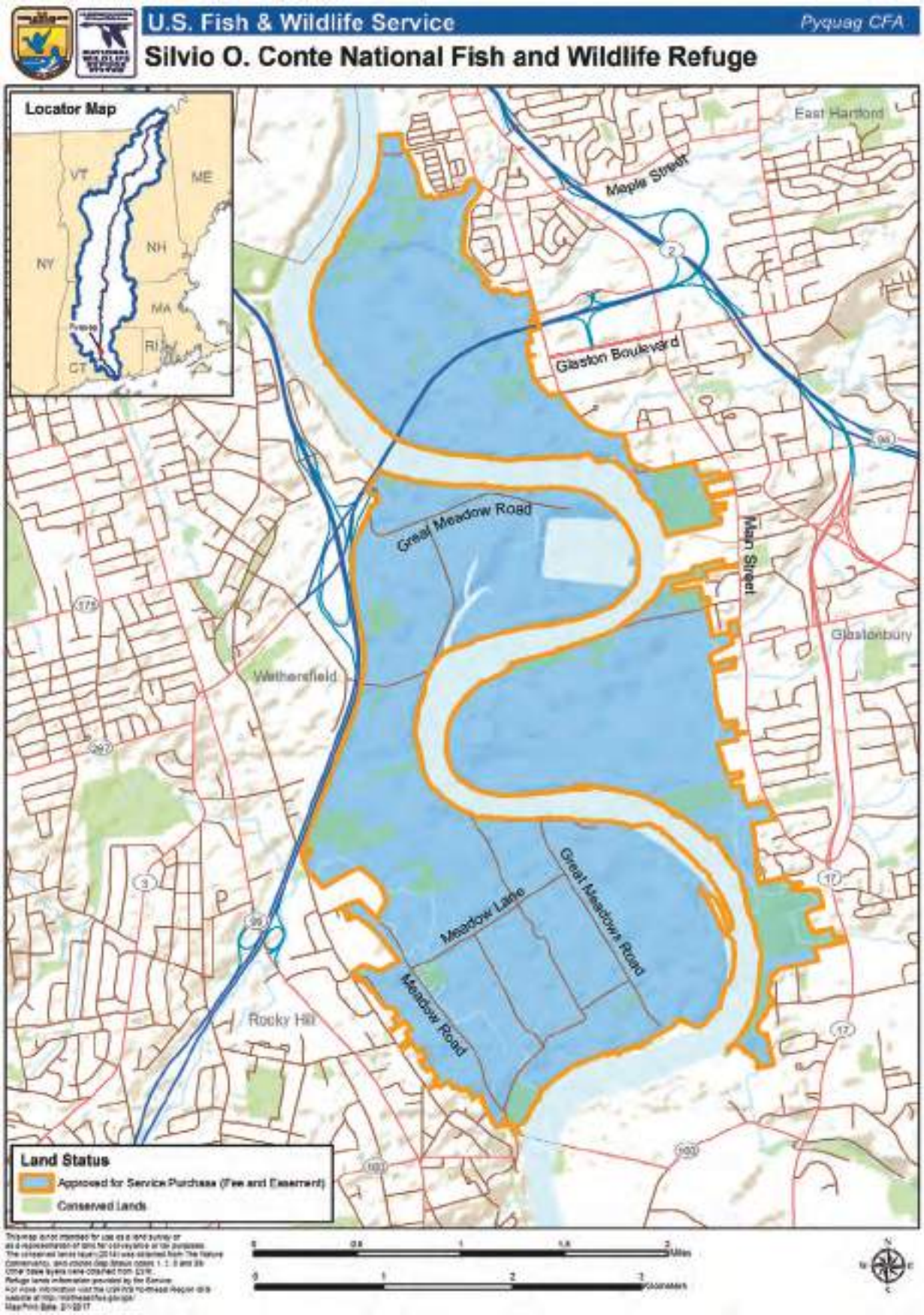
- Non-forest management activities will occur within the emergent wetland habitats, and will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- Open water (stream, rivers, and coves) will focus on maintaining stream connectivity, including connectivity between the coves and the Connecticut River, and providing outstanding water quality.

What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, interpretation, and environmental education.

Map A.12. Pyquag CFA – Location.



Map A.13. Pyquag CFA – Habitat Types.

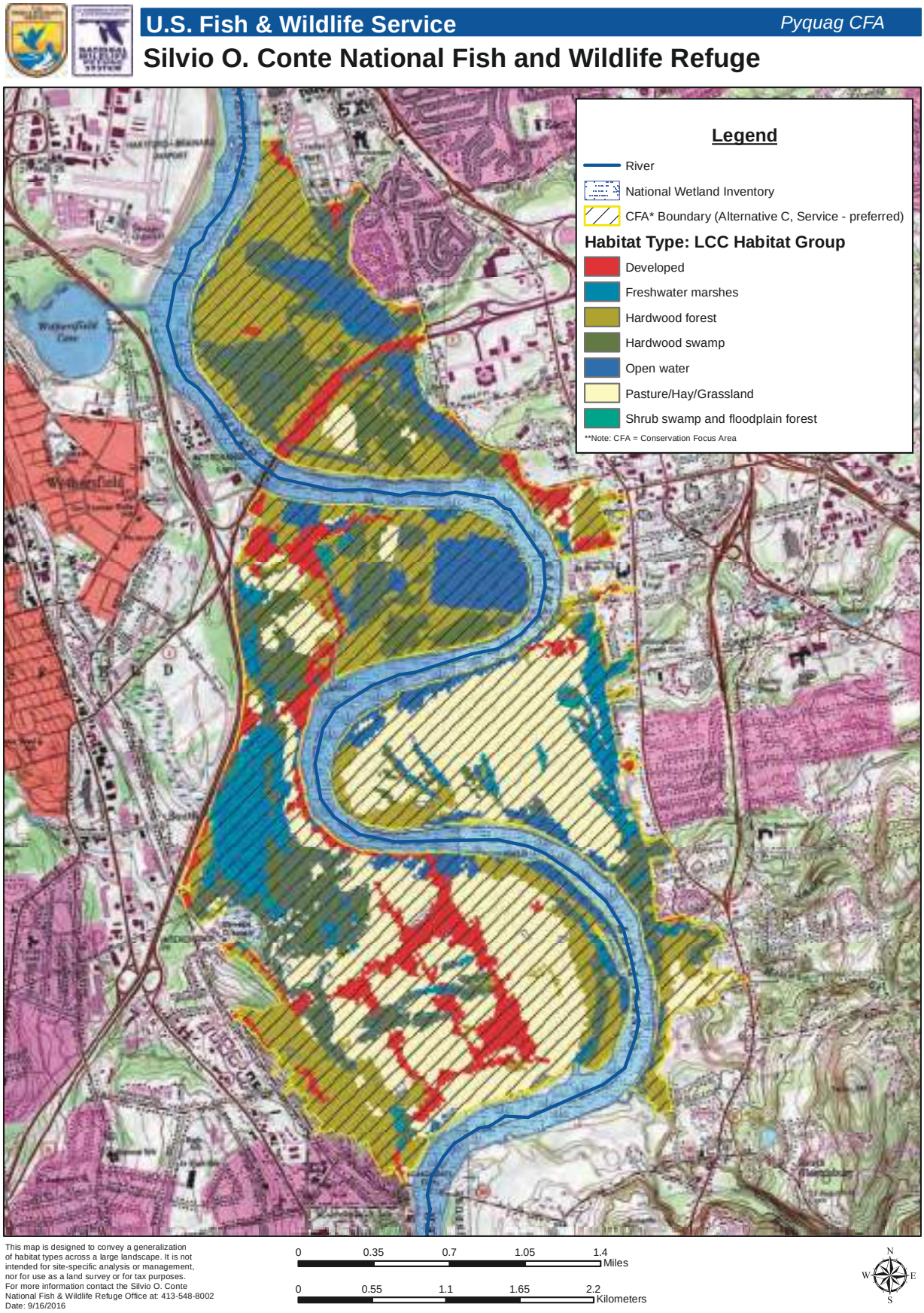


Table A.8. Pyquag CFA – Habitat Types.

LCC General Habitat Type[1]	CFA[2]			
	Total Acres	Conserved by Others[3]	USFWS Owned[4]	Percent CFA[5]
Forested Uplands and Wetlands[6]				
Hardwood forest	927	232	0	25.0%
Hardwood swamp	735	144	0	19.8%
Shrub swamp and floodplain forest	32	9	0	0.9%
Forested uplands and wetlands subtotal	*1,694*	*385*	*0*	*45.7%*
Non-forested Uplands and Wetlands[6]				
Freshwater marshes	228	96	0	6.1%
Pasture/hay/grassland	1,083	162	0	29.2%
Non-forested uplands and wetlands subtotal	*1,311*	*259*	*0*	*35.4%*
Inland aquatic habitats[6]				
Open Water	334	39	0	9.0%
Inland aquatic habitats subtotal	*334*	*39*	*0*	*9.0%*
Other				
Developed	369	68	0	10.0%
Other subtotal	*369*	*68*	*0*	*10.0%*
TOTAL[7]	**3,708**	**750**	**0**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Focus Area

3 Acres in the CFA currently conserved by others (TNC 2014)

4 Acres in the CFA currently owned by the USFWS

5 Percentage of the CFA represented by the habitat type

6 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies

7 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.9. Pyquag CFA – Priority Refuge Resources of Concern

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] – 933 acres		
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically ≥ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	Migratory Species Little Brown Bat[I]
Hardwood Swamp[5] – 734 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory Species
Shrub Swamp and Floodplain Forest[5] – 32 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Northern Harrier[I,J] Wood Duck[A,I,J] Green-winged Teal[A,I,J] Snowy Egret[A,I,J] Rusty Blackbird[A] **American Bittern**[A,I] Common Merganser[I] Bufflehead[A] Canada Goose, NAP[AJ] Canada Goose, AP[AJ] **Virginia Rail**[I] **Marsh Wren**[A,I] Mallard[A,I,J] Davis' Sedge[I] Waputo[I] Gray Catbird[A,I,J] **Willow Flycatcher**[A, I] **Warbling Vireo**[I] **Spotted Turtle**[I] Eastern Kingbird[A,I,J]
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory Species

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] – 229 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Northern Harrier[I,J] Wood Duck[A,I,J] Green-winged Teal[A,I,J] Snowy Egret[A] Rusty Blackbird[A] **American Bittern**[A,I] Common Merganser[I] Bufflehead[A] Canada Goose, NAP[AJ] Canada Goose, AP[AJ] **Virginia Rail**[I] **Marsh Wren**[A,I] Mallard[A,I,J] Davis' Sedge[I] Waputo[I] Gray Catbird[A,I,J] **Willow Flycatcher**[A, I] **Warbling Vireo**[I] **Spotted Turtle**[I] Eastern Kingbird[A,I,J]
Pasture/Hay/Grassland[5] – 1,085 acres		
Where appropriate and supported by the local community, restore to floodplain forest	*Laurentian-Acadian floodplain forest* occurs along medium to large rivers, and includes a matrix of upland and wetland habitats. Floodplain forests, with silver maple are characteristic, as well as herbaceous sloughs and shrub wetlands. Most areas are underwater each spring; micro-topography determines how long the various habitats are inundated. Associated trees include red maple and American hornbeam, the latter frequent but never abundant. On terraces or in more calcium rich areas, sugar maple or red oak may be locally prominent, with yellow birch and ash, black willow is characteristic of the levees adjacent to the channel. Common shrubs include silky dogwood and viburnum. The herb layer in the forested portions often features abundant spring ephemerals, giving way to a fern-dominated understory in many areas by mid-summer. Non-forested wetlands associated with these systems include shrub-dominated and grass-non-woody vegetation (Gawler 2008).	Migratory Bird Species

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 329 acres		
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	Smallmouth Bass[I] Burbot[I] Striped Bass[I] Pumpkinseed[I] Sea Lamprey[I] Longnose Dace[I] Yellow Perch[I]
Shortnose Sturgeon[B, D, F, G]	Spawn in slow-moving, 48 F water of large rivers, and feed in fresh and brackish water along the river bottom (USFWS 1996).	
Alewife[B, F, G]	Spawn in ponds and slow-moving streams (USFWS 1996).	
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58 F (USFWS 1996).	
American Shad[B, F, G]	Spawn when the water temperature is above 60° F in shoal area of river and lower reaches of larger tributaries (USFWS 1996).	
American Black Duck[A, B, C, G]	Migrating habitat includes open water, such as, estuaries, coves or bays with submerged aquatic vegetation, mollusks and crustaceans for foraging (DeGraaf et al. 2001).	Canada Goose, Atlantic[A] Canada Goose, North Atlantic[A] **Bufflehead**[A] Mallard[A] Snowy Egret[A,I,J] Bald Eagle[A,I] Wood Duck[A] Green-winged Teal[A]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.

I: 2015 Connecticut Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Objectives and Strategies for Refuge Lands in the Pyquag CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for spring and fall migrants, as well as potential roosting and foraging habitat for bats such as the northern long-eared bat and tricolored bat.

Rationale:
We envision healthy forests within the Pyquag CFA where a diverse seral structure provides suitable habitat conditions for a suite of Connecticut wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010).

Pyquag CFA hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is certainly available within the CFA. To date our review of the Pyquag CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Pyquag comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Pyquag are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Moore et al. 1990, Petit 2000, Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Moore et al. 1990, Noss 1991). Clearly, structurally complex habitats will not be suitable for all migratory species, but our conservation goal is to provide those areas used most frequently by migrating birds, suggesting relatively tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990, Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. While our management goals may create a relatively old forest, hardwood forests within Pyquag will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated (i.e. forest-agricultural edge and suburban forest of the type within Pyquag) and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al. 2004).

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Hardwood forests within Pyquag should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of foraging opportunities. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991, DeGraaf et al. 2006). Efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney et al. 2004, Côté et al. 2004, see also Rawinski 2008).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including the State of Connecticut, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.

- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood Swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, and potential winter habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Pyquag Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer.

Hardwood swamp occurrences within Pyquag with more alkaline soils are often found along riparian and floodplain areas in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the water table drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum. The examples identified within the Pyquag CFA occur within the floodplain of the Connecticut River.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. Our conservation efforts within the Pyquag will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA may also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map vernal pools and seeps.

- Conduct forest and wildlife inventories.

- Conduct rusty blackbird surveys to determine if habitat is used during the migration and wintering periods.

- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide breeding, foraging and stopover habitat for priority refuge resources of concern including American black duck, and potential migrating and wintering habitat for rusty blackbirds.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush. Our coarse-scale habitat analysis of this CFA identifies a wetland complex in South Wethersfield on the west side of the Connecticut River with a high percent of freshwater marsh interspersed with small pockets of shrub swamp. Please see sub-objective 1.2a for a detailed discussion on this wetland complex, freshwater marsh communities, and priority resource of concern.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including waterfowl surveys, migratory landbird surveys, and winter surveys for rusty blackbirds.

- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marsh communities to support natural and rare ecological communities, and provide breeding, wintering and stopover habitat for priority refuge resources of concern including American black duck.

Rationale:
The freshwater marsh habitat within the Pyquag CFA occurs in past channels of the Connecticut River. These marshlands are within the active floodplain, and may be influenced by the tide. The largest contiguous acreage occurs in South Wethersfield on the east side of Interstate 91. It is part of a larger wetland complex that may provide breeding, foraging, and wintering habitat for American black duck, a species of conservation concern, as well as migratory stopover habitat for a variety of other waterfowl species. These freshwater marshes also provide important habitat for American bittern, sora rails, and least bittern. Two state plant species of special concern, green dragon and golden club also occur in the Pyquag CFA wetland habitats.

Flooding of this wetland complex during high water events provides a diversity of plant communities, and habitats for a variety of wildlife species. American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 30. Black ducks use wetlands, including shrub swamp and freshwater marsh communities, as stopover habitat during migration, and as breeding and wintering habitat. Well-concealed nests are placed on the ground in nearby uplands or hummocks in wetlands, and adults and their broods forage on seeds, aquatic vegetation, and invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). Open water habitat and the adjacent wetland complex provides excellent wintering and migrating habitat for American black ducks. And located on the Connecticut River, an important migration corridor, these wetland communities are used by other waterfowl species during migration including green-winged teal, common merganser, mallards, bufflehead and wood ducks.

The wetland complex is surrounded by development and agricultural land. Impacts may include altered hydrology, contamination, and non-native invasive plant species. A multi-scale wildlife habitat inventory will be necessary to determine the condition of all habitats in the CFA. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Encourage local landowners to use Connecticut Best Management Practices within active agricultural fields that are located along the perimeter of marsh habitats.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife use of existing wetlands.
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Where appropriate, restore historic composition and structure, and improve the natural hydrology and landscape connectivity to support natural and rare ecological communities. Management will provide stopover habitat for migratory species.

Rationale:
Thirty percent of the Pyquag CFA is typed as pasture, hay, and grassland habitat. The majority of these habitats is in active agricultural use, and is located in floodplain of the Connecticut River. This large floodplain includes Keeny and Wethersfield Coves, and extends approximately 5 miles south along the winding Connecticut River. It is 4 to 5 feet above the normal river level, and annual spring floods generally rise 10 to 15 feet above, flooding approximately 2,740 acres. This floodplain is a natural flood storage area for the surrounding communities, and remnant patches are ranked as exemplary by the Connecticut Natural Heritage Program.

The topography and natural processes of floodplain systems result in the development of complex upland and wetland vegetation on generally flat topography, and soils deposited by the river. The Pyquag CFA has this diversity of habitats in areas not cleared for agricultural use. Hardwood forests and swamps, shrub swamps, and freshwater marsh are part of the floodplain. Silver maple is a characteristic species of a floodplain forest, as well as red maple, ash, red oak, and yellow birch. Common shrubs include black willow, silky dogwood and viburnums. The herbaceous layer within the forested portions of the floodplain, include spring ephemerals and ferns (Gawler 2008).

Restoration of this floodplain will provide a more contiguous and diverse breeding and migratory habitat for a variety of wildlife species. The Pyquag CFA is significant migration habitat as it straddles the Connecticut River, an important migratory corridor. A restored floodplain will also improve its function to retain and slow flood waters, reducing the extent of damage to the surrounding communities, and thereby improving water quality.

However, we also support the protection of high-value, productive agricultural lands identified by local communities and the State. It is not the refuge's intention to target these lands for acquisition. Instead, our priority will be to work with individual landowners, states, and other Federal agencies to protect these lands and ensure they continue to be part of the working landscape. There are many State and Federal programs that protect agricultural lands and help promote farming practices that benefit wildlife and help protect water quality. Through our private lands program, we will help direct landowners who are interested in these programs to the proper state and Federal agencies and programs. In rare cases, we may acquire agricultural lands from willing sellers, when other options to keep the land in agricultural production are not available, of if habitats for Federal trust resources are in jeopardy from development or other land use changes.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners and landowners to promote farming practices that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- As new pasture, hay, and/or grassland habitat is acquired, evaluate its ecological importance to determine if it should be maintained or if it should be restored to native forest through tree plantings or natural succession.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, identify and implement habitat restoration opportunities within the Pyquag CFA and Connecticut River to benefit priority refuge resources of concern including American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon, as well as other species of conservation concern such as sea lamprey.

Rationale:
The Pyquag CFA straddles the Connecticut River which provides important habitat for American shad, shortnose sturgeon, American eel, alewife blueback herring and Atlantic salmon. Keeney and Wethersfield Coves, located in past river channels, and Crow Point (a borrow pit for I-91) are accessible from the Connecticut River and provide additional open water habitat for these species. It is important, therefore, to maintain open channels to these coves for aquatic species passage. There are also various brooks that feed into the Connecticut River and Coves that are important for river herring. The Connecticut River is important migratory habitat for Atlantic salmon, American shad, and shortnose sturgeon (a federally listed species), and spawning habitat for river herring. This area of the Connecticut River is also important as overwintering habitat for shortnose sturgeon. American eel also occurs in the freshwater systems of this CFA. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit bays, estuaries, streams, lakes, and ponds. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

Another species of conservation concern that utilize freshwater aquatic habitats in this CFA is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

Restoring and maintaining the ecological integrity of upland and wetland habitats of the CFA will have positive impacts on water quality of the Connecticut River, and other aquatic systems in the CFA. Baseline information on the condition of the water resources, and associated upland and wetland habitats in the CFA will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to maintain open channels from the Connecticut River to open water coves.
- Work with adjacent landowners to eliminate barriers to aquatic species passage.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Work with partners to protect and increase "hard bottom" (e.g., gravel, cobble, or bedrock) substrate for spawning aquatic species.
- Work with partners to reduce combined sewer overflow.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Pyquag CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Pyquag CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Pyquag CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Pyquag CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Pyquag CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Pyquag CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Pyquag CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Pyquag CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.

- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Pyquag CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Pyquag CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Pyquag CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
Hunting is allowed on national wildlife refuges, consistent with the final compatibility determination. The Pyquag CFA is comprised of floodplain forests and wetlands adjacent to the Connecticut River, offering good hunting opportunities for waterfowl, small game, and white-tailed deer. A public hunting area in close proximity to Hartford will be popular and will help the refuge connect with the sporting community. Hunting, if found to be a compatible use, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal CFA open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions to support a safe, manageable hunt program.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Open newly acquired lands to hunting, if found to be compatible.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use.)

Within 1 year of acquiring land sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Pyquag CFA kiosks, through a friends group, and in local businesses.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.
- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.
- Offer to host hunter education field courses.
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Pyquag CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Connecticut Department of Energy and Environmental Protection regulations.

Rationale:
Fishing will be allowed on a newly created CFA consistent with the final compatibility determination. The principal fishing resource on this CFA is the Connecticut River, although three small streams (i.e. Beaver Brook, Salmon Brook, and Hubbard Brook) flow through sections of the CFA. Most people fish the Connecticut River from boats, but allowing bank fishing on Pyquag CFA will provide the public with another recreational opportunity. Fishing is a popular activity throughout the river and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Pyquag CFA will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land with fishable waters:

- Work with the Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that fishing is a compatible use.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses.
- In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new CFA to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that these uses are compatible.)

Within 1 year of acquiring land:

- Consistent with the final compatibility determination, allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that these uses are compatible.

Within 1 year of acquiring land:

Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:

- Develop interpretive panels for kiosks and trails that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.

- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.

- Encourage local schools and groups and environmental organizations to offer wildlife-centered trips to the refuge.

- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Pyquag CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:
- Work with public and private partners to determine whether and what roles this CFA might contribute to a Connecticut River waterway route.
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Pyquag CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:
- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Pyquag CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination these uses are appropriate and compatible.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Allow canoeing and kayaking in acquired coves and waterways.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Salmon River Conservation Focus Area (Existing Refuge Division)

East Hampton, Haddam and East Haddam, Connecticut

Conservation Focus Area (CFA) — Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	4,455	83 %
■ *Existing Refuge Ownership in CFA*[1]	*468*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*3,987*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	1,064	17 %
Total Acres in CFA[2, 4]	5,519	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Salmon River CPA (map A.14) encompasses the Salmon River CFA (map A.15) which was a SFA in the 1995 Conte FEIS. The refuge's Salmon River Division was established in 2009. The area is considered a priority by The Nature Conservancy, the State of Connecticut, and local constitutes because of its tidal freshwater wetlands and location along the main stem of the Connecticut River. The area is relatively intact and expected to be relatively resilient to climate change. The Salmon River CFA includes most of two terrestrial Tier 1 Cores and the connecting habitat between them identified through the *Connect the Connecticut* landscape conservation design. Habitat conservation in this CFA will help allow for the landward migration of the coastal wetland complex (salt-, brackish-, and freshwater tidally influenced wetlands) due to climate change. The Salmon River CFA is also directly across the river from the Maromas CFA. Conserving these two CFAs will help provide connectivity on both sides of the Connecticut River. Other existing conserved lands near the Salmon River CFA include the George Dudley Seymour, Haddom Meadows, Haddom Island, and Machimoodus State Parks.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 80.8%
- Freshwater Marsh – 1.3%
- Shrub Swamp and Floodplain Forest – 1.2%

For more information on the habitats in the CFA, see map A.16 and table A.10.

What are the resources of conservation concern for the CFA?

As noted in table A.11 below, there are twelve priority refuge resources of concern (PRRC); terrestrial and aquatic species that may rely upon the diverse habitats in this CFA, three of which are Federal candidate species and one which is listed under the Endangered Species Act. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. This includes extensive tidal wetlands which are part of the Connecticut River estuary system. These wetlands provide habitat for a diversity of species

including shorebirds, waterbirds, and waterfowl. The refuge will seek to protect and restore (if necessary) these wetlands and other habitat types. Additionally, we recognize the value of this area to migratory species, forest interior nesting species, and State Species of Greatest Conservation Need (SGCN). These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   The aquatic habitats in the CFA supports brook floater, a species petitioned for Federal listing. Brook floater require rivers and streams with high water quality, and are one among many species of freshwater mussels in the CFA.

   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Salmon River CFA is situated on the Connecticut River, and the forested habitat and tidal wetlands provide very important stopover and breeding habitat for landbirds and shorebirds.

   This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

   The PRRC species for the Salmon River CFA include wood thrush and Louisiana waterthrush. This CFA is located within their core breeding range, and the contiguous forests provide breeding habitat for these and other priority conservation concern species. Blue-winged warbler is also a PRRC species, which relies on early successional forests and shrublands in the CFA, habitats in decline throughout the southern portion of the Connecticut River watershed. Bald eagles are also a PRRC species for this CFA. Habitats support nesting, migrating, and wintering bald eagle populations. In addition, the mudflats of the river, creeks and coves, provide foraging habitat for a small number of shorebirds and waders.

3. **Waterfowl**
   The wetland complexes in the Salmon River CFA, consist of shrub swamp and freshwater marsh communities. This habitat is located near the mouth of the Moodus and Salmon Rivers. These areas are flooded during high water events, providing a diversity of plant communities, and habitats for a variety of wildlife species. Large concentrations of American black ducks (a PRRC species), green-winged teal, mallard, Canada geese, and bufflehead utilize these wetlands.

4. **Diadromous fish and other aquatic species**
   The Salmon River serves as the State's reference stream for water quality in the Connecticut River basin and features one of the most diverse and healthy bottom-dwelling invertebrate populations in State. Most of the Salmon River watershed (including upstream of the CFA) is open to migratory aquatic species passage due to the Leesville Dam Fish-way, and other fish-way and dam removal projects. These aquatic habitats support PRRC species such as blueback herring, alewife, brook floater, American eel, and Atlantic salmon.

   The Salmon River is still stocked with juvenile Atlantic salmon as part of the CT DEEP's Atlantic Salmon Legacy Program. Along with the Farmington River, it is the only place in the US where wild Atlantic salmon are present outside of Maine. The Salmon River is important migratory habitat for Atlantic

salmon, American shad, and shortnose sturgeon (a federally listed species), and spawning habitat for river herring. This area of the Salmon River is also important as overwintering habitat for shortnose sturgeon. American eel, a species petitioned for Federal listing, spends the majority of their young life in the freshwater systems of this CFA. The Salmon River CFA also provides important aquatic habitat for freshwater mussels, including brook floater, another species petitioned for Federal listing. Sea lamprey, another species of conservation concern, also occurs in this CFA providing important ecological benefits to aquatic systems.

5. **Wetlands**
   From a regional standpoint, there are no areas in the Northeast that support such extensive or high quality fresh and brackish tidal wetland systems as those in the Connecticut River estuary. The lower Connecticut River wetlands and river area consist of over 20 individual tidal wetland units and river islands of various sizes occurring along a 40-mile stretch of the lower Connecticut River from Old Saybrook to Cromwell. Taken as a whole, this area represents a gradation of tidal wetlands from a very narrow zone of relatively high salinity marshes at the mouth of the Connecticut River where it enters Long Island Sound, through an intermediate zone of brackish, lower salinity wetlands, to extensive freshwater tidal marshes and floodplain forests beginning at Deep River and extending upriver to Cromwell (Comins personal communication).

   Fifty-five acres of freshwater tidal emergent wetlands and 54 acres of shrub-swamp and floodplain forest occur at the mouth the Salmon River. These tidal wetlands are part of the Connecticut River estuary, and provide habitat for a diversity of species. The Nature Conservancy considers Salmon Cove part of one of the highest quality tidal marsh systems in the Northeast and one of the best tributary systems in the lower reach of the Connecticut River.

   One hundred and eighty-seven acres of hardwood swamps are scattered and mostly occur further inland, with the exception of an approximately 57 acre hardwood swamp that occurs on a spit of land at the mouth of the Salmon River.

6. **Other**
   New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts. Due to the loss of early successional forest and natural shrubland habitats to development and forest maturation, this species occupies less than a fifth of its historical range (Fuller and Tur 2012). New England cottontail is no longer sustaining a viable population, and given this conservation urgency, a range-wide New England cottontail Initiative was established. This initiative involves collaboration from multiple agencies to address cottontail conservation on a landscape scale. Focus areas were identified within its historical range in New England as locations to manage and restore habitat for New England cottontail. Other wildlife species associated with this habitat type have experienced similar declines, and the New England cottontail has been identified as a surrogate for this suite of shrubland-dependent species.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested and open water habitats) will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, management will focus on maintaining the following conditions:

- Forest management activities will provide a diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse and appropriate for site conditions and location. Management of invasive species that weaken or kill native trees (such as Oriental bittersweet) or prevent their regeneration (such as garlic mustard and Japanese stiltgrass) will be a priority. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (streams and rivers) habitats, we will focus on maintaining instream connectivity and outstanding water quality and maintaining cold temperatures for the cold water fisheries. An invasive plant management priority will be to manage species that kill or prevent the regeneration of riparian trees that shade the water. Water chestnut, an invasive aquatic species that can cover and degrade shallow waterbodies has been found in the vicinity and will be a priority for control if found.

What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, interpretation, and environmental education.

Were there other special considerations in delineating the CFA boundary?

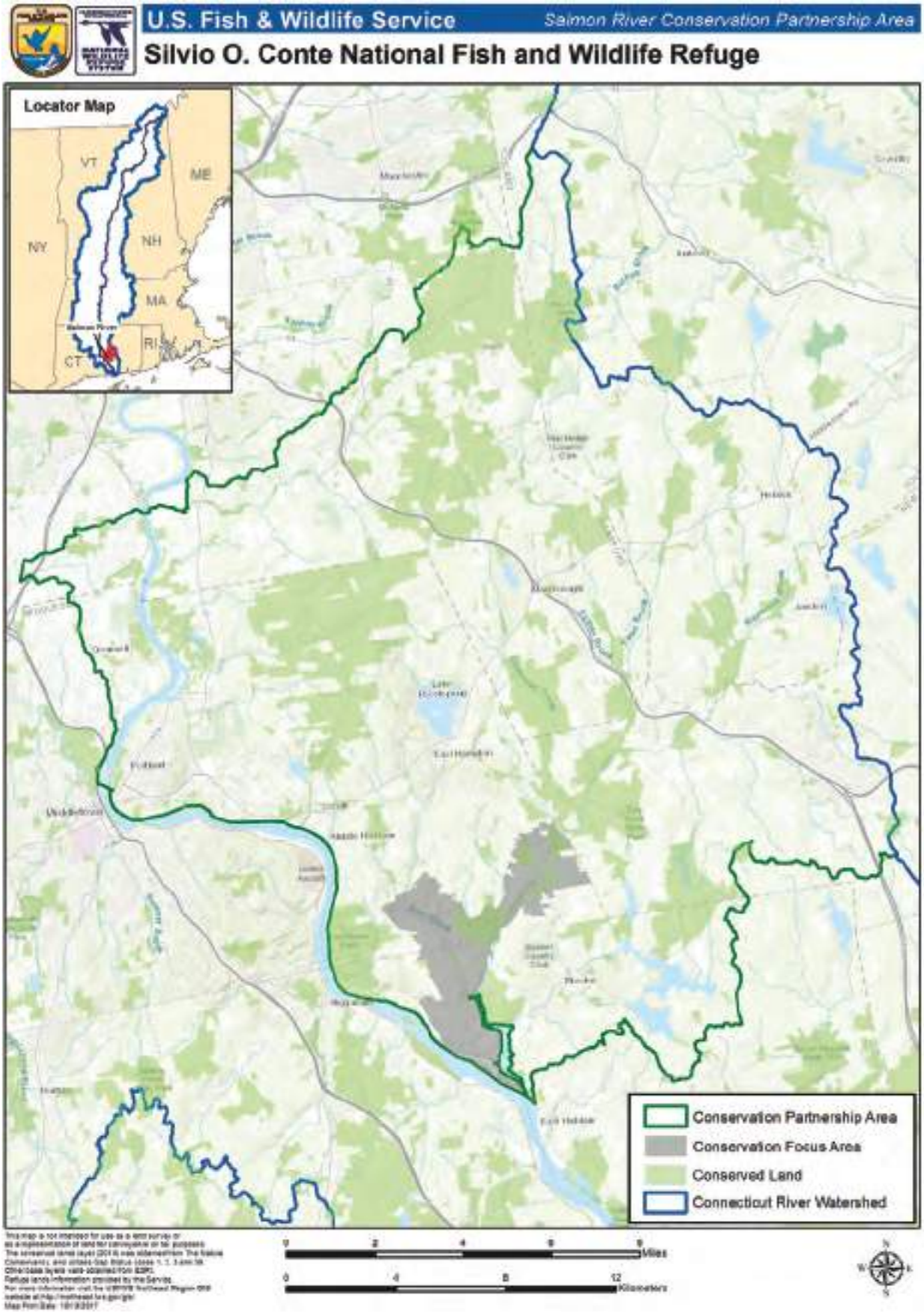
The Venture Smith Site occurs on the existing refuge division. It is an 18th century homestead of African-American archaeological significance and has been identified as potentially eligible for listing on the National Register of Historic Places. Venture Smith (Broteer Furro) was born around 1729 in West Africa, likely in current-day western Mali. At the age of six, he was kidnapped by an enemy tribe and sold to the steward of a Rhode Island slave ship. After a stop in Barbados, Smith was taken to Newport, Rhode Island, and then to Fisher's Island, where he was enslaved for about 13 years.

In 1765, Venture Smith purchased his freedom, and moved to Long Island, where he supported himself by farming, fishing, harvesting wood, river trafficking, and other activities. By 1775, Venture had purchased the freedom of his wife and children. Two years later, he sold his property on Long Island and purchased 10 acres on Haddam Neck in Connecticut, adding 70 acres abutting the Salmon River Cove where he built his dwelling house. He continued to prosper in farming, fishing, lumbering, and river commerce, adding a wharf, small warehouses, blacksmith shop, and other dwellings near his home. In 1798, Venture narrated his life story to Elisha Niles, a Yale graduate and Revolutionary War veteran of anti-slavery background. The published narrative provided an extraordinary account of the American experience of an enslaved African.

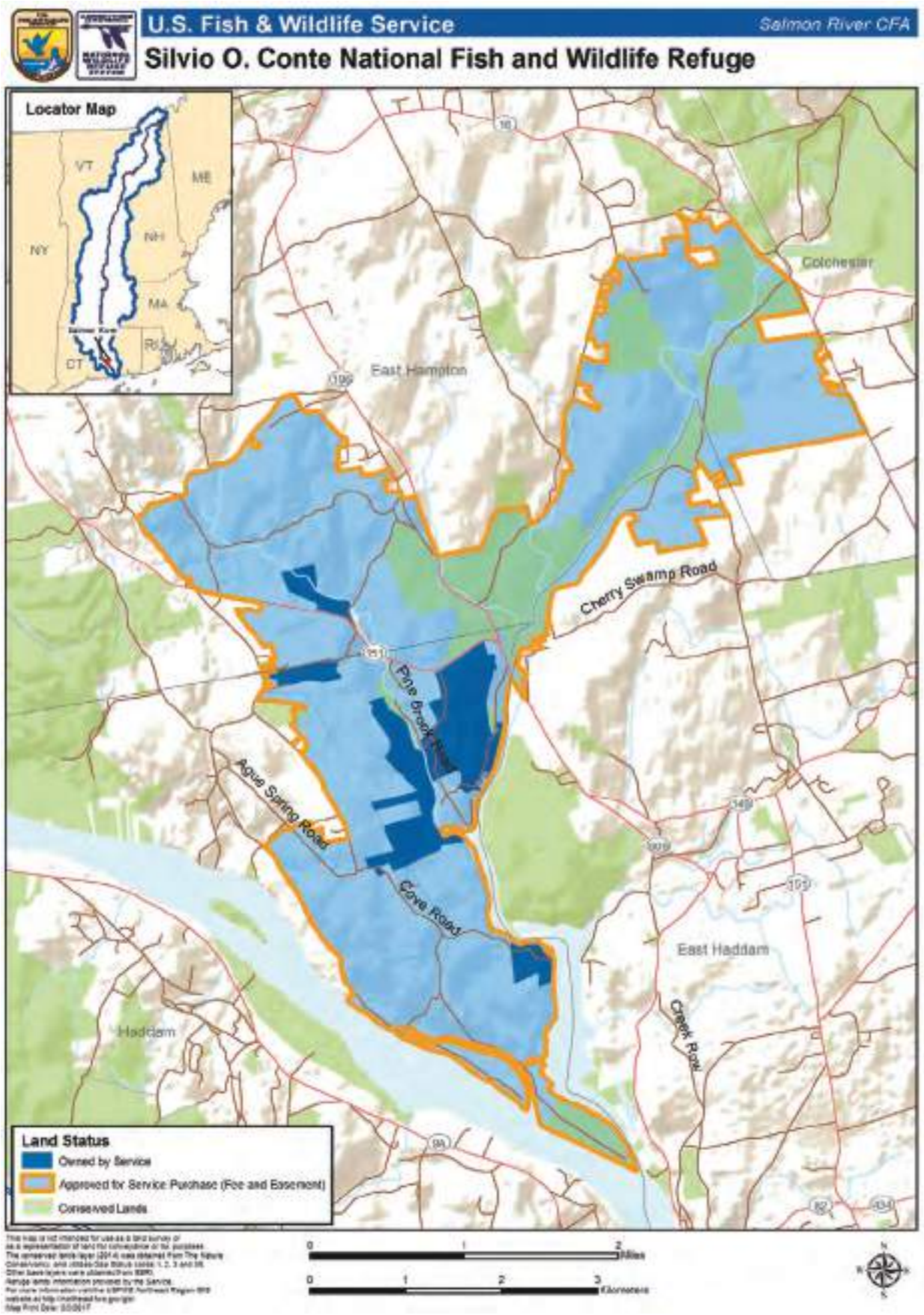
Prior to Service acquisition, extensive archaeological investigations were conducted at the site. Evidence of the various homestead buildings was identified, as well as numerous artifacts associated with the lives of Venture Smith and his family.

In addition to the Venture Smith homestead site, the Salmon River Division contains a variety of other archaeological resources, including pre-Contact Native American sites and evidence of other historical settlements.

Map A.14. Salmon River CPA.



Map A.15. Salmon River CFA – Location.



Map A.16. Salmon River CPA/CFA – Habitat Types.

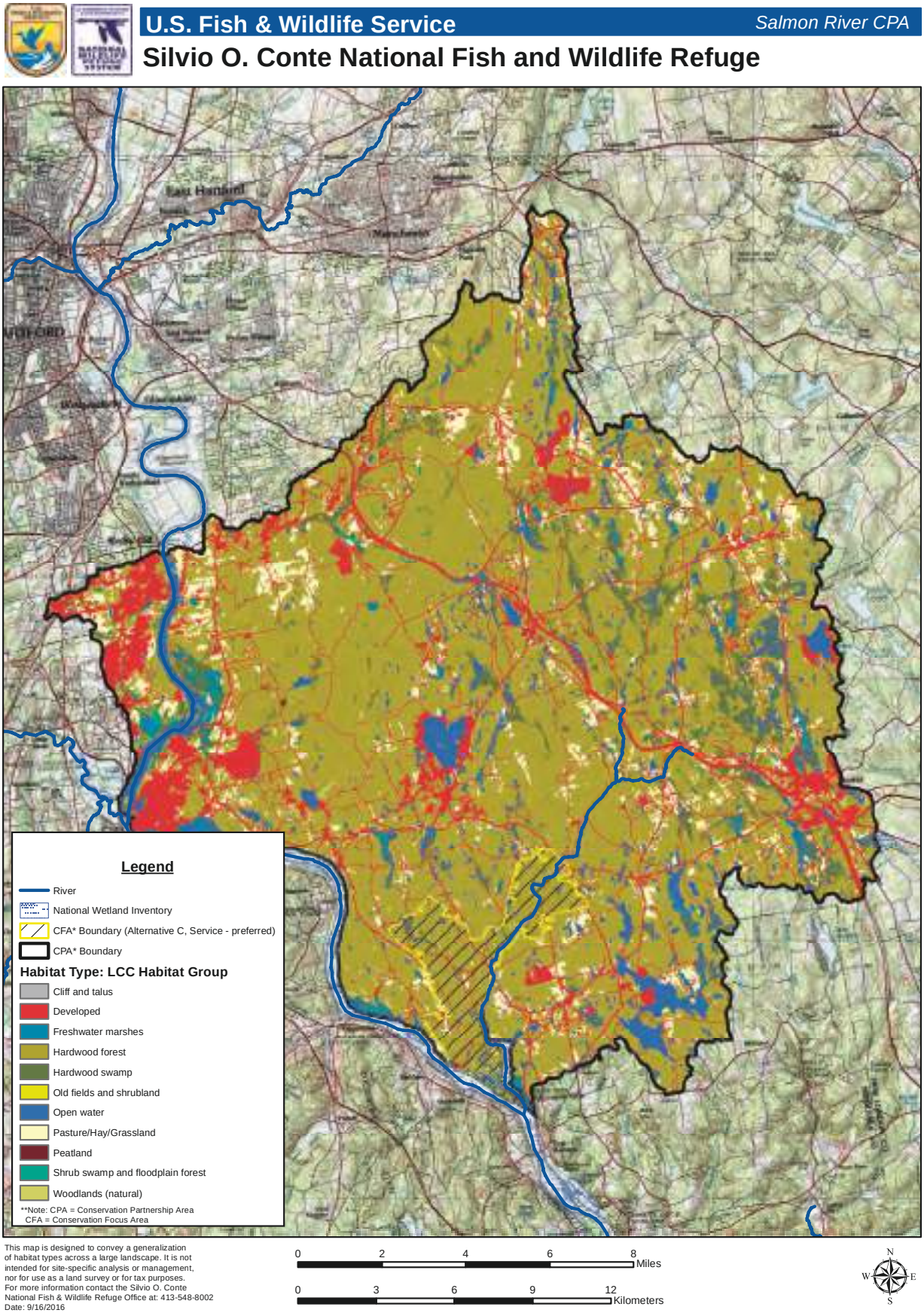


Table A.10. Salmon River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Hardwood forest	94,707	67.3%	4,721	824	411	85.6%	5.0%
Hardwood swamp	10,973	7.8%	224	48	10	4.1%	2.0%
Shrub swamp and floodplain forest	1,249	0.9%	11	2	–	0.2%	0.9%
Woodlands (natural)	143	0.1%	28	3	4	0.5%	19.7%
Forested uplands and wetlands subtotal	107,072	76.1%	4,985	877	425	90.4%	4.7%
Non-forested Uplands and Wetlands[9]							
Cliff and talus	19	0.0%	3	2	0	0.1%	15.5%
Freshwater marshes	1,064	0.8%	11	2	–	0.2%	1.0%
Old fields and shrubland	6	0.0%	4	4	–	0.1%	67.9%
Pasture/hay/grassland	10,368	7.4%	134	9	20	2.4%	1.3%
Peatland	16	0.0%	–	–	–	0.0%	0.0%
Non-forested uplands and wetlands subtotal	11,473	8.2%	152	18	21	2.8%	1.3%
Inland aquatic habitats[9]							
Open Water	3,882	2.8%	80	30	4	1.5%	2.1%
Inland aquatic habitats subtotal	3,882	2.8%	80	30	4	1.5%	2.1%
Other							
Developed	18,260	13.0%	297	44	26	5.4%	1.6%
Other subtotal	18,260	13.0%	297	44	26	5.4%	1.6%
TOTAL[10]	140,688	100.0%	5,513	968	477	100.0%	3.9%

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.11. Salmon River CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] – 3,515 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Eastern Towhee[A,I] Black-billed Cuckoo[I,J] Broad-winged hawk[A,I,J] Blue-winged Warbler[A, B] Great-crested Flycatcher[A,I] Hooded Warbler[J] Sharp-shinned Hawk[I,J] Yellow-throated Vireo[A,J] **Eastern Red Bat**[I] **Ovenbird**[J] American Woodcock[A,I] Gray Catbird[A,I,J] Eastern Box Turtle[I] Acadian Flycatcher[J] Scarlet Tanager[A,I,J] Black-and-white Warbler[A,I,J] Baltimore Oriole[A,I,J] Prairie Warbler[A,I] Worm-eating Warbler[I,J] Northern Flicker[A,I,J] Cerulean Warbler[A,I,J] Ruffed Grouse[I] Little Brown Bat[I] Whip-poor-will[A,I] **Chestnut-sided Warbler**[A,B]
Louisiana Waterthrush[A]	Breeding habitat includes contiguous (250+ acres) mature deciduous or mixed wood forests along medium to high-gradient, first to third-order, perennial streams (Mattsson et al. 2009, DeGraaf et al., 2001).	
New England Cottontail[B]	Year round habitat includes dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within 1 km of each other (Arbuthnot 2008, DeGraaf et al. 2001).	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Blue-winged Warbler[A,B]	Breeding habitat includes fields scattered with shrubs and small trees, or young deciduous and mixed forests 1-20 years old (DeGraaf et al. 2001, Gill et al. 2001)	
Bald Eagle[C, G]	Breeding, migrating and wintering habitat includes large bodies of open water with little human disturbance, and large canopy trees or other elevated sites for nesting, perching, and roosting (DeGraaf et al. 2001).	
Hardwood Swamp[5] – 187 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory Species

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Shrub Swamp and Floodplain Forest[5] – 54 acres		
American Black Duck[A, B, C, G]	Migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	American Redstart[J] Gray Catbird[A,I,J] Chestnut-sided Warbler[A,B] **Willow Flycatcher**[A, I] American Woodcock[A,I] **Warbling Vireo**[I] **Spotted Turtle**[I] Eastern Kingbird[A,I,J] Migratory Species
New England Cottontail[B]	Year round habitat includes shrub swamps of at least 25 acres that are within 1 km of other shrub swamps, and early successional forest patches (Arbuthnot 2008, DeGraaf et al. 2001).	
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	
Woodlands (natural)[5] – 23 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] – 55 acres		
American Black Duck[A, B, C, G]	Migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Northern Harrier[I,J] Wood Duck[A,I,J] Green-winged Teal[A,I,J] Snowy Egret[A,I,J] Short-billed Dowitcher[A] Bufflehead[A] Canada Goose, NAP[A,J] Canada Goose, AP[A,J] **Virginia Rail**[I] **Marsh Wren**[A,I] Mallard[A,I,J] Lesser Yellowlegs[A,J]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Old Fields and Shrublands[5] – 7 acres		
New England Cottontail[B]	Year round habitat includes pastures, abandoned fields, and dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within 1 km of each other (Arbuthnot 2008, DeGraaf et al. 2001).	American Woodcock[A,I,J] Hognosed Snake[I] Eastern Towhee[A,I] Gray Catbird[A,I] Prairie Warbler[A,I] **Brown Thrasher**[A,I] **Field Sparrow**[A,I] Chimney Swift[A,I] Northern Harrier[I,J] Indigo Bunting[I,J] Migratory Species
Blue-winged Warbler[A,B]	Breeding habitat includes fields scattered with shrubs and small trees, or young deciduous and mixed forests 1-20 years old (DeGraaf et al. 2001, Gill et al. 2001)	
Pasture/Hay/Grassland[5] – 199 acres		
New England Cottontail[B]	Year-round habitat includes pastures, abandoned fields, and dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within 1 km of each other (Arbuthnot 2008, DeGraaf et al. 2001).	**Bobolink**[I] **Eastern Meadowlark**[I] Eastern Kingbird[A,I] Chimney Swift[A,I] Northern Harrier[I,J] Migratory Species
Cliff and Talus[5] – 1 acre		
North-central Appalachian circumneutral cliff and talus[H]	This cliff system occurs at low to mid elevations and consists of vertical or near-vertical cliffs and steep rocky slopes. Substrates include limestone, dolomite and other rocks. The vegetation varies from sparse to patches of small trees, in places forming woodland or even forest vegetation. Ash, basswood and American bladdernut are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., yellow jewelweed, purple cliffbrake, ebony spleenwort, or bluntlobe cliff fern (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 46 acres		
Alewife[B, F, G]	Spawn in ponds and slow-moving streams (USFWS 1996).	Smallmouth Bass[I] Tidewater Mucket[I] Golden Club[I] Striped Bass[I] Longnose Dace[I] Yellow Perch[I]
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58 F (USFWS 1996).	
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/ coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	
Brook Floater[E]	Inhabits creeks and small rivers, prefers the stable bank conditions afforded by gravel or sandy substrates, and good water quality (Nedeau et al. 2000).	
American Black Duck[A, B, C, G]	Migrating and wintering habitat includes open water, such as, estuaries, coves or bays with submerged aquatic vegetation, mollusks and crustaceans for foraging (DeGraaf et al. 2001).	Canada Goose, Atlantic[A] Canada Goose, North Atlantic[A] **Bufflehead**[A] Mallard[A] Snowy Egret[A,I,J] Bald Eagle[A,I] Wood Duck[A] Green-winged Teal[A]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.

I: 2015 Connecticut Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Salmon River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, Louisiana waterthrush, New England cottontail, blue-winged warbler, bald eagle, and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
We envision healthy forests within the Salmon River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Connecticut wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Salmon River CFA hardwood forests provide a diversity of habitats for wildlife. To date our review of the Salmon River CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Salmon River comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, 2002, Bellemare et al. 2002). Our sub-objective assumes the forests of the Salmon River are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For many species, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Salmon River will contain a variety of patches in different age classes and developmental stages; it will not be uniform throughout. This diversity of age classes provides a variety of species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. The Service's New England cottontail initiative has identified focus areas, including the Salmon River CFA, where the decline in early successional habitats is a particular problem for the New England cottontail. New England cottontail is a species of greatest conservation need in Connecticut.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of fifteen or more habitat patches, several of which are 25 acres or more. Each habitat patch should be one mile or less from each other to aid in New England cottontail movement between

patches (Fuller and Tur 2012). Approximately 25 acres of forest will be managed in early successional habitat in support of New England cottontail in the CFA. Another species of conservation concern that will use these habitat patches is American woodcock. High quality woodcock habitat includes young forest patches within a mile of feeding areas. New England cotton tail habitat patches will be placed in the vicinity of shrub wetlands, where feasible, to benefit this species. If early successional habitat is lacking within the landscape, we will provide other strategically located patches with these conditions to support other species of conservation concern such as chestnut-sided warbler, gray catbird, eastern towhee, black and white warbler, blue-winged warbler, eastern red bat, and ruffed grouse (DeGraaf et al. 2006).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Hardwood forests within the Salmon River CFA should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and Louisiana waterthrush. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils, and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). Additionally, wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Louisiana waterthrush prefer a dense, multilayer forest canopy — particularly along high-gradient streams — for protection from nest predation.

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (>75-80% closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. Efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney and Waller 2003, Côté et al. 2004, see also Rawinski 2008). The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Closed canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, Acadian flycatcher, and — when along rocky bottomed streams — Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the Sharp-shinned hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that, when near open bodies of water, are utilized by bald eagles. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are >3 inches in dbh with crevices, cavities, cracks or exfoliating bark will provide summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, barred owls, and woodpeckers, like the northern flicker.

In 2011, an extensive inventory of invasive plants revealed populations of several species that could degrade habitats. The most abundant species are Japanese stiltgrass (mostly along Pine Brook riparian areas and other wetland types), Oriental bittersweet (mostly along the Salmon River riparian areas), and Japanese barberry and multiflora rose (mostly within forest interior). Garlic mustard is newer to the division, but has the potential to spread quickly. Local volunteers have been removing garlic mustard and Japanese stiltgrass to prevent their spread within the more pristine interior. Kudzu, one of the most prevalent invasive plants in the southeastern United States was found near the Salmon River Division; this is a very uncommon sighting in central Connecticut, and is of concern to state authorities.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional

stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Develop an Integrated Pest Management Plan.

- Work with partners and adjacent landowners to identify areas appropriate for New England cottontail management. Plan to manage approximately, 25 acres of forest in early successional habitat for New England cottontail in the CFA. This approximation of the amount and distribution of acreage over the next 15 years assumes we will have a large enough land base to manage. Our target acreage may also be refined once site conditions are verified and a habitat management plan is completed.

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complements adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible. In particular, manage oriental bittersweet in riparian areas to protect the health of canopy trees that provide migratory bird habitat. Also, control kudzu if detected.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.

- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood Swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, and potential winter habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Salmon River Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer.

Hardwood swamp occurrences within Salmon River with more alkaline soils are often found along riparian and floodplain areas in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the water table drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum. The examples identified within the Salmon River CFA occur within the floodplain of the Connecticut River.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. Our conservation efforts within the Salmon River will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA may also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map vernal pools and seeps.
- Conduct forest and wildlife inventories.
- Conduct rusty blackbird surveys to determine if habitat is used during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forests)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide habitat for priority refuge resources of concern including American black duck, rusty blackbird and New England cottontail.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). Our coarse-scale habitat analysis of this CFA identifies a wetland complex, consisting of shrub swamp and freshwater marsh communities, in the southeast portion of the CFA at the mouth of the Salmon River. This area is flooded during high water events, providing a diversity of plant communities, and habitats for a variety of wildlife species, including American black duck and, potentially, New England cottontail.

New England cottontail is a species of greatest conservation need in Connecticut. The historic range of this species likely included southeastern New York, north through the Champlain Valley and into southern Vermont, New Hampshire and Maine, and statewide in Massachusetts, Connecticut, and Rhode Island. Due to loss of early successional habitat to development and forest maturation, this species occupies less than a fifth of its historical range (Fuller and Tur 2012). New England cottontail no longer exists at a sustainable population, and given this conservation urgency, a range-wide New England cottontail Initiative was established. This initiative involves collaboration from multiple agencies, including the USFWS, state wildlife agencies, Universities, Natural Resources Conservation Service, The Nature Conservancy, and Wildlife Management Institute, to address cottontail conservation on a landscape scale.

Focus areas were identified as locations to manage and restore habitat for New England cottontail. The Salmon River CFA was one of 49 focus areas in six states. Early successional management and protection of adjacent natural shrubland habitat, such as shrub swamps, will meet the conservation goals set for the New England cottontail. "A Conservation Strategy for the New England cottontail" was developed and approved in November 2012, and provides the conservation and habitat management goals and strategies for this species (Fuller and Tur 2012).

American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 30. Black ducks use wetlands, including shrub swamp communities, as stopover habitat during migration, and as breeding and wintering habitat. Well-concealed nests are placed on the ground in nearby uplands or hummocks in wetlands, and adults and their broods forage on seeds, aquatic vegetation, and invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). Open water habitat and the adjacent wetland complex provide excellent wintering and migrating habitat for American black ducks. Given their location on the Connecticut River, an important migration corridor, these wetland communities are used by other waterfowl species during migration including green-winged teal, common merganser, mallards, bufflehead, and wood ducks.

This CFA may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Due to our lack of knowledge of the habitat conditions in the CFA, a comprehensive, multi-scale wildlife habitat inventory will be necessary. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale (shrub swamps), but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- If appropriate, incorporate shrub swamps into the network of habitat patches required for New England cottontail.
- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including waterfowl surveys, migratory landbird surveys, and winter surveys for rusty blackbirds.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management

that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Salmon River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide breeding and foraging habitat for priority refuge resources of concern such as American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrsh, jewelweed, marsh fern, water lily and narrow-leaved cattail (Gawler 2008). Our coarse-scale habitat analysis of this CFA identifies freshwater marsh habitat at the mouth of the Salmon and Moodus Rivers.

The wetland complex located at the mouth of the Salmon River is discussed above as it consists of shrub swamp communities, as well as freshwater marsh communities. The wetland at the mouth of Moodus River is a large freshwater marsh that is adjacent to tidal flats in the Salmon River. The marsh vegetation in this wetland complex includes wild rice, a nutritious food source for waterfowl. Both locations provide excellent stopover habitat during migration, and breeding and wintering habitat for American black duck, and other waterfowl species. Please see sub-objective 1.1b for species specific details.

Due to our lack of knowledge of the habitat conditions in the CFA, a comprehensive, multi-scale wildlife habitat inventory will be necessary. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale (freshwater marsh), but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of freshwater marsh habitat at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate wetland hydrology for impacts to natural flow regimes.
- Continue to control invasive water chestnut in marshes.
- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Inventory wetland plant communities.
- Maintain current and increase native wild rice population.
- Survey wildlife use of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland and Old Fields and Shrublands)
Provide appropriate conditions within current pasture, hay, and grassland acreage, and old field and shrubland habitat that will support New England cottontail (where appropriate), and other shrub-dependent conservation concern species such as blue-winged warbler. Also maintain large contiguous tracts of grassland habitat, if present and appropriate.

Rationale:
Over four percent of the Salmon River CFA is typed as pasture, hay, grassland, old fields and shrublands. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses, while shrubs dominate shrublands, and a mixture of shrubs and grasses tend to occur in old fields.

Many bird species of conservation concern rely on these habitats, including grassland dependent species such as bobolink and grasshopper sparrow, and shrub dependent species such as blue-winged warbler, prairie warbler, field sparrow, American woodcock, and chestnut-sided warbler. Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers2003). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occur in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Another species of conservation concern that uses shrubland dominated habitat is New England cottontail. This species is New England cottontail is a species of greatest conservation need in Connecticut. The Salmon River CFA is a New England cottontail Focus Area, which are areas identified as locations to manage and restore habitat for New England cottontail. New England cottontail require early successional habitat (dense shrubs and tree saplings), and the pastures, hay fields, grasslands, shrublands and old fields in the CFA will provide this habitat with very little initial manipulation.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of fifteen or more habitat patches, several of which are 25 acres or more. Each habitat patch should be one mile or less from each other to aid in New England cottontail movement between patches (Fuller and Tur 2012). Where appropriate and suitable, pastures, hay fields, grasslands, shrublands, and old fields will be incorporated into the network of patches managed for New England cottontail by allowing woody stem colonization.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species and pollinators. Current pasture, hay, grassland, old fields and shrubland acres can provide quality habitat if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
See rationale for sub-objective 1.1d.

Habitats that occur within the Salmon River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, identify and implement habitat restoration opportunities within the Salmon River CFA to benefit priority refuge resources of concern including American eel, alewife, blueback herring, Atlantic salmon, and brook floater, as well as other species of conservation concern such as sea lamprey. Also provide undisturbed wintering and stopover habitat for American black duck, and other waterfowl.

Rationale:
The Salmon River and two of its tributaries, Pine Brook, and Moodus River are important aquatic ecosystems in the CFA. The Salmon River is still stocked with juvenile Atlantic salmon as part of the CT DEEP's Atlantic Salmon Legacy Program. Along with the Farmington River, it is the only place in the US where wild Atlantic salmon are present outside of Maine. Most of the Salmon River watershed (including upstream of the CFA) is open to migratory aquatic species passage due to the Leesville Dam Fish-way, and other fish-way and dam removal projects. Pine Brook is also remarkable fish habitat; this brook's former dams have washed out and migratory fish have access to their full historic habitat up to a natural falls about two miles upstream of the mouth. Pine Brook also provides spawning habitat for Adult Atlantic salmon. Furthermore, it is one of very few places in Connecticut where the head of tide is located in an undeveloped area and not subjected to intense sport and commercial fisheries.

The Salmon River is important migratory habitat for Atlantic salmon, American shad, and spawning habitat for river herring. American eel spend the majority of their young life in the freshwater systems of this CFA. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit bays, estuaries, streams, lakes, and ponds. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000). The Salmon River CFA also provides important aquatic habitat for freshwater mussels, including brook floater, a species petitioned for Federal listing.

Another species of conservation concern that utilize freshwater aquatic habitats in this CFA is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

The open water habitat within the Salmon River, Connecticut River main stem and wetlands provide excellent wintering and stopover habitat for American black duck. Other migratory waterfowl also take advantage of these secluded areas including green-winged teal, common merganser, mallards, bufflehead and wood ducks.

The aquatic habitats in the Salmon River CFA are diverse, and provide habitat for a variety of wildlife species. Development and human activities have impacted water quality and infringed on aquatic species movements and life cycles. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Work with partners to protect and increase "hard bottom" (e.g., gravel, cobble, or bedrock) for spawning aquatic species.
- Work with partners to reduce combined sewer overflow.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate stream and fish community health.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Salmon River Division as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Salmon River Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Salmon River Division as an outdoor classroom.

Rationale:
Because this division will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Salmon River Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Salmon River Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Salmon River Division will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Salmon River Division's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements about natural and cultural resources to be used in the delivery of programming at the Salmon River Division.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.
- Work with regional cultural resources staff to develop interpretive messages about the historical importance of Venture Smith and his property.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members and the general public, with priority given to refuge affiliates.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See the rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Salmon River Division. Interpretive programs will cover both natural and cultural resource themes, including the importance of Venture Smith and his property.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media e.g. pamphlets, signs, etc.

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Salmon River Division will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Salmon River Division will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. Under Service ownership, the division south of State Highway 151 has been open to hunting, excluding safety zones around buildings, under a pre-acquisition compatibility determination. In partnership with the Connecticut Department of Energy and Environmental Protection, hunting regulations follow that of nearby state-owned lands. Prior to Service acquisition, hunting was allowed through a lottery system administered by The Nature Conservancy. Retaining hunting opportunities at this division conforms to historic use on this property and much of the surrounding land in the area. Principal game species include white-tailed deer, Eastern wild turkey, and cottontail rabbits.

Management Strategies:
Continue to:

- Allow hunter access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are discernable.
- Open newly acquired lands to hunting, if found to be compatible.
- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions to support a safe, manageable hunt program.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Salmon River Division kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide the opportunity for a quality fishing experience based on Connecticut Department of Energy and Environmental Protection regulations, and division-specific conditions, if necessary.

Rationale:
Fishing is a priority public use on national wildlife refuges and a popular outdoor recreational activity. The division has been open to fishing, following acquisitions, through pre-acquisition compatibility determinations, but no formal opening package or fishing plan has been completed. Fishing opportunities on the division are currently limited to sections of the Salmon River and Pine Brook. Both support game fish populations.

Management Strategies:
Within 1 year of CCP approval:

- Complete all administrative requirements to maintain fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are discernable.

- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.

- The Salmon River Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of CCP approval:

- Work with the Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the division.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Although most dedicated anglers will be drawn to the nearby Connecticut River, the reaches of Salmon River and Pine Brook on the division do offers fishing opportunities. Visitors unaware of this available resource may choose to participate while on the division.

Management Strategies:
Within 1 year of CCP approval:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new division to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
Continue to:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Allow wildlife observation and photography at the Salmon River Division.

Within 1 year of CCP approval:

- Install an informational kiosk to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 10 years of CCP approval:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the division.

Rationale:
The open portions of the division will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of CCP approval:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of CCP approval:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the division for distribution at informational kiosks, the refuge website, and other popular media.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Salmon River Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include a Connecticut River waterway trail. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Within 5 years of acquiring land with Connecticut River frontage:

- Work with public and private partners to determine whether and what roles this division might contribute to a Connecticut River waterway route.
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Salmon River Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Salmon River Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division without detrimentally impacting the wildlife resource.

Management Strategies:
Within 1 year of CCP approval:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Allow bicycles on the Salmon River Road.
- Allow canoeing and kayaking in acquired coves and waterways.

Within 5 years of CCP approval:

- Work with friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Scantic River Conservation Focus Area

Windsor, East Windsor, South Windsor, Hartford, and East Hartford, Connecticut

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	4,144	90 %
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*4,144*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	466	10 %
Total Acres in CFA[2, 4]	4,610	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers

What specific criteria and/or considerations drove the selection of this CFA?

The Scantic River CPA (map A.17) encompasses the Scantic River CFA (map A.18) which was a SFA in the 1995 Conte FEIS. The Scantic River CFA area is considered important floodplain forest by the Nature Conservancy and the CFA will allow for the restoration and conservation of the floodplain forest and associated wetland complex. Much of the Scantic River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Habitat conservation in this CFA will help allow for the landward migration of the coastal wetland complex (salt-, brackish-, and freshwater tidally influenced wetlands) due to climate change.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Pasture/Hay/Grassland – 30.3%
- Hardwood Swamp – 22.8%
- Freshwater Marsh – 6.1%

For more information on the habitats in the unit, see map A.19 and table A.12.

What are the resources of conservation concern for the CFA?

As noted in table A.13 below, there are seven priority refuge resources of concern (PRRC) aquatic and terrestrial species that rely upon the open water and wetland habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. This includes floodplain habitats which have undergone significant alteration within the Connecticut River watershed. The refuge will seek to protect and restore (if necessary) these, and other PRRC habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and migratory birds. These species and habitats are discussed further below.

1. **Federal Threatened and Endangered Species**
   This section of the Connecticut River provides spawning habitat for the federally listed shortnose sturgeon. This species is not known to spawn in any other sections or tributaries of the river in Connecticut.

   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Scantic River CFA is situated on the Connecticut River, and provides important stopover habitat for landbirds, shorebirds, and waterbirds.

   This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

3. **Waterfowl**
   The freshwater marshes, hardwood swamps and open water of the Connecticut River provide important stopover areas for migrating and wintering waterfowl. Large concentrations of American black ducks (a PRRC species), green-wing teal, mallard, and American wigeon use habitats in this CFA. Other species include Canada geese, bufflehead, canvasback, wood duck, northern pintail, gadwall, and mergansers.

4. **Diadromous fish and other aquatic species**
   The Scantic River CFA straddles the Connecticut River, and is located at the mouth of the Podunk, Scantic, and Farmington Rivers. Many species of conservation concern use these aquatic habitats including PRRC species like American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon.

   This section of the Connecticut River, and mentioned tributaries are important spawning habitat for shad, alewife, and blueback herring. The main stem also provides crucial spawning habitat for the federally listed shortnose sturgeon. This species is not known to spawn in any other sections or tributaries of the river in Connecticut. American eel also occupy the main stem and tributaries within the Scantic River CFA. Sea lamprey, another species of conservation concern, occurs in this CFA providing important ecological benefits to aquatic systems.

5. **Wetlands**
   The Scantic River CFA contains a small portion of ecologically significant floodplain habitat (Marks et al 2011) located along the Connecticut River main stem extending from west side of the river from North Meadows of Hartford to Windsor and on the east side of the river from East Hartford almost to Enfield. The remnant patches of floodplain habitat in the Scantic River CFA are vulnerable to invasive species, especially habitats that flood infrequently. Opportunities may be available for floodplain restoration in areas where these habitats have been altered.

What habitat management activities will be a priority on refuge lands within the CFA?

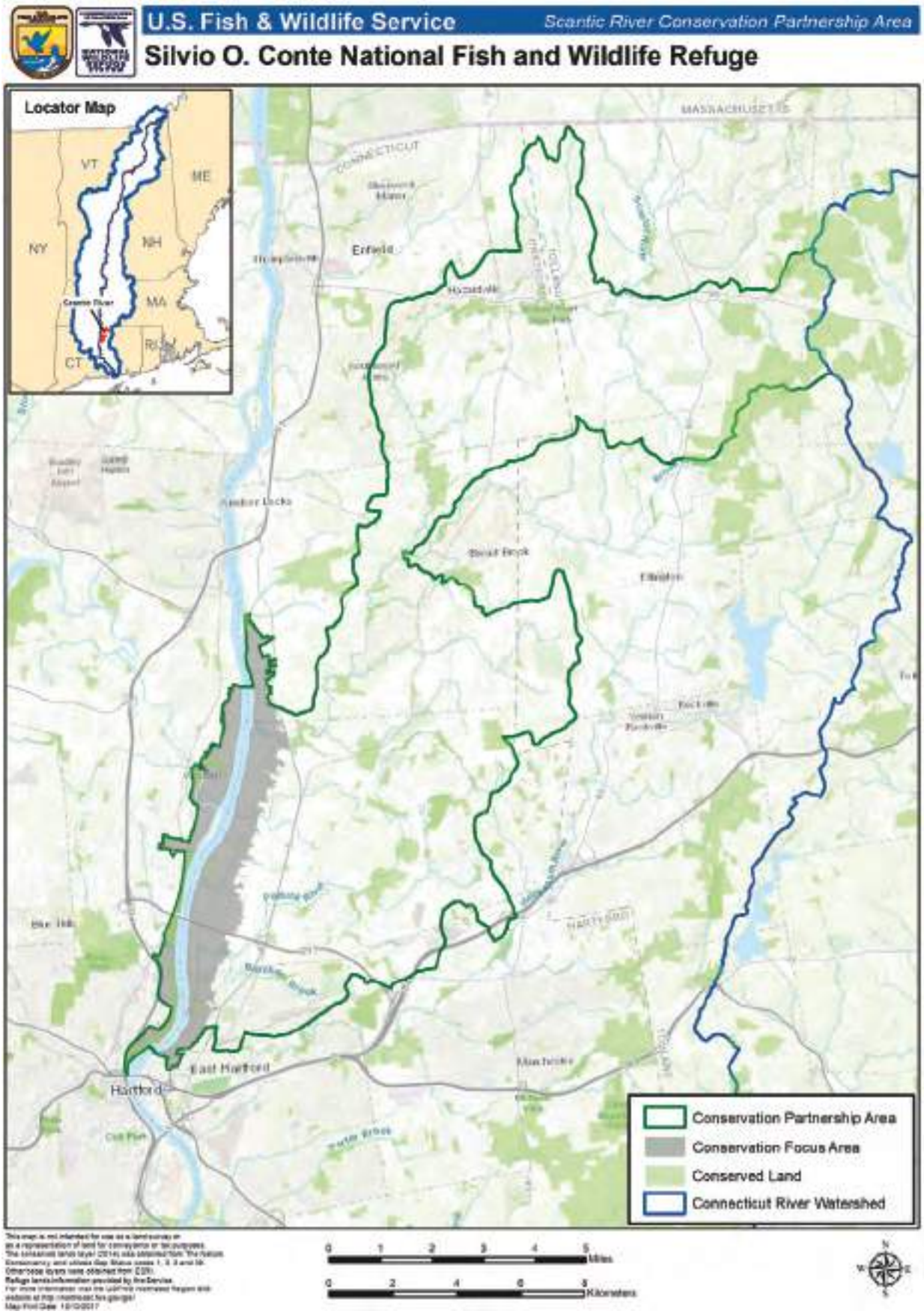
We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e. forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once the inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will focus on restoration of degraded floodplains, including restoring the primary natural disturbance mechanism (seasonal flooding) and species composition and structure to accepted historical conditions. Management of upland forests will also provide structurally diverse habitat dominated by species appropriate to site conditions and location.
- We will also manage emergent and shrub wetland habitats, and will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- In open water (stream, rivers, and coves) habitats, we will focus on maintaining stream connectivity, establishing riparian buffers, and reducing run-off from the surrounding landscape.

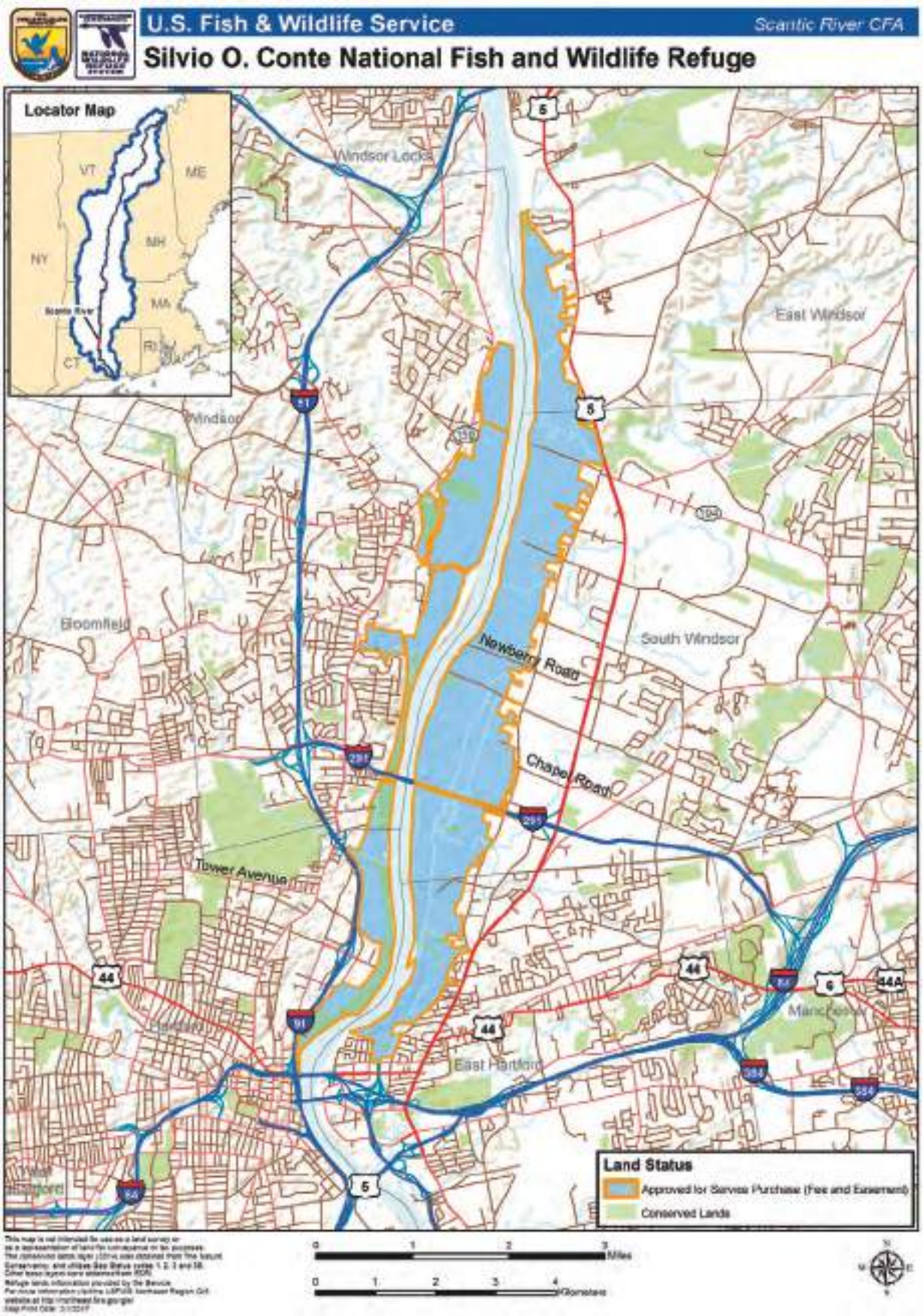
What public use opportunities will be a priority on refuge lands within the CFA?

When compatible, we will seek to provide recreational access to the river for priority public uses (hunting, fishing, wildlife observation and photography, interpretation, and environmental education) and for boating.

Map A.17. Scantic River CPA.



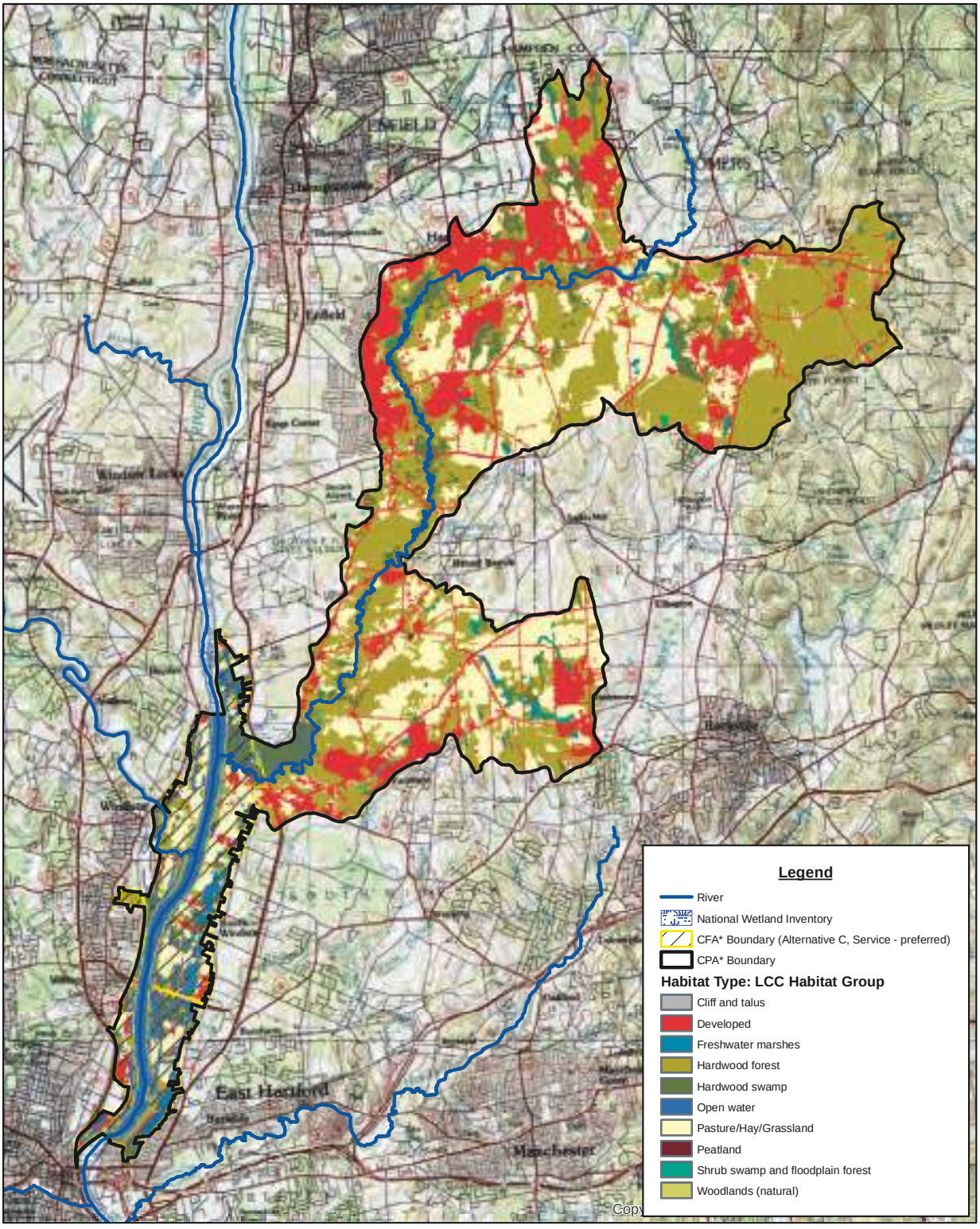
Map A.18. Scantic River CFA – Location.



Map A.19. Scantic River CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Scantic River CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes.
For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 1.5 3 4.5 6 Miles

0 2 4 6 8 Kilometers

N W E S

Table A.12. Scantic River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]			
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]
Uplands and Wetlands[9]						
Hardwood forest	17,622	34.2%	1,065	235	0	23.1%
Hardwood swamp	4,425	8.6%	1,037	106	0	22.5%
Shrubland swamp and floodplain forest	512	1.0%	112	7	0	2.4%
Woodlands (natural)	24	<0.1%	-	-	0	0.0%
Forested uplands and wetlands subtotal	*22,583*	*43.8%*	*2,214*	*348*	*0*	*48.1%*
Non-forested Uplands and Wetlands[9]						
Cliff and Talus	22	<0.1%	-	-	0	0.0%
Freshwater marshes	523	1.0%	278	35	0	6.0%
Pasture/hay/grassland	11,222	21.8%	1,384	39	0	30.1%
Peatland	10	<0.1%	-	-	0	0.0%
Non-forested uplands and wetlands subtotal	*11,776*	*22.9%*	*1,662*	*74*	*0*	*36.1%*
Inland aquatic habitats[9]						
Open Water	1,470	2.9%	234	25	0	5.1%
Inland aquatic habitats subtotal	*1,470*	*2.9%*	*234*	*25*	*0*	*5.1%*
Other						
Developed	15,675	30.4%	496	38	0	10.8%
Other subtotal	15,675	30.4%	*496*	*38*	*0*	*10.8%*
TOTAL[10]	**51,503**	**100.0%**	**4,606**	**485**	**0**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.13. Scantic River CFA – Priority Refuge Resources of Concern

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 1,074 acres		
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	Migratory Species Little Brown Bat[I]
Hardwood Swamp[5] - 1,049 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory species
Shrub Swamp and Floodplain Forest[5] - 114 acres		
American Black Duck[A, B, C, G]	Migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Northern Harrier[I,J] Wood Duck[A,I,J] Green-winged Teal[A,I ,J] Snowy Egret[A,I,J] **American Bittern**[A,I] Common Merganser[I] Bufflehead[A] Canada Goose, NAP[A,J] Canada Goose, AP[A,J] **Virginia Rail**[I] **Marsh Wren**[A,I] Mallard[A,I,J] Davis' Sedge[I] Waputo[I] Gray Catbird[A,I,J] **Willow Flycatcher**[A, I] **Warbling Vireo**[I] **Spotted Turtle**[I] Eastern Kingbird[A,I,J] Migratory Species
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 280 acres		
American Black Duck[A, B, C, G]	Migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Northern Harrier[I,J] Wood Duck[A,I,J] Green-winged Teal[A,I ,J] Snowy Egret[A,I,J] **American Bittern**[A,I] Common Merganser[I] Bufflehead[A] Canada Goose, NAP[A,J] Canada Goose, AP[A,J] **Virginia Rail**[I] **Marsh Wren**[A,I] Mallard[A,I,J] Davis' Sedge[I] Waputo[I] Gray Catbird[A,I,J] **Willow Flycatcher**[A, I] **Warbling Vireo**[I] **Spotted Turtle**[I] Eastern Kingbird[A,I,J]
Pasture/Hay/Grassland[5] – 1,393 acres		
Where appropriate and supported by the local community, restore to floodplain forest	*Laurentian-Acadian floodplain forest* occur along medium to large rivers, and include a matrix of upland and wetland habitats. Floodplain forests, with silver maple are characteristic, as well as herbaceous sloughs and shrub wetlands. Most areas are underwater each spring; micro-topography determines how long the various habitats are inundated. Associated trees include red maple and American hornbeam, the latter frequent but never abundant. On terraces or in more calcium rich areas, sugar maple or red oak may be locally prominent, with yellow birch and ash, black willow is characteristic of the levees adjacent to the channel. Common shrubs include silky dogwood and viburnum. The herb layer in the forested portions often features abundant spring ephemerals, giving way to a fern-dominated understory in many areas by mid-summer. Non-forested wetlands associated with these systems include shrub-dominated and grass-non-woody vegetation (Gawler 2008).	Migratory Species

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 210 acres		
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	Smallmouth Bass[I] Burbot[I] Striped Bass[I] Pumpkinseed[I] Longnose Dace[I] Yellow Perch[I]
Shortnose Sturgeon[B, D, F, G]	Spawn in slow-moving, 48° F water of large rivers, and feed in fresh and brackish water along the river bottom (USFWS 1996).	
Alewife[B, F, G]	Spawn in ponds and slow-moving streams (USFWS 1996).	
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/ coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58° F (USFWS 1996).	
American Shad[B, F, G]	Spawn when the water temperature is above 60° F in shoal area of river and lower reaches of larger tributaries (USFWS 1996).	
American Black Duck[A, B, C, G]	Migrating habitat includes open water, such as, estuaries, coves or bays with submerged aquatic vegetation, mollusks and crustaceans for foraging (DeGraaf et al. 2001).	Canada Goose, Atlantic[A] Canada Goose, North Atlantic[A] **Bufflehead**[A] Mallard[A] Snowy Egret[A,I,J] Bald Eagle[A,I] Wood Duck[A] Green-winged Teal[A]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.
I: 2015 Connecticut Comprehensive Wildlife Conservation Strategy
J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Scantic River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for spring and fall migrants, as well as potential roosting and foraging habitat for the northern long-eared bat and tricolored bat.

Rationale:
We envision healthy forests within the Scantic River CFA where a diverse seral structure provides suitable habitat conditions for a suite of Connecticut wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010).

Scantic River CFA hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is certainly available within the CFA. To date our review of the Scantic River CFA habitats and wildlife species — and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Scantic comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, 2002, Bellemare et al. 2002). Our sub-objective assumes the forests of the Scantic are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Moore et al. 1990, Petit 2000, Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Moore et al. 1990, Noss 1991). Clearly, structurally complex habitats will not be suitable for all migratory species, but our conservation goal is to provide those areas used most frequently by migrating birds, suggesting relatively tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990, Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. While our management goals may create a relatively old forest, hardwood forests within Scantic will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated (i.e. forest-agricultural edge and suburban forest of the type within Scantic) and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al. 2004).

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Hardwood forests within Scantic should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of foraging opportunities. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991, DeGraaf et al. 2006). Efforts to regenerate any portion of forest within the CFA must account for the abundance of invasive understory species and risk of regeneration failure from white-tailed deer overbrowsing (Hochholzer 2010)

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including the State of Connecticut, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.

- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, and potential winter habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Scantic Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer.

Hardwood swamp occurrences within Scantic with more alkaline soils are often found along riparian and floodplain areas in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the water table drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum. The examples identified within the Scantic River CFA occur within the floodplain of the Connecticut River.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Scantic will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.

- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including surveys for rusty blackbirds during the migration and wintering periods.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, provide breeding, foraging and stopover habitat for American black duck, and potential migrating and wintering habitat for rusty blackbirds.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush. Our coarse-scale habitat analysis of this CFA identifies an 8-mile wetland complex in South Windsor on the east side of the Connecticut River. This complex is floodplain habitat consisting of a mosaic of freshwater marsh, shrub swamp, and hardwood swamp. This area is also interspersed with agricultural land, and adjacent to East Hartford. Please see sub-objective 1.2a and 1.1a for a detailed discussion on this wetland complex and priority resources of concern.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.

- Work with partners, including State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including waterfowl surveys, migratory landbird surveys, and winter surveys for rusty blackbirds.

- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marsh communities to support natural and rare ecological communities, and provide breeding, wintering and stopover habitat for priority refuge resources of concern including American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily and narrow-leaved cattail (Gawler 2008). The freshwater marsh habitat within the Scantic River CFA is part of a larger wetland complex on the east side of the Connecticut River. This complex is floodplain habitat consisting of freshwater marsh, shrub swamp, and hardwood swamp. It is also interspersed with agricultural land and adjacent to East Hartford. This area is under intense development pressure, threatening state listed and refuge priority resources of concern.

This floodplain habitat in the Scantic River CFA is a state priority for conservation. It provides habitat for a suite of species of conservation concern. American black duck, a refuge priority resource of concern and NALCC representative species for freshwater marsh, winters in the Scantic River CFA. Black ducks forage on aquatic vegetation in wetlands during the winter and on invertebrates and vegetation during migration. The Connecticut River is an important migration corridor, and the Scantic River CFA also supports migratory Canada geese, bufflehead, canvasback, American wigeon, mallard, wood duck, northern pintail, gadwall, and mergansers. The freshwater marshes also support several rails and bitterns during the breeding season and migration.

Threats to this wetland complex are altered hydrology, contamination, and non-native invasive plant species. A multi-scale wildlife habitat inventory will be necessary to determine the condition of all habitats in the CFA. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Encourage local landowners to use Connecticut Best Management Practices within active agricultural fields that are located along the perimeter of marsh habitats.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map natural communities; protect rare or exemplary examples.
- Survey wildlife use of wetlands.
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Restore historic composition and structure, and improve the natural hydrology and landscape connectivity to support natural and rare ecological communities. Management will provide stopover habitat for migratory species.

Rationale:
Thirty percent of the Scantic River CFA is typed as pasture, hay, and grassland habitat. The majority of these habitats is in active agricultural use, and is located in floodplain of the Connecticut River. This large floodplain extends approximately 8 miles along the Connecticut River, and is a natural flood storage area for the surrounding communities.

The topography and natural processes of floodplain systems result in the development of complex upland and wetland vegetation on generally flat topography, and soils deposited by the river. The Scantic River CFA has this diversity of habitats in areas not cleared for agricultural use. Hardwood forests and swamps, shrub swamps, and freshwater marsh are part of the floodplain. Silver maple is a characteristic species of a floodplain forest, as well as red maple, ash, red oak, and yellow birch. Common shrubs include black willow, silky dogwood, and viburnums. The herbaceous layer within the forested portions of the floodplain, include spring ephemerals and ferns (Gawler 2008).

Restoration of this floodplain will provide a more contiguous and diverse breeding and migratory habitat for a variety of wildlife species. The Scantic River CFA is significant migration habitat as it straddles the Connecticut

River, an important migratory corridor. A restored floodplain will also improve its function to retain and slow flood waters, reducing the extent of damage to the surrounding communities, and thereby improving water quality.

However, we also support the protection of high-value, productive agricultural lands identified by local communities and the State. It is not the refuge's intention to target these lands for acquisition. Instead, our priority will be to work with individual landowners, states, and other Federal agencies to protect these lands and ensure they continue to be part of the working landscape. There are many State and Federal programs that protect agricultural lands and help promote farming practices that benefit wildlife and help protect water quality. Through our private lands program, we will help direct landowners who are interested in these programs to the proper state and Federal agencies and programs. In rare cases, we may acquire agricultural lands from willing sellers, when other options to keep the land in agricultural production are not available, of if habitats for Federal trust resources are in jeopardy from development or other land use changes.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners and landowners to promote farming practices that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- As new pasture, hay, and/or grassland habitat is acquired, evaluate its ecological importance to determine if it should be maintained or if it should restored to native forest through tree plantings or natural succession.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, identify and implement habitat restoration opportunities within the Scantic River CFA and Connecticut River to benefit priority refuge resources of concern including American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon, as well as other species of conservation concern such as sea lamprey.

Rationale:
The Scantic River CFA straddles the Connecticut River, and is located at the mouth of the Podunk, Scantic, and Farmington Rivers. Many species of conservation concern use these aquatic habitats including American shad, shortnose sturgeon, American eel, alewife, blueback herring, Atlantic salmon, and sea lamprey.

This section of the Connecticut River, and mentioned tributaries are important spawning habitat for shad, alewife, and blueback herring. The main stem also provides crucial spawning habitat for the federally listed shortnose sturgeon. This species is not known to spawn in any other sections or tributaries of the river in Connecticut.

American eel also occupy the main stem and tributaries within the Scantic River CFA. American eel are long lived, and spend the majority of their young life in these freshwater systems. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit bays, estuaries, streams, lakes, and ponds. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

Another species of conservation concern that utilize freshwater aquatic habitats in this CFA is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

The aquatic habitats in the Scantic River CFA provide habitat for many species of conservation concern, and is especially important for the federally listed shortnose sturgeon. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to maintain open channels from the Connecticut River to open water coves.
- Work with adjacent landowners to eliminate barriers to aquatic species passage.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Work with partners to protect and increase "hard bottom" (e.g., gravel, cobble, or bedrock) for spawning aquatic species.
- Work with partners to reduce combined sewer overflow.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Scantic River CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Scantic River CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Scantic River CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Scantic River CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Scantic River CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

***Rationale*:**
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Scantic River CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Scantic River CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Scantic River CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Scantic River CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Scantic River CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Scantic River CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
The Scantic River CFA is comprised of floodplain forests and wetlands adjacent to the Connecticut River. Existing public hunting in the area is limited to the Connecticut River proper for waterfowl and Kings Island Coop Wildlife Management Area which offers waterfowl hunting under a state permit. Much of the Scantic River CFA is adjacent to municipal Hartford which limits hunting opportunities. We will coordinate with Connecticut Department of Energy and Environmental Protection, Hunting Review Team following acquisition of land where hunting is feasible and has been found to be a compatible use. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contributes to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions to support a safe, manageable hunt program, consistent with the final compatibility determination.
- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disable hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of a refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting

community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Scantic River CFA kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Scantic River CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Connecticut Department of Energy and Environmental Protection regulations and division-specific regulations, if necessary.

Rationale:
The principal fishing resources on this CFA are the Connecticut River and the lower reaches of the Scantic and Farmington rivers. The Podunk River, Newberry, and Stoughton brooks are also within the CFA. Most people fish the Connecticut River from boats, but allowing bank fishing on a Scantic River CFA will provide the public with another recreational opportunity. Fishing is a popular activity in this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.

- The Scantic River CFA will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land with fishable waters:
- Work with the Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new CFA to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:
- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:
- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses.)

Within 1 year of acquiring land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Scantic River CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route.

Management Strategies:
Within 5 years of acquiring land:

- Work with public and private partners to determine whether and what roles this CFA might contribute to a Connecticut River waterway route.

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Scantic River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Scantic River CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross country skiing.

- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.

- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.

- When compatible, allow commercial guiding in support of priority public uses by special use permit.

- Allow canoeing and kayaking in acquired coves and waterways.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Whalebone Cove Conservation Focus Area (Existing Refuge Division)

East Haddam and Lyme, Connecticut

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	3,930	56 %
■ *Existing Refuge Ownership in CFA*[1]	*116*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	3,814	
Existing Acres in CFA Permanently Conserved by Others[2,3]	3,047	44 %
Total Acres in CFA[2, 4]	6,977	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers

What specific criteria and/or considerations drove the selection of this CFA?

The Whalebone Cove CPA (map A.20) encompasses the Whalebone Cove CFA (map A.21) which consists of five SFAs from the 1995 Conte FEIS. It is part of larger area considered a priority for conservation by the State of Connecticut. The CFA is also located in an area with an extensive conserved lands network, including Selden Neck State Park, Becket Hill State Park Reserve, Mount Archer, and other privately conserved lands. Additional land protection by the Service in this area will help better connect these conserved lands. Also, this CFA is expected to be fairly resilient to project climate change impacts. Nearly all of the Whalebone Cove CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Land conservation in the Whalebone Cove CFA and lower portion of the Quonatuck CFA will help facilitate the landward migration of the coastal wetland complex.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 80.5%
- Freshwater Marsh – 6.5%
- Shrub Swamp and Floodplain Forest – 2%

For more information on the habitats in the CFA, see map A.22 and table A.14.

What are the resources of conservation concern for the CFA?

As noted in table A.15 below, there are fourteen priority refuge resources of concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA, one of which is a Federal candidate species and another that is listed as Federal endangered. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. This includes extensive tidal wetlands which are part of the Connecticut River estuary system. These wetlands provide habitat for a diversity of species including shorebirds, waterbirds, and waterfowl. The refuge will seek to protect and restore (if necessary) these wetlands and other habitat types. Additionally, we recognize the value of this area to migratory species, forest interior nesting species, and State Species of Greatest Conservation Need (SGCN). These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   Juvenile Atlantic sturgeon were recently documented in the lower portion of the Connecticut River (S. Gephard, CTDEEP, personal communication 2015). This Federal endangered species and a species of greatest conservation need in Connecticut, were once considered extirpated in the Connecticut River, as reproduction no longer occurred in the main stem (Sprankle personal communication 2014). The documentation of juveniles provides a higher probability and opportunities for recovery of this species in the Connecticut River.

   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Whalebone Cove CFA is situated on the Connecticut River, and the forested habitat and tidal wetlands provide very important stopover and breeding habitat for landbirds and waterbirds.

   This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

   The PRRC species for the Whalebone Cove CFA include wood thrush and Louisiana waterthrush. This CFA is located within their core breeding range, and the contiguous forests provide breeding habitat for these and other forest nesting birds, many of which are priority conservation concern species. In fact, Audubon has included the Eightmile River Watershed (within the CFA) as a focal area for forest conservation efforts due to a high concentration of forest nesting birds (P. Comins, Audubon Connecticut, personal communication 2013). Blue-winged warbler is also a PRRC species, which relies on early successional forests and shrublands in the CFA, habitats in decline throughout the southern portion of the Connecticut River watershed.

   Osprey and bald eagle are also PRRC species for this CFA. The open water habitats within the lower Connecticut River constitute the core of breeding osprey in the State, and supports nesting bald eagles, as well as a significant wintering bald eagle population. The mudflats of the river, creeks and coves, provide foraging habitat for shorebirds and wading birds including willets and lesser and greater yellow-legs. Snowy egrets, a PRRC and state species of concern also use these wetlands as foraging areas. In addition, the freshwater tidal wetlands in the lower Connecticut River, and CFA, also provide significant stopover habitat, and potentially breeding habitat, for rails including Virginia, sora, and king rails.

3. **Waterfowl**
   The large tidal wetland complexes in the Whalebone Cove CFA provide excellent food sources for a diversity of waterfowl (TNC 2013). Large concentrations of American black ducks (a PRRC species) occupy habitats during migration and the winter. And located on the Connecticut River, an important migration corridor, these habitats are used by other waterfowl species during migration including green-winged teal, common merganser, mallards, bufflehead, and wood ducks.

4. **Diadromous fish and other aquatic species**
   Whalebone Cove CFA aquatic habitats are among the highest in quality of the shallow fresh water bays, coves, tidal creeks, and tributaries which typify the Lower Connecticut River and the significant overwintering, spawning and feeding habitat they provide for a large number of fish species. Many species of conservation concern use these aquatic habitats including PRRC species like American eel, alewife, the Federal listed Atlantic sturgeon, blueback herring, and brook trout.

Many of the tidally influenced coves and creeks provide important spawning habitat for alewife and blueback herring. These creeks also provide excellent nursery habitat for these species. American eel also occupy tidally influenced aquatic systems, as well as the non-tidal rivers. Brook trout occur in the upland portions of the CFA, where free-flowing cold water habitat is present, and a requirement for this species life cycle. Juvenile Atlantic sturgeon were documented recently in the lower portion of the CT River. Sea lamprey, another species of conservation concern, occurs in this CFA providing important ecological benefits to aquatic systems.

5. **Wetlands**
   From a regional standpoint, there are no areas in the Northeast that support such extensive or high quality fresh and brackish tidal wetland systems as those in the Connecticut River estuary. The lower Connecticut River wetlands and river area consists of over 20 individual tidal wetland units and river islands of various sizes occurring along a 40-mile (64 kilometer) stretch of the lower Connecticut River from Old Saybrook to Cromwell. In particular, Whalebone Cove is one of the most undisturbed and biologically significant freshwater marshes along the Connecticut River (TNC 2013). Taken as a whole, the estuary represents a gradation of tidal wetlands from a very narrow zone of relatively high salinity marshes at the mouth of the Connecticut River where it enters Long Island Sound, through an intermediate zone of brackish, lower salinity wetlands, to extensive freshwater tidal marshes and floodplain forests beginning at Deep River and extending upriver to Cromwell (Comins personal communication).

   There are 455 acres of freshwater tidal emergent wetlands and 138 acres of shrub-swamp and floodplain forest at the mouth of creeks and within secluded coves of the Whalebone Cove CFA. Whalebone Cove has one of the largest stands of wild rice in the State. These tidal wetlands are part of the Connecticut River estuary, and provide habitat for a diversity of species. Further in land there are also 93 acres of scattered hardwood swamps.

6. **Other**
   New England cottontail is a species of greatest conservation need in Connecticut and Massachusetts. Due to the loss of early successional forest and natural shrubland habitats to development and forest maturation, this species occupies less than a fifth of its historical range (Fuller and Tur 2012). New England cottontail is no longer sustaining a viable population, and given this conservation urgency, a range-wide New England cottontail Initiative was established. This initiative involves collaboration from multiple agencies to address cottontail conservation on a landscape scale. Focus areas were identified within its historical range in New England as locations to manage and restore habitat for New England cottontail. Other wildlife species associated with this habitat type have experienced similar declines, and the New England cottontail has been identified as a surrogate for this suite of shrubland-dependent species.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse and appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (stream, rivers, coves) habitats, will focus on maintaining in-stream connectivity and outstanding water quality.

What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six, priority public uses, if determined compatible for the Whalebone Cove Division: wildlife observation, wildlife photography, environmental education, interpretation, hunting, and fishing.

Were there other special considerations in delineating the CFA boundary?

The lower portion of the Eightmile River occurs in the CFA. Fifteen miles of the Eightmile River and its East Branch are included on the National Park Service's Nationwide Rivers Inventory of potential Wild and Scenic River segments. Both segments are included on the inventory for outstanding scenic, geologic, fish and wildlife values. In 2001, Congress passed Public Law 107-65 authorizing a study of the Eightmile River to determine if it meets established criteria for designation as an addition to the National Wild and Scenic River (WSR) System. This is the first step to formally including the River in the WSR. To date, Study partners have identified six criteria that make the Eightmile River a special natural resource:

(1) The presence of unique species of plants and animals, and unique natural communities.

(2) Outstanding water quality and quantity.

(3) Exemplary hydrology systems.

(4) Unique geology.

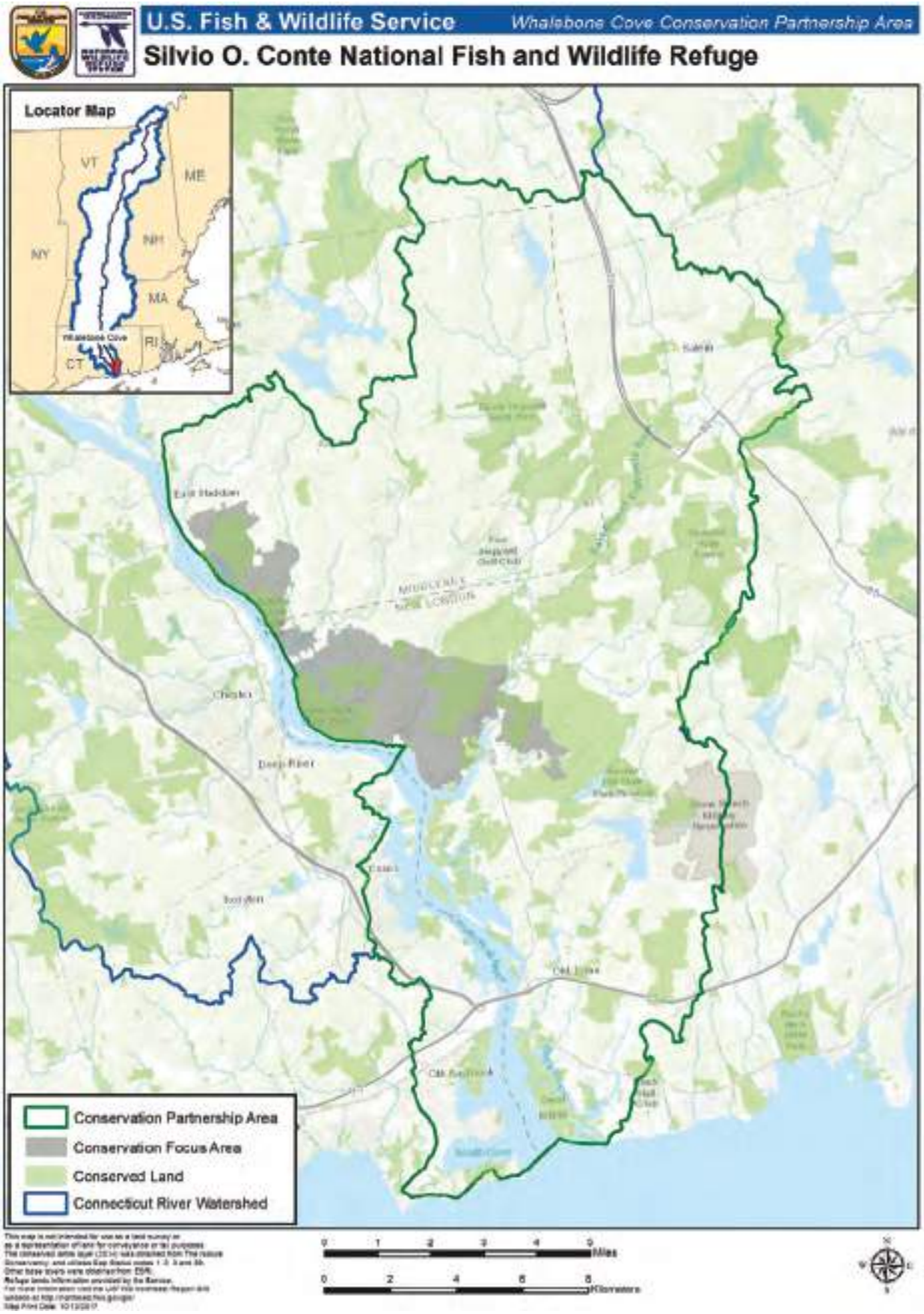
(5) An outstanding cultural landscape, including Native American settlement dating back to at least 6,000 to 4,000 BC, varied uses of the landscape since the time of European settlement, and its high potential for intact archaeological resources.

(6) An intact functioning watershed ecosystem.

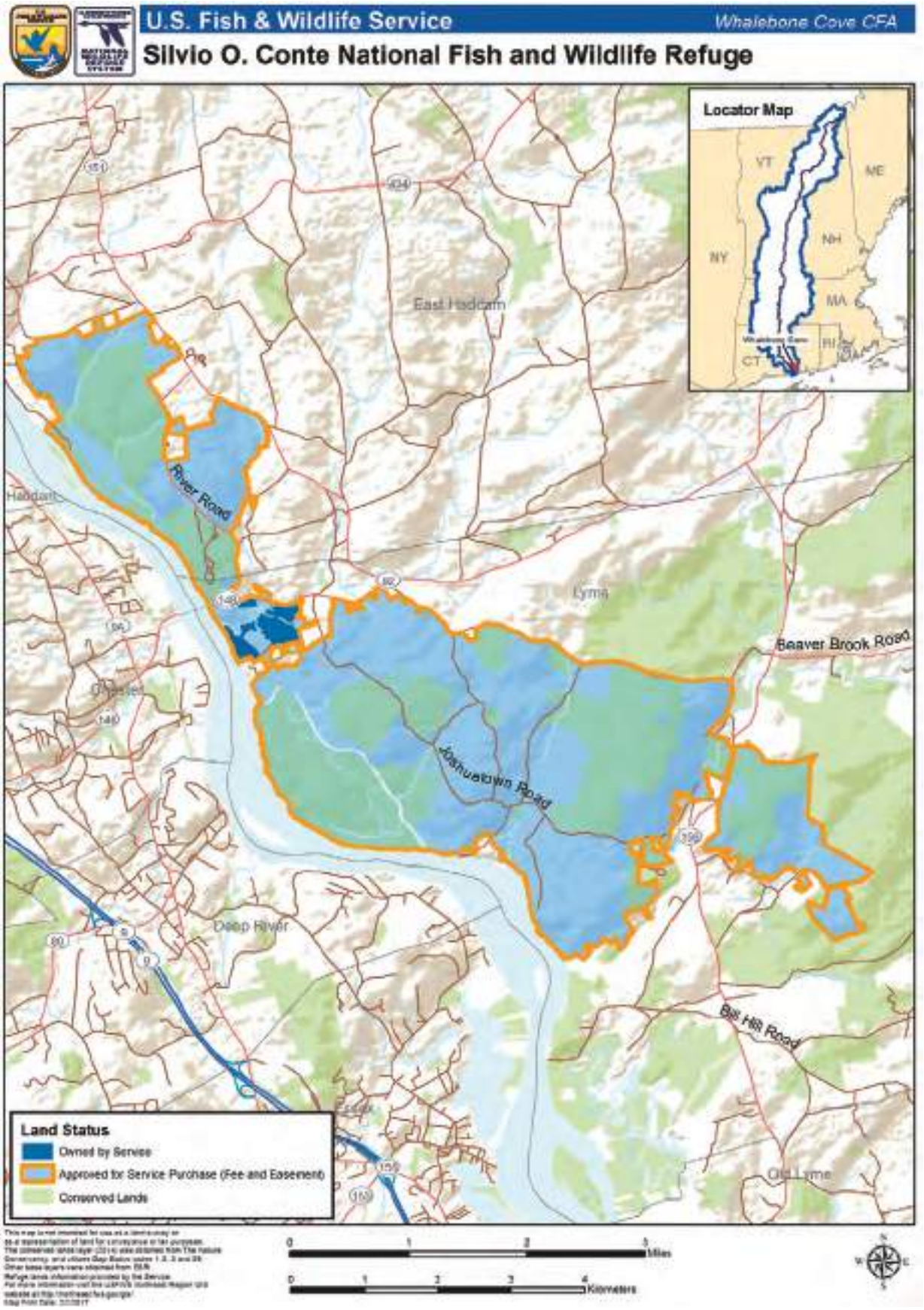
The Eightmile River Watershed is a critical ecosystem in Connecticut. The River contains exceptionally high quality forest, aquatic, and early successional habitats that make it a critical region for birds and other wildlife in Connecticut. The Nature Conservancy and other groups collectively protect almost a quarter of the 40,000-acre watershed. The Eightmile River is located within the Lower Connecticut River Valley—a region named as one of the 40 Last Great Places in the Western Hemisphere by The Nature Conservancy in 1993. This area has also been designated a Ramsar wetland of international importance.

The Eightmile River represents a remarkably intact, free flowing and virtually unobstructed riverine ecosystem with excellent water quality and 85% forest cover. Because of the exceptional water quality and lack of migratory obstructions such as dams, the river system contains exceptional habitat for anadromous and catadromous fish species.

Map A.20. Whalebone Cove CPA.



Map A.21. Whalebone Cove CFA – Location.



Map A.22. Whalebone Cove CPA/CFA – Habitat Types.

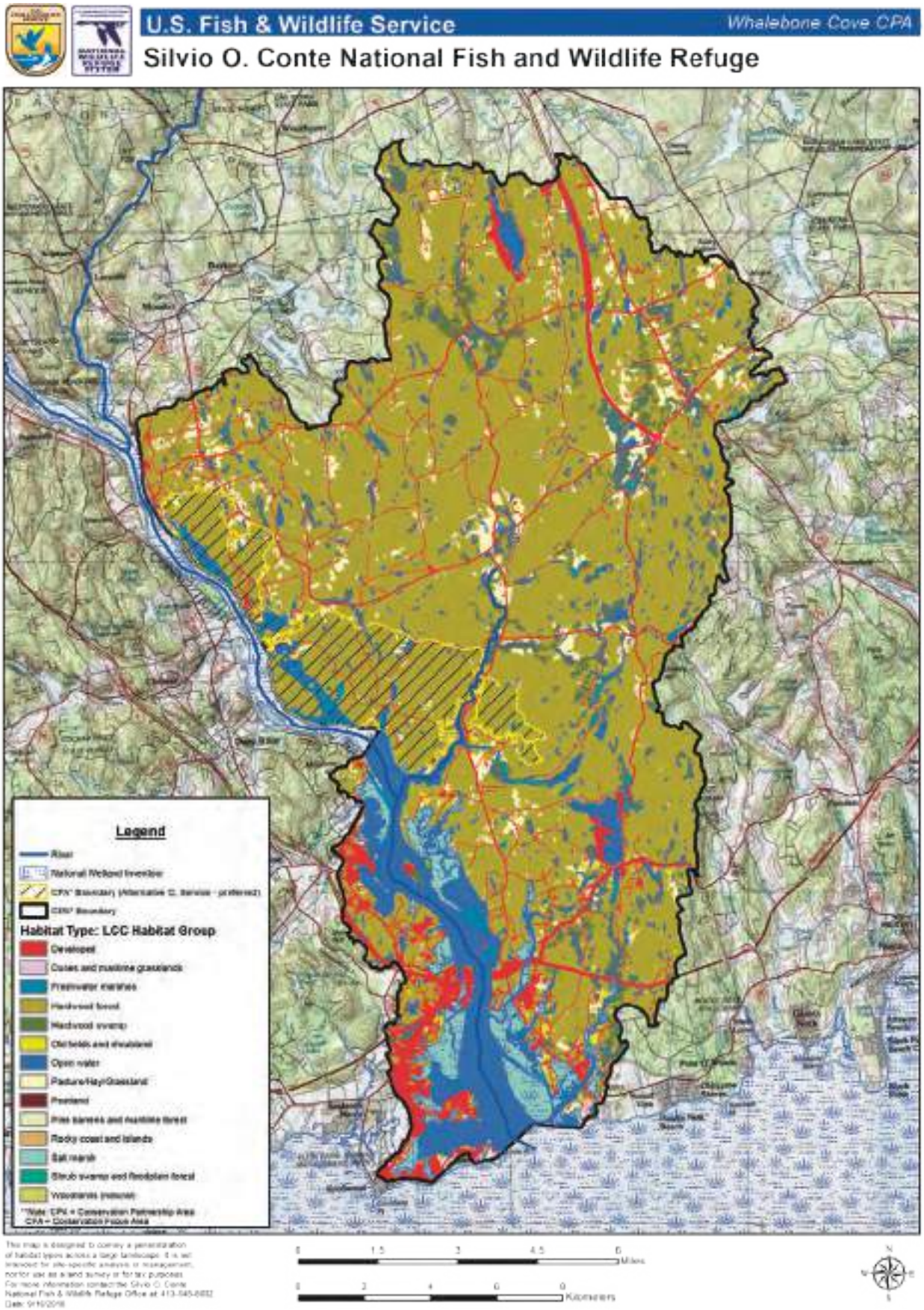


Table A.14. Whalebone CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[2]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Hardwood forest	54,463	66.2%	5,614	2,543	33	80.6%	10.3%
Hardwood swamp	5,540	6.7%	94	22	0	1.3%	1.7%
Pine barrens and maritime	83	0.1%	0	0	0	0.0%	0.0%
Shrub swamp and floodplain forest	600	0.7%	136	92	10	2.0%	22.7%
Woodlands (natural)	13	0.0%	2	0	0	0.0%	18.6%
Forested uplands and wetlands subtotal	*60,699*	*73.8%*	*5,846*	*2,657*	*43*	*84.0%*	*9.6%*
Non-forested Uplands and Wetlands[9]							
Freshwater marshes	1,240	1.5%	445	242	58	6.4%	35.9%
Old fields and shrubland	429	0.5%	47	19	2	0.7%	11.0%
Pasture/hay/grassland	4,008	4.9%	180	44	1	2.6%	4.5%
Peatland	15	0.0%	0	0	0	0.0%	0.0%
Non-forested uplands and wetlands subtotal	*5,692*	*6.9%*	*673*	*305*	*61*	*9.7%*	*11.8%*
Inland aquatic habitats[9]							
Open Water	5,631	6.8%	153	35	6	2.2%	2.7%
Inland aquatic habitats subtotal	*5,631*	*6.8%*	*153*	*35*	*6*	*2.2%*	*2.7%*
Coastal non-forested uplands[9]							
Dunes and maritime grasslands	82	0.1%	0	0	0	0.0%	0.0%
Rocky coast and islands	56	0.1%	41	32	0	0.6%	74.4%
Coastal non-forested uplands subtotal	*137*	*0.2%*	*41*	*32*	*0*	*0.6%*	*30.1%*

LCC General Habitat Type[1]	CPA[2]		CFA[2]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Coastal wetlands and aquatic habitats[9]							
Salt marsh	2,570	3.1%	5	5	0	0.1%	0.2%
Coastal wetlands and aquatic habitats subtotal	*2,570*	*3.1%*	*5*	*5*	*0*	*0.1%*	*0.2%*
Other							
Developed	7,547	9.2%	246	73	3	3.5%	3.3%
Other subtotal	*7,547*	*9.2%*	*246*	*73*	*3*	*3.5%*	*3.3%*
TOTAL[10]	**82,277**	**100.0%**	**6,964**	**3,108**	**114**	**100.0%**	**8.5%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.15. Whalebone Cove CFA – Priority Refuge Resources of Concern

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 5,607 acres		
Wood Thrush[A,B,C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Eastern Towhee[A,I] Black-billed Cuckoo[I,J] Broad-winged hawk[A,I,J] Great-crested Flycatcher[A,I] Hooded Warbler[J] Sharp-shinned Hawk[I,J] Yellow-throated Vireo[A,J] **Eastern Red Bat**[I] **Ovenbird**[J] American Woodcock[A,I] Gray Catbird[A,I,J] Eastern Box Turtle[I] Acadian Flycatcher[J] Scarlet Tanager[A,I,J] Black-and-white Warbler[A,I,J] Baltimore Oriole[A,I,J] Prairie Warbler[A,I] Worm-eating Warbler[I,J] Northern Flicker[A,I,J] Cerulean Warbler[A,I,J] Ruffed Grouse[I] Little Brown Bat[I] Whip-poor-will[A,I] **Chestnut-sided Warbler**[A,B]
Louisiana Waterthrush[A]	Breeding habitat includes contiguous (250+ acres) mature deciduous or mixedwood forests along medium to high-gradient, first to third-order, perennial streams (Mattsson et al. 2009, DeGraaf et al., 2001).	
Blue-winged Warbler[A,B]	Breeding habitat includes fields scattered with shrubs and small trees, or young deciduous and mixed forests 1-20 years old (DeGraaf et al. 2001, Gill et al. 2001)	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
New England cottontail[B]	Year round habitat includes dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within1 km of each other (Arbuthnot 2008, DeGraaf et al. 2001).	
Bald Eagle[C, G] Osprey[G] (breeding and migrating only)	Breeding, migrating and wintering habitat includes large bodies of open water with little human disturbance, and large canopy trees or other elevated sites for nesting, perching, and roosting (DeGraaf et al. 2001).	
Hardwood Swamp[5] - 93 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory Species

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Shrub Swamp and Floodplain Forest[5] - 138 acres		
New England cottontail[B]	Year-round habitat includes shrub swamps of at least 25 acres that are within 1 km of other shrub swamps, and early successional forest patches (Arbuthnot 2008, DeGraaf et al. 2001).	American Redstart[J] Gray Catbird[A,I,J] Chestnut-sided Warbler[I] Migratory Species **Willow Flycatcher**[A, I] American Woodcock[A,I] **Warbling Vireo**[I] **Spotted Turtle**[I] Eastern Kingbird[A,I,J]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	
Woodlands (natural)[5] - 2 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 455 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001). Wintering habitat includes open water, such as, estuaries, coves or bays with submerged aquatic vegetation, mollusks and crustaceans for foraging, as well as tidal wetlands (DeGraaf et al. 2001)	Northern Harrier[I,J] Wood Duck[A,I,J] Green-winged Teal[A,I,J] **American Bittern**[A,I] Bufflehead[A] Canada Goose, NAP[A,J] Canada Goose, APA[J] **Virginia Rail**[I] **Marsh Wren**[A,I] Mallard[A,I,J] Lesser Yellowlegs[A,J]
Snowy Egret[A,C]	Foraging habitat includes shallow pools, freshwater wetlands, and tidal flats within the vicinity of nesting areas (DeGraaf et al. 2001).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Old Fields and Shrublands[5] - 49 acres		
New England Cottontail[B]	Year round habitat includes pastures, abandoned fields, and dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within 1 km of each other (Arbuthnot 2008, DeGraaf et al. 2001).	American Woodcock[A,I,J] Eastern Towhee[A,I] Gray Catbird[A,I] **Bobolink**[I] **Eastern Meadowlark**[I] **Blue-winged Warbler**[A,B] Prairie Warbler[A,I] **Brown Thrasher**[A,I] **Field Sparrow**[A,I] Eastern Kingbird[A,I] Chimney Swift[A,I] Northern Harrier[I,J] Indigo Bunting[I,J] Migratory Species
Blue-winged Warbler[A,B]	Breeding habitat includes fields scattered with shrubs and small trees, or young deciduous and mixed forests 1-20 years old (DeGraaf et al. 2001, Gill et al. 2001)	
Pasture/Hay/Grassland[5] – 177 acres		
New England Cottontail[B]	Year round habitat includes pastures, abandoned fields, and dense, young deciduous and mixed forests in patch sizes of 25 acres or more that are situated within 1 km of eachother (Arbuthnot 2008, DeGraaf et al. 2001).	American Woodcock[A,I,J] Eastern Towhee[A,I] Gray Catbird[A,I] **Bobolink**[I] **Eastern Meadowlark**[I] **Blue-winged Warbler**[A,B] Prairie Warbler[A,I] **Brown Thrasher**[A,I] **Field Sparrow**[A,I] Eastern Kingbird[A,I] Chimney Swift[A,I] Northern Harrier[I,J] Indigo Bunting[I,J] Migratory Species
Inland Aquatic Habitats[4]		
Open Water[5] – 170 acres		
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58 F (USFWS 1996).	Sea Lamprey[I] Bridle Shiner[I] Pumpkinseed[I] Striped Bass[I] Longnose Dace[I] Yellow Perch[I] Banded Sunfish[I] White Perch[I]
Alewife[B, F, G]	Spawn in ponds and slow-moving streams (USFWS 1996).	
Brook Trout[F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4] (cont.)		
American Black Duck[A, B, C, G]	Migrating and wintering habitat includes open water, such as, estuaries, coves or bays with submerged aquatic vegetation, mollusks and crustaceans for foraging (DeGraaf et al. 2001).	Canada Goose, Atlantic[A] Canada Goose, North Atlantic[A] **Bufflehead**[A] Mallard[A] Snowy Egret[A,I,J] Bald Eagle[A,I] Wood Duck[A] Green-winged Teal[A,I,J]
Coastal Non-forested Uplands[4]		
Rocky Coast and Islands[5] – 42 acres		
Acadian-North Atlantic rocky coast[H]	This system encompasses non-forested uplands that are often a narrow zone between the high tide line and the upland forest; this zone becomes wider with increasing maritime influence. The substrate is rock, sometimes with a shallow soil layer, and tree growth is prevented by extreme exposure to wind, salt spray, and fog. Slope varies from flat rock to cliffs. Cover is patchy shrubs, dwarf-shrubs and sparse non-woody vegetation, sometimes with a few stunted trees. Many coastal islands have grass-shrub areas that were maintained by sheep grazing and now persist even after grazing has ceased (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Coastal Wetlands and Aquatic Habitats		
Salt marsh[5] – 5 acres		
Northern Atlantic coastal plain tidal salt marsh[H]	This system encompasses intertidal marshes where salinity levels are between 5 and 50 (ppt). It includes a number of different broad vegetation types including salt pannes (depressions within a salt marsh that flood during high tide), salt marshes, and salt shrublands. The typical salt marsh profile, from sea to land, can be summarized as follows: a low regularly flooded marsh strongly dominated by smooth cordgrass; a higher irregularly flooded marsh dominated by salt meadow cordgrass and sea shore saltgrass; low hyper-saline pannes characterized by glasswort spp.; and a salt scrub ecotone characterized by Jesuit's bark, eastern baccharis, and switchgrass. Moving up a tidal river, brackish marshes have less cover of salt meadow cordgrass and increased cover of associated species including tall grasses such as chair maker's bulrush and narrow-leaf cattail (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.
B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.
C: 2008 USFWS Birds of Conservation Concern.
D: Federal Threatened and Endangered status as of 2016, including Candidate Species
E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016
F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan
G: Silvio O Conte Refuge Purpose Species.
H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.

I: 2015 Connecticut Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Whalebone Cove CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, Louisiana waterthrush, northern long-eared bat (if appropriate), tricolored bat (if appropriate), New England cottontail, blue-winged warbler, osprey, and bald eagle.

Rationale:
We envision healthy forests within the Whalebone Cove CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Connecticut wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Whalebone Cove CFA hardwood forests are among the most diverse and productive for wildlife, and abundant, high-quality habitat is certainly available within the CFA. To date our review of the Whalebone Cove CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Whalebone Cove comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Whalebone Cove are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For many species, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Whalebone Cove will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. The USFWS New England cottontail initiative has identified focus areas, including the Whalebone Cove CFA, where the decline in early successional habitats is a particular problem for the New England cottontail. New England cottontail is a species of greatest conservation need in Connecticut.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of fifteen or more habitat patches, several of which are 25 acres or more. Each habitat patch should be one mile or less from each other to aid in New England cottontail movement between patches (Fuller and Tur 2012). Approximately 375 acres of forest will be managed in early successional habitat in support of New England cottontail in the CFA. Another species of conservation concern that will use these habitat patches is American woodcock. High quality woodcock habitat includes young forest patches within a mile of feeding areas. New England cottontail habitat patches will be placed in the vicinity of shrub wetlands, where feasible, to benefit this species. If early successional habitat is lacking within the landscape, we will provide other strategically located patches with these conditions to support other species of conservation concern such as blue-winged warbler, chestnut-sided warbler, gray catbird, eastern towhee, black and white warbler, eastern red bat, and ruffed grouse (DeGraaf et al. 2006).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Hardwood forests within the Whalebone Cove CFA should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and Louisiana waterthrush. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Louisiana waterthrush prefer a dense, multilayer forest canopy—particularly along high-gradient streams—for protection from nest predation.

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Closed canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, acadian flycatcher, and—when along rocky bottomed streams—Louisiana waterthrush. Efforts to regenerate any portion of forest within the CFA must account for the abundance of invasive understory species and risk of regeneration failure from white-tailed deer overbrowsing (Hochholzer 2010).

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the sharp-shinned hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy— provide special habitats that, when near open bodies of water, are utilized by bald eagles and osprey. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, barred owls, and woodpeckers, like the northern flicker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners and adjacent landowners to identify areas appropriate for New England cottontail management. Plan to manage approximately 375 acres of forest in early successional habitat for New England cottontail in the CFA. This approximation of the amount and distribution of acreage over the next 15 years assumes we will have a large enough land base to manage. Our target acreage may also be refined once site conditions are verified and a habitat management plan is completed.

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices.

- Protect hard and soft mast producing species such as American beech, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.

- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood Swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, and potential winter habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Whalebone Cove Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer.

Hardwood swamp occurrences within Whalebone Cove with more alkaline soils are often found along riparian and floodplain areas in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water

common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the water table drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum. The examples identified within the Whalebone Cove CFA occur within the floodplain of the Connecticut River.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. Our conservation efforts within the Whalebone Cove will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA may also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map vernal pools and seeps.

- Conduct forest and wildlife inventories.
- Conduct rusty blackbird surveys to determine if habitat is used during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forests)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide habitat for priority refuge resources of concern including American black duck, rusty blackbird and New England cottontail.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush. Our coarse-scale habitat analysis of this CFA identifies shrub swamps scattered in pockets across the CFA, but appear to be more concentrated in a wetland complex, consisting of shrub swamp and freshwater marsh communities, at the mouth of Joshua and Whalebone Creeks, and on the perimeter of Selden Creek and Chapman Pond. These tide influenced wetlands, and those that are not influenced by tide events, provide a diversity of plant communities, and habitats for a variety of wildlife species, including American black duck, rusty blackbird and, potentially, New England cottontail.

New England cottontail is a species of greatest conservation need in Connecticut. The historic range of this species likely included southeastern New York, north through the Champlain Valley and into southern Vermont, New Hampshire, and Maine, and statewide in Massachusetts, Connecticut, and Rhode Island. Due to loss of early successional habitat to development and forest maturation, this species occupies less than a fifth of its historical range (Fuller and Tur 2012). New England cottontail is no longer sustaining a viable population, and given this conservation urgency, a range-wide New England cottontail Initiative was established. This initiative involves collaboration from multiple agencies, including the USFWS, state wildlife agencies, Universities, Natural Resources Conservation Service, The Nature Conservancy, and Wildlife Management Institute, to address cottontail conservation on a landscape scale.

Focus areas were identified as locations to manage and restore habitat for New England cottontail. The Whalebone Cove CFA was one of forty-nine focus areas in six states. Early successional management and protection of adjacent natural shrubland habitat, such as shrub swamps, will meet the conservation goals set for the New England cottontail. "A Conservation Strategy for the New England cottontail" was developed and approved in November 2012, and provides the conservation and habitat management goals and strategies for this species (Fuller et al 2012).

American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 30. Black ducks use wetlands, including shrub swamp communities, as stopover habitat during migration, and as breeding and wintering habitat. Well-concealed nests are placed on the ground in nearby uplands or hummocks in wetlands, and adults and their broods forage on seeds, aquatic vegetation and invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). Open water habitat, and the adjacent wetland complex provides excellent wintering and migrating habitat for American black ducks. And located on the Connecticut River, an important migration corridor, these wetland communities are used by other waterfowl species during migration including green-winged teal, common merganser, mallards, bufflehead, and wood ducks.

This CFA may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Due to our unfamiliarity with habitat conditions in the CFA, management of this wetland complex will first require a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale (shrub swamps), but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of these wetlands at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Minimize refuge activities that disturb wetland communities.
- If appropriate, incorporate shrub swamps into the network of habitat patches required for New England cottontail.
- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Survey wildlife utilization of wetlands including waterfowl surveys, migratory landbird surveys, and winter surveys for rusty blackbirds
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management

that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Whalebone Cove CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide habitat for priority refuge resources of concern including American black duck, and waders such as snowy egret, and rails.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail (Gawler 2008). Our coarse-scale habitat analysis

of this CFA identifies a wetland complex, consisting of shrub swamp and freshwater marsh communities, at the mouth of Joshua and Whalebone Creeks, and on the perimeter of Selden Creek and Chapman Pond. These tide influenced wetlands provide a diversity of plant communities, and habitats for a variety of wildlife species, including American black duck, long-legged waders such as snowy egret and rails. Please see sub-objective 1.2a for a detailed discussion on shrub swamp communities, and priority resources of concern.

American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 30. Black ducks use wetlands, including freshwater marsh communities, as stopover habitat during migration, and as breeding and wintering habitat. Well-concealed nests are placed on the ground in nearby uplands or hummocks in wetlands, and adults and their broods forage on seeds, aquatic vegetation and invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). Open water habitat, and this adjacent wetland complex provides excellent wintering and migrating habitat for American black ducks. And located on the Connecticut River, an important migration corridor, these wetland communities are used by other waterfowl species during migration including green-winged teal, common merganser, mallards, bufflehead and wood ducks.

These freshwater marsh habitats also provide important habitat for waders, such as snowy egrets and lesser yellow legs, and rails including Virginia rail. Snowy egrets are one of thirteen target species to benefit from conservation actions within large freshwater wetland habitats in BCR 30 (Steinkamp, Melanie 2008). This species is also a state species of conservation concern. Egrets use the CFA freshwater wetlands as foraging areas, and may be important for post-nesting dispersals (P. Comins personal communication 2010).

Due to our unfamiliarity with habitat conditions in the CFA, management of this wetland complex will first require a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale (freshwater marsh), but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of these wetlands at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Evaluate wetland hydrology for impacts to natural flow regimes.
- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Inventory wetland plant communities.
- Survey wildlife use of existing wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland and Old Fields and Shrublands)
Provide appropriate conditions within current pasture, hay, and grassland acreage, and old field and shrubland habitat that will support New England cottontail (where appropriate), and other shrub-dependent conservation concern species such as blue-winged warbler.

Rationale:
Over two percent of the Whalebone Cove CFA is typed as pasture, hay, grassland, old fields and shrublands. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses, while shrubs dominate shrublands, and a mixture of shrubs and grasses tend to occur in old fields.

Many bird species of conservation concern rely on these habitats, including grassland dependent species such as bobolink and grasshopper sparrow, and shrub dependent species such as blue-winged warbler, prairie warbler, field sparrow, American woodcock, and chestnut-sided warbler. Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occur in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Another species of conservation concern that uses shrubland dominated habitat is New England cottontail. This species is a species of greatest conservation need in Connecticut. The Whalebone Cove CFA is a New England cottontail Focus Area, which are areas identified as locations to manage and restore habitat for New England cottontail. New England cottontail require early successional habitat (dense shrubs and tree saplings). The pastures, hay fields, and grasslands within the CFA, if allowed to revert to woody stems, will provide this habitat with very little initial manipulation.

The conceptual model for the conservation of New England cottontail is for a focus area to contain at least 1,000 acres of early successional habitat of fifteen or more habitat patches, several of which are 25 acres or more. Each habitat patch should be one mile or less from each other to aid in New England cottontail movement between patches (Fuller and Tur 2012). Where appropriate, pastures, hay fields, grasslands, shrublands, and old fields will be incorporated into the network of patches managed for New England cottontail by allowing woody stem colonization.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, grassland, old fields and shrubland acres can provide quality habitat if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, identify and implement habitat restoration opportunities within the Whalebone Cove CFA to benefit priority refuge resources of concern including American eel, alewife, blueback herring, Atlantic sturgeon and brook trout, as well as other species of conservation concern such as sea lamprey. Also provide undisturbed wintering and stopover habitat for American black duck, and other waterfowl.

Rationale:
Whalebone Cove CFA aquatic habitats are among the highest in quality of the shallow fresh water bays, coves, tidal creeks, and tributaries which typify the Lower Connecticut River and the significant overwintering, spawning and feeding habitat they provide for a large number of fish species. Many species of conservation concern use these aquatic habitats including American eel, alewife, Atlantic sturgeon, blueback herring, brook trout and sea lamprey.

Many of the tidally influenced coves and creeks, including Whalebone cove, and Whalebone and Joshua creeks, provide important spawning habitat for alewife and blueback herring. The creeks also provide excellent nursery habitat for these species. American eel spend the majority of their young life in the freshwater systems of this CFA. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit bays, estuaries, streams, lakes, and ponds. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

Juvenile Atlantic sturgeon were recently documented in the lower portion of the Connecticut River (S. Gephard, CTDEEP, personal communication 2015). This Federal endangered species and a species of greatest conservation need in Connecticut, were once considered extirpated in the Connecticut River, as reproduction no longer occurred in the main stem (Sprankle personal communication 2014). The documentation of juveniles provides a higher probability and opportunities for recovery of this species in the Connecticut River.

Brook trout occur in the upland portions of the CFA, where free-flowing cold water habitat is present, and a requirement for this species life cycle. Brook Trout are a species of conservation concern due to habitat loss and potential impacts from climate change. This species is present in the tributaries to Eightmile, and Chapman Pond.

Another species of conservation concern that utilize freshwater aquatic habitats in this CFA is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

The open water habitat within the various coves, rivers, creeks and wetlands provide excellent wintering and stopover habitat for American black duck. Other migratory waterfowl also take advantage of these secluded areas including green-winged teal, common merganser, mallards, bufflehead and wood ducks. This open water habitat also supports foraging opportunities for bald eagles and osprey.

The aquatic habitats in the Whalebone Cove CFA are diverse, and provide habitat for a variety of wildlife species. Development and human activities have impacted water quality and infringed on aquatic species movements and life cycles. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 10 years of approval:

- Work with partners to protect and increase “hard bottom” (e.g., gravel, cobble, or bedrock) for spawning aquatic species.
- Work with partners to reduce combined sewer overflow.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of approval:

- Work with partners to conduct stream assessments to evaluate stream and fish community health.
- Work with partners to conduct a physical and biological assessment of Whalebone Cove.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Sub-objective 1.4a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and slow moving streams and pools in wetland ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Whalebone Cove CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger upland and wetland matrix, and providing additional structural and species diversity to the matrix. Rocky shorelines along large river systems and wet meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these meadows are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including CTDEEP in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Sub-objective 1.5a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
See the rationale for objective 1.4a.

Habitats that occur within the Whalebone Cove CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky shorelines along large river systems and wet meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these meadows are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State of Connecticut, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Whalebone Cove Division as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Whalebone Cove Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Whalebone Cove Division as an outdoor classroom.

Rationale:
Because this division will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Whalebone Cove Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Whalebone Cove Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Whalebone Cove Division will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Whalebone Cove Division's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Whalebone Cove Division.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Whalebone Cove Division.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:
- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Whalebone Cove Division will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Whalebone Cove Division is unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
The Whalebone Cove Division is comprised of floodplain forests and wetlands adjacent to the Connecticut River, offering good hunting opportunities for waterfowl, small game, and white-tailed deer. Public hunting areas in the vicinity include Selden Neck State Park. Hunting, consistent with the final compatibility determination, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions to support a safe, manageable hunt program.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Whalebone Cove Division kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Whalebone Cove Division after completing all administrative procedures to officially open refuge lands to fishing, consistent with the final compatibility determination, based on Connecticut Department of Energy and Environmental Protection regulations, and any division-specific conditions.

Rationale:
Fishing will be allowed on a newly created division, consistent with the final compatibility determination. The principal fishing resources on this CFA are the Connecticut River and the Eightmile River, although there are several other smaller streams that support game fish. However, some of these streams are difficult to access. Most people fish the Connecticut River from boats, but allowing bank fishing on the Whalebone Cove Division, where it can be done safely and not significantly impact resources, will provide the public with another recreational opportunity. Fishing is a popular activity in this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Whalebone Cove Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land with fishable waters:
- Work with the Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the division.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, Web site pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities, if these activities are found to be compatible uses.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new division to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of CCP approval:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of CCP approval:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of CCP approval:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the division.

Rationale:
The entire division will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of CCP approval:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of CCP approval:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the division for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of CCP approval:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of CCP approval:

- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Whalebone Cove Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of CCP approval:

- Work with public and private partners to determine whether and what roles this division might contribute to a Connecticut River waterway route.
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that are part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Whalebone Cove Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that are part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Whalebone Cove Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on the determination that the use is both appropriate and compatible.)

Within 1 year of CCP approval:

- Allow dispersed hiking, snowshoeing, and cross country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Allow canoeing and kayaking in acquired coves and waterways.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Deadman Swamp Unit (Existing Refuge Unit)

Cromwell, Connecticut

Total Unit Acres[1]	31

[1]Actual surveyed acres.

What are the priority habitat types within the unit?

- Hardwood forest - 25%
- Hardwood Swamp – 49%
- Freshwater Marsh – 7%
- Open water – 17%

For more information on the unit's location and habitats, see map A.23, map A.24, and table A.16.

What are the Federal trust and other natural resource values in the unit?

1. **Endangered Species**
   The Puritan tiger beetle, a federally listed species, uses beach habitat on the south end of the Deadman Swamp Unit along the Connecticut River. Beetles also utilize beach habitat adjacent to the northern portion of the unit, which is privately owned. The river flow dynamics of the Connecticut River creates open sandy beaches that are required for breeding beetles. Encroachment of herbaceous and woody plants reduces suitable larval habitat and because of this there has been periodic vegetation control on this unit.

   Both populations are monitored by the State. A site visit with partners in 2011, determined that vegetation and silt are impacting tiger beetle populations on the southern portion of the Unit, and very few adults have been observed. Removal of this vegetation will be necessary to provide appropriate tiger beetle habitat. The beach habitat adjacent to the north end of the unit is expanding, and beetle numbers are increasing, though recreational activities may impact recovery.

   Recovery criteria in the USFWS Puritan Beetle Recovery Plan specifies a minimum of three metapopulations, at least two of which are large (500 to 1000 or more adults) are maintained or established (i.e., self-maintained for at least 10 years) within the species historical range along the Connecticut River, and habitat they occupy is permanently protected (Hill and Knisley 1993). We will continue to work with partners in the recovery of Puritan tiger beetle populations in the Connecticut River.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor for bird species. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). Deadman Swamp Unit abuts the Connecticut River, and though small in acreage, the forest and wetlands are important stopover habitat for landbirds.

3. **Waterfowl**
   The coves adjacent to the Deadman Swamp may provide important stopover areas for migrating and wintering waterfowl.

4. **Diadromous fish and other aquatic species**
   The Deadman Swamp Unit is adjacent to the Connecticut River which provides important habitat for American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon.

5. **Wetlands**
   There are 15 acres of hardwood swamp and 2 acres of freshwater marsh on the unit. These wetland acres are adjacent to the Connecticut River, and are part of its floodplain.

What habitat management activities will be a priority on refuge lands within the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on the following:

- Work with partners to maintain beach habitats, and monitor Puritan tiger beetle populations.
- Manage invasive plants in the floodplain forest to maintain native diversity.

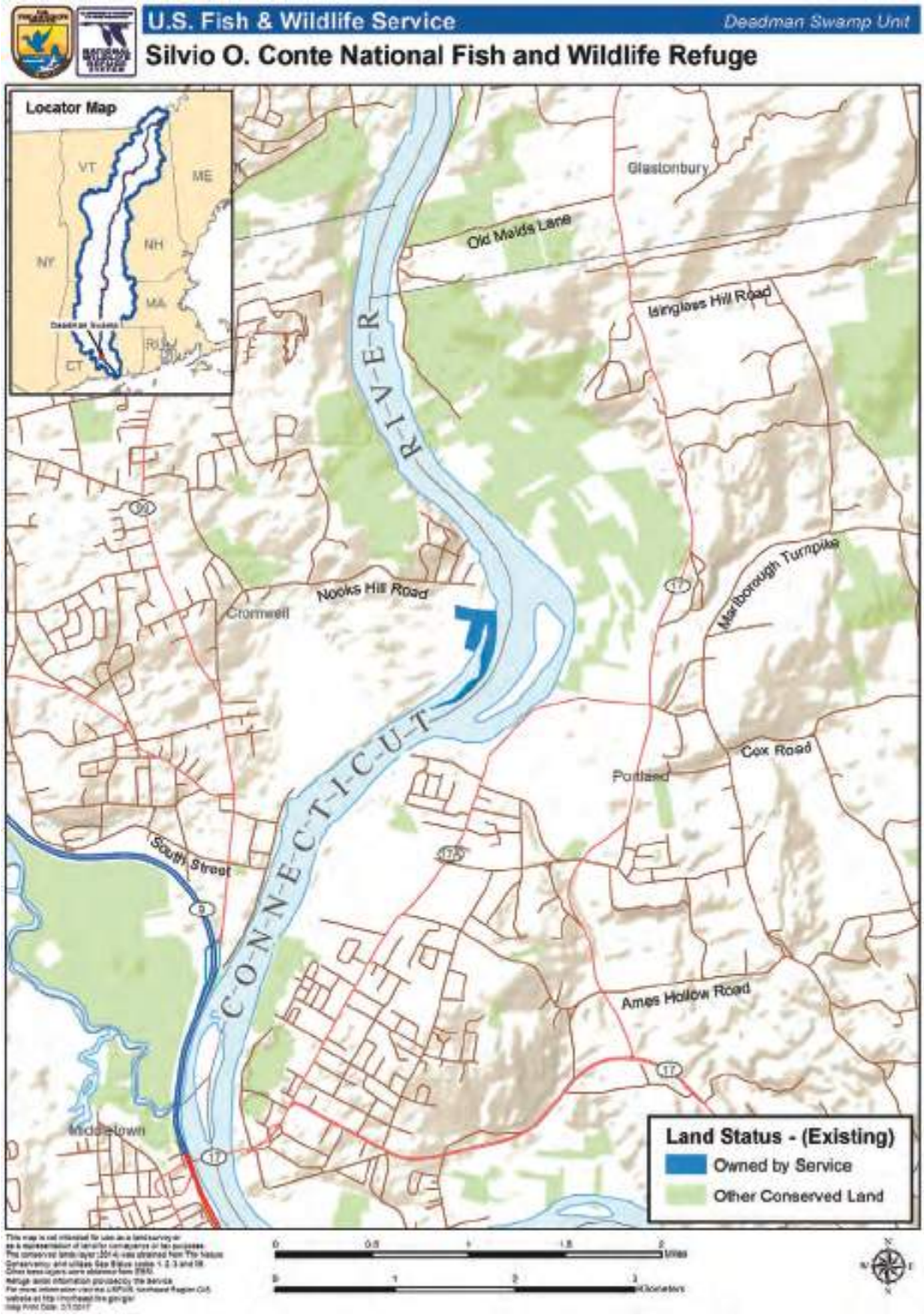
What public use opportunities will occur on refuge lands within the unit?

The Deadman Swamp Unit is closed to the public to protect the federally threatened Puritan tiger beetle.

Does the unit have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

As mentioned above, the Deadman Swamp Unit supports the federally threatened Puritan tiger beetle.

Map A.23. Deadman Swamp Unit – Location.



Map A.24. Deadman Swamp Unit – Habitat Types.

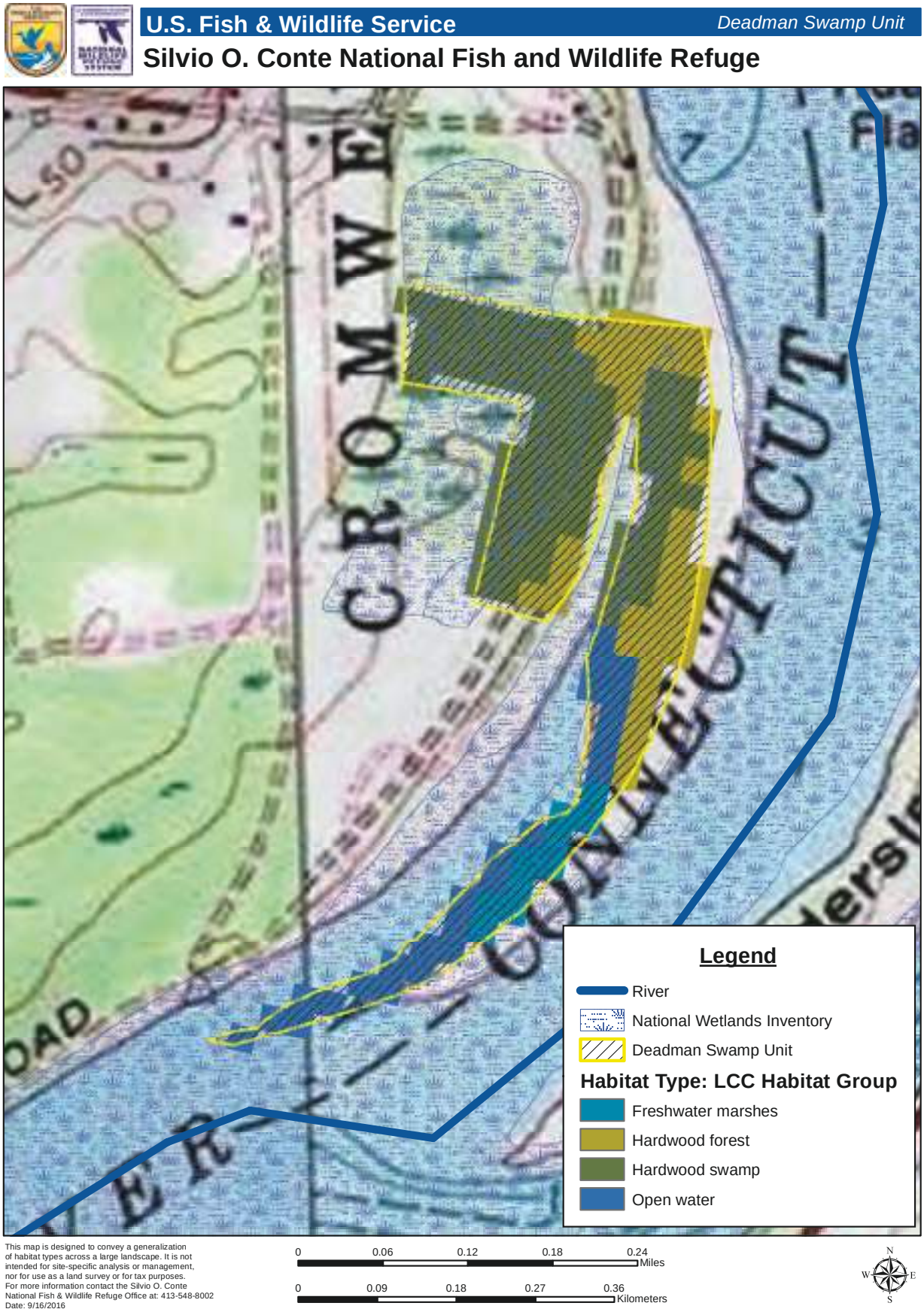


Table A.16. Deadman Swamp Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	8	25.5%
Hardwood swamp	15	49.6%
Forested uplands and wetlands subtotal	*23*	*75.2%*
Non-forested Uplands and Wetlands[2]		
Freshwater marshes	2	7.3%
Non-forested uplands and wetlands subtotal	*2*	*7.3%*
Inland aquatic habitats[2]		
Open Water	5	17.5%
Inland aquatic habitats subtotal	*5*	*17.5%*
TOTAL	**30**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies.

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Deadman Swamp Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Deadman Swamp's small size and isolation from other refuge units, has led us to aggregate our objectives and discussion under a single sub-objective that addresses the Unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. The Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Deadman Swamp Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats, by virtue of refuge land ownership, represent small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and provide additional structural and species diversity to the matrix. A riverine sand spit along the Connecticut River main stem or a central hardwood swamp, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna — providing sand and clay deposits for larval Puritan tiger beetles, or quaking swamps for secretive bird species. One could make the case that these habitats are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context.

Some habitats within the Unit will be managed under a fine filter approach — primarily those areas where the Federally-listed Puritan tiger beetle has been documented. USFWS policy requires species-specific management efforts in the case of rare, threatened, or endangered species (see sub-objective 1.3a).

Combining coarse and fine-scale conservation efforts under the rubric of BIDEH will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually, and more targeted strategies for those rare, threatened, or endangered species like the Puritan tiger beetle. Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 3 years of CCP approval

- Work with partners to develop and begin implementation of actions to conserve the existing Puritan tiger beetle metapopulation that includes the Deadman Swamp Unit. This should include identifying potentially suitable sandy beach habitat, land protection options for suitable habitats, actions that will contribute to recovery, and management of Service lands to complement tiger beetle recovery efforts.

Within 5 years of CCP approval:

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories

- Map natural communities; protect rare or exemplary examples

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water and River Shore)
In collaboration with partners, identify and implement habitat restoration opportunities to provide sparsely vegetated or open sandy beaches for Puritan tiger beetles.

Rationale:
The Puritan tiger beetle was listed as threatened by the U.S. Fish and Wildlife Service on August 7, 1990 due to declining range and threats from habitat loss and degradation. There are two metapopulations, one on the Chesapeake Bay in Maryland and the other in New England. The recovery of the New England population requires at least three metapopulations, two of which must be large (i.e. 500 to 1,000+ adults) (USFWS 1993). Currently, there is a single metapopulation in Cromwell, Connecticut that meets this criterion occupying four satellite sites; three of which are privately owned and not protected. The fourth site was purchased by the Service in 2005 as the Deadman's Swamp Unit of the Conte Refuge.

This metapopulation has been monitored by CT DEEP since 1991 and appears to be stable, but has not expanded. A site visit with partners in 2011, determined that vegetation and silt are impacting tiger beetle populations on the southern portion of the Unit, and very few adults have been observed. Removal of this vegetation will be necessary to provide appropriate tiger beetle habitat.

The Service contracted surveys in Connecticut to evaluate potentially suitable habitat for reintroductions (Kapitulik 2009). Of the surveyed sites, Higganum Meadows and Windsor Islands, both owned by the state are considered suitable for reintroduction. These sites, along with proven larval translocation protocols, offer an opportunity to establish two additional metapopulations as required by Recovery Criterion 3 (USFWS 1993). We will continue to work with partners to manage habitats to maintain and increase tiger beetles at the Cromwell location and take steps to establish two additional Connecticut metapopulations.

Management Strategies:
Continue to:

- Work with partners to manage beach habitats to benefit Puritan tiger beetles which includes hand-pulling or herbicide application to encroaching vegetation in Puritan tiger beetle larval habitat.
- Continue to support Puritan tiger beetle research opportunities.

Inventory and Monitoring Strategies:
Continue to:

- Work with partners to monitor Puritan tiger beetle populations.
- Work with partners to educate the general public about recreational use impacts on Puritan tiger beetle populations using outreach, visitor contact, restricted access and other tools, as warranted.
- Partner with CT DEEP and other partners to establish two additional metapopulations as called for in the Recovery Plan.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

This goal is not applicable to this unit because it is closed to all public access, except by special use permit, to protect the federally threatened Puritan tiger beetle.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

This goal is not applicable to this unit because it is closed to all public access, except by special use permit, to protect the federally threatened Puritan tiger beetle.

Roger Tory Peterson Unit (Existing Refuge Unit)

Old Lyme, Connecticut

Total Unit Acres[1]	56

[1]Actual surveyed acres.

What are the priority habitat types within the unit? What percentage of the total unit acreage do they represent?

- Hardwood forest – 89%
- Salt marsh – 3%

For more information on the unit's location and habitats, see map A.25, map A.26, and table A.17.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Roger Tory Peterson Unit is in close proximity to the Connecticut River, and though small in acreage, the forest and wetlands are important stopover habitat for land birds.

What habitat management activities will be a priority on the unit?

- We will prioritize control of invasive plants to maintain native diversity.

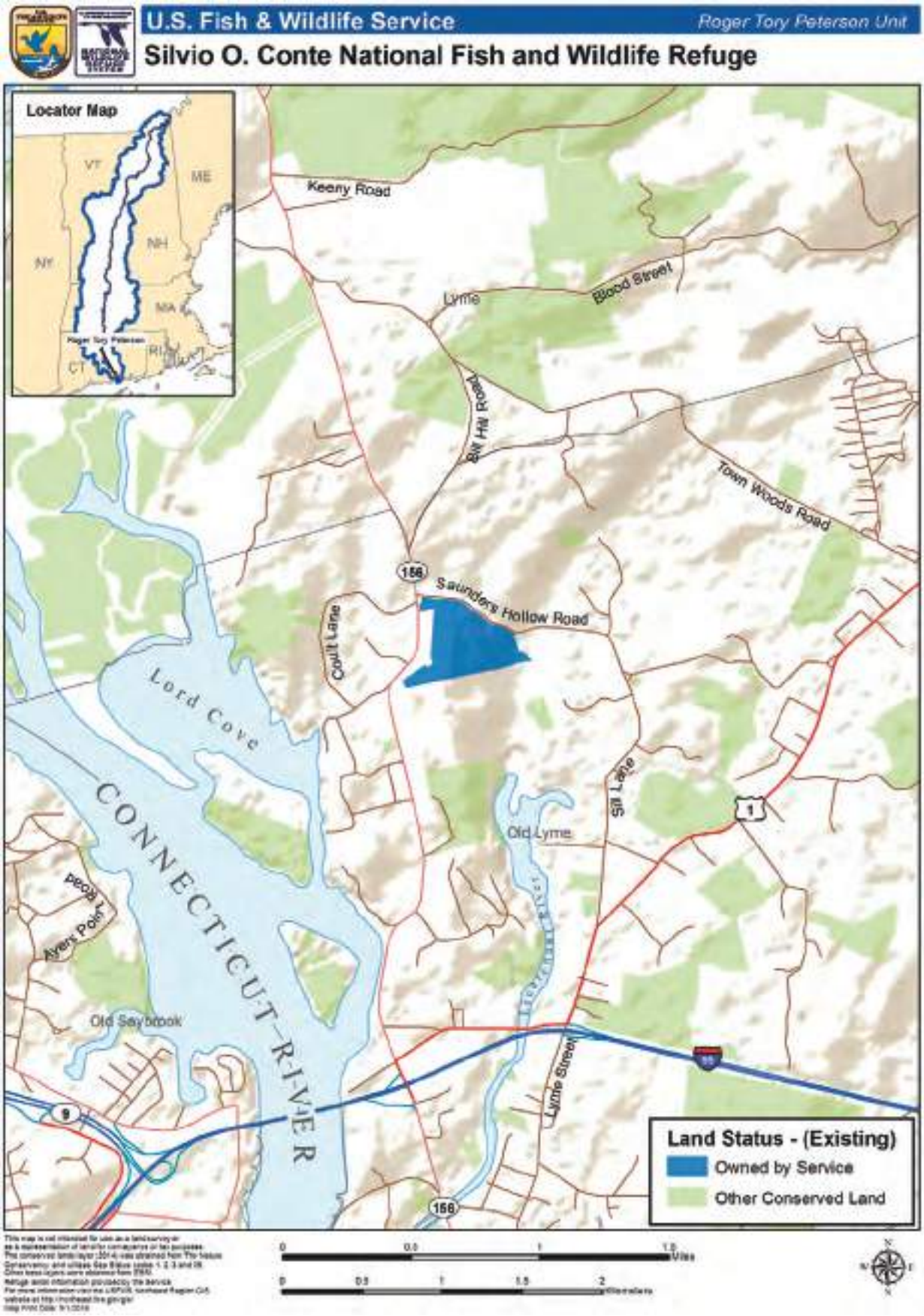
What public use opportunities will be a priority on the unit?

The main focus our visitor services program at this unit will be interpretation and wildlife observation and photography. We will work with partners to develop interpretive materials about Roger Tory Peterson and his importance as a naturalist, educator, ornithologist, and wildlife artist. We also plan to construct an ADA-accessible nature trail on the unit.

Does the unit have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

The unit contains a small house that served as Roger Tory Peterson's office and an adjacent small garage. Peterson was a renowned naturalist, ornithologist, artist, and educator, best known for his series of successful nature field guides.

Map A.25. Roger Tory Peterson Unit – Location.



Map A.26. Roger Tory Peterson Unit – Habitat Types.

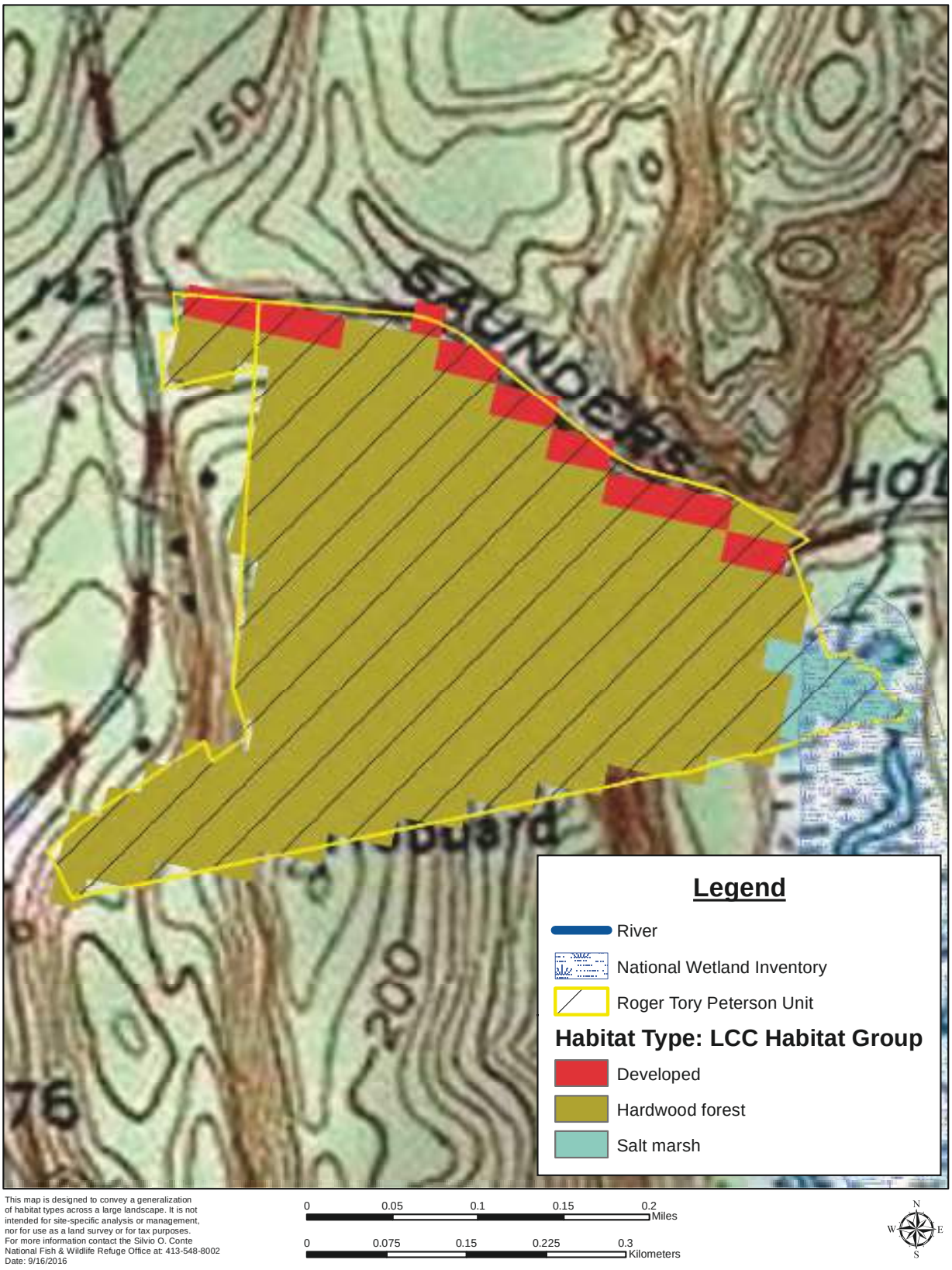


Table A.17. Roger Tory Peterson Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested uplands and wetlands[2]		
Hardwood forest	50	89.3%
Forested uplands and wetlands subtotal	*50*	*89.3%*
Coastal wetlands and aquatic habitats[2]		
Salt marsh	2	3.6%
Coastal wetlands and aquatic habitats subtotal	*2*	*3.6%*
Other		
Developed	4	7.1%
Other subtotal	*4*	*7.1%*
TOTAL	56	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies.

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Roger Tory Peterson Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Roger Tory Peterson Unit's small size and isolation from other refuge units has led us to aggregate our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. The Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Roger Tory Peterson where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Salt marsh and rocky outcrops, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or tidal waters that support brackish grasses and plants. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. The same is true when the refuge may own a limited example of a larger ecosystem, as in the case of the salt marsh within the Unit. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the unit is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Work with partners, including the State of Connecticut, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Monitor impacts to sensitive habitats from the introduction of trail users.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Provide support to the Friends group who will act as a resource to communities, school systems, public and non-profit organizations, and private educational organizations in Connecticut, who want to use the Peterson Unit as an outdoor environmental education classroom.

Rationale:
The 56-acre Peterson Unit was once owned by renowned naturalist, Roger Tory Peterson. Located in Old Lyme, Connecticut, the site offers visitors a chance to see hardwood forests mixed with riparian wetlands along the western boundary of the Lieutenant River. Located on the property is a small house, the York House, used by Roger Tory Peterson as an office. The forming Friends group, and local residents would like to see this site developed into a small visitor contact station to interpret the life and work of Roger Tory Peterson, as well as the larger Conte Refuge. The refuge supports this vision.

Environmental education is an important tool that can be used to spread the refuge message to private residents throughout the watershed, including to residents surrounding the Peterson Unit in Connecticut. The Peterson Unit has a small house on it, the York House, which was once used by Roger Tory Peterson as an office. This facility will be able to host students from the surrounding area participating in environmental education and educate them not only about refuge purposes, but also about the work of Roger Tory Peterson, a great naturalist. Because the Peterson Unit does not have full time visitor services staff, most environmental education efforts will be conducted through volunteers, Friends members, and partners.

Management Strategies:
Within 5 years of CCP approval:

- Develop a cadre of volunteers and partners that can lead educational visits from local schools.
- Promote the Peterson Unit as a destination for field trips and increase the number of students by two percent per year for the next 5 years.
- Develop educational partnerships with at least one local school to use the unit as an outdoor classroom emphasizing migratory birds, the Peterson legacy, hardwood forests, and riparian areas.
- Encourage partners to develop an evaluation system to measure the effectiveness of environmental education programs.
- Encourage and support Friends group to work with local schools to develop experiential learning programs focusing on hardwood forests, riparian wetlands, the Peterson legacy, and migratory birds that contribute to Connecticut curriculum standards.
- Make environmental education training available to volunteers and Friends group members.

Within 10 years of CCP approval:

- Offer the Peterson Unit as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Promote other government agencies, non-profit organizations, private educational organizations, staff, volunteers, and members of the Friends of Peterson to offer high quality EE programs at the Peterson Unit.

Rationale:
See rationale for sub-objective 2.1a.

Management Strategies:
Within 5 years of CCP approval:

- Work through volunteers and members of Friends group to facilitate teachers and students at the Peterson Unit.
- Work with local environmental education providers to implement the refuge's Adopt-a-Habitat initiative to help individuals learn about and connect with their local environments;
- Work with Friends of Conte Recreation and Education sub-committee to support and recruit partners that seek funding for watershed-based environmental education.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
Encourage and support Friends group to work with communities, public and non-profit organizations, staff, and volunteers to offer quality interpretive programming at the Peterson Unit. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. The Peterson Unit will provide ample opportunities to not only interpret the refuge but to also interpret the great work of the world renowned naturalist Roger Tory Peterson. The York House which served as Dr. Peterson's office will offer visitors a glimpse of his work life. In addition, the habitats and wildlife that inhabit the land at the Peterson Unit will be the basis for many important stories to deliver to visitors from near and far.

Management Strategies:
Within 5 years of CCP approval:

- Develop more detailed interpretive objectives and strategies as part of a Visitor Services Plan.
- Coordinate with state to provide resources and trainings to Friends, and volunteers in support of interpretive programs.
- Collaborate with the Friends group and volunteers to create meaningful, consistent, thematic statements to be used in the delivery of programming at the Peterson Unit.
- Work with Friends group and other partners to employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, print and social media, signs, and exhibits) when creating programming for natural and cultural resource interpretation.

Within 10 years of CCP approval:

- Develop self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.

Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Through Friends group and other partners, annually provide quality interpretive programs, exhibits, and printed media at the Peterson Unit.
- Initiate a "refuge host" program, or utilize SCA interns and volunteers to provide personal contacts at the visitor contact station to initiate discussion and answer questions.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.

- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.

Within 10 years of CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Although the Peterson Unit is unstaffed there may be opportunities to use the York House and a future trail for interpretation and events that honor his life and work.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Peterson Unit is unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

This objective is not applicable because the Roger Tory Peterson Unit is a 56-acre parcel in a rural portion of the town of Old Lyme. Hunting on this unit will not be permitted because it was not previously allowed, the adjacent landowners do not allow hunting, and it is in close proximity to houses.

Objective 3.2: Fishing

This objective is not applicable because the Roger Tory Peterson Unit is a 56-acre parcel in a rural portion of the town of Old Lyme without suitable fishing opportunities. The Lieutenant River forms part of the eastern boundary; however, the riparian area is comprised of dense, tall vegetation that makes it virtually inaccessible from the refuge.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Roger Tory Peterson Unit.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in this part of the state. Currently, there is no infrastructure in place at this unit to support this use, and consequently, visitation for wildlife viewing and photography is limited. Allowing people to engage in wildlife observation and photography is in keeping with the legacy of Roger Tory Peterson and the nature of the area.

Management Strategies:
Within 1 year of CCP approval:

- Consistent with the final compatibility determination, allow public access at the unit daily from 30 minutes before sunrise to 30 minutes after sunset.
- Add information on the unit to the refuge website.

Within 10 years of CCP approval:

- Develop a public access strategy following required administrative processes (e.g., additional NEPA, compatibility determinations) that includes consideration of trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of CCP approval:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the unit.

Rationale:
The entire unit will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance their time on the unit. Visitation increases are expected as this unit becomes better known and because of its connection to the Roger Tory Peterson legacy. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of CCP approval:

- Add information on the unit to the refuge website.

Within 5 years of CCP approval:

- Produce a wildlife and plant species guide for the Roger Tory Peterson Unit that will be available on the refuge website, at the refuge headquarters.
- Install an informational kiosk in a conspicuous location to post information and notices to visitors.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Roger Tory Peterson Unit that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the unit without detrimentally impacting the wildlife resource.

Management Strategies:
Within 1 year of CCP approval:

- Allow dispersed hiking and snowshoeing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- Work with partners to determine whether a virtual geocache course at the unit is acceptable on the conserved property. The course should integrate orienteering with refuge interpretive messages that include linking this unit to other refuge divisions and units.

Maddie List/USFWS

Holyoke Range from the Fort River Division, Massachusetts

State of Massachusetts

- **Dead Branch Conservation Focus Area (Existing Refuge Division)**
- **Fort River Conservation Focus Area (Existing Refuge Division)**
- **Mill River Conservation Focus Area (Existing Refuge Division)**
- **Westfield River Conservation Focus Area (Existing Refuge Division)**
- **Fannie Stebbins Unit (Existing Refuge Unit)**
- **Great Falls Discovery Center, Massachusetts (Existing Partner Facility)**
- **Hatfield Unit (Existing Refuge Unit)**
- **Honeypot Road Wetlands Unit (Existing Refuge Unit)**
- **Mount Toby Unit (Existing Refuge Unit)**
- **Mount Tom Unit (Existing Refuge Unit)**
- **Third Island Unit (Existing Refuge Unit)**
- **Wissatinnewag Unit (Existing Refuge Unit)**

Dead Branch Conservation Focus Area (Existing Refuge Division)

Chesterfield, Westhampton, and Huntington, Massachusetts

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	5,186	74%
■ *Existing Refuge Ownership in CFA*[1]	*98*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*5,088*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	1,812	26%
Total Acres in CFA[2,4]	6,998	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Westfield River CPA (map A.27) encompasses the Dead Branch CFA (map A.28) which is an existing division established in 2011. The Dead Branch CFA is part of an area identified by the State of Massachusetts as a priority for conservation. It will offer the opportunity to conserve and restore forested habitat and protect small dispersed wetlands. It will also help conserve lands along a high-quality segment of the Westfield River that supports cold-water fisheries, such as eastern brook trout. The CFA is located in an area with an extensive conserved lands network, including the Peru, Middlefield, and October Mountain State Parks, several TNC lands (e.g., Westfield River Highlands), Hinsdale Flats, Fox Den, Peru, and Walnut Hill Wildlife Management Areas, and other privately conserved lands. Most of the Dead Branch CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional land protection by the Service in this area will help better connect these conserved lands.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 88.4%
- Freshwater Marsh – 1.0%
- Shrub swamp and floodplain forest – 1.5%

For more information on habitats in the CFA, see map A.29 and table A.18.

What are the resources of conservation concern for the CFA?

As noted in table A.19 below, there are eight priority refuge resources of concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity, Diversity, and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN), wetland dependent species and forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem. Migrants become more evenly distributed in watershed habitats beyond the Connecticut River main stem (Smith College 2006). The Dead Branch CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat for a diversity of bird species as well.

   The Dead Branch CFA is within the East Branch of the Westfield River Watershed which provides a contiguous core of mostly undeveloped forested acres. The Dead Branch CFA provides a diversity and mosaic of habitats including large patches of emergent and shrub wetlands. These habitats are important for breeding landbirds and waterbirds including those that are a priority for conservation. The priority refuge resources of concern for the Dead Branch CFA include blackburnian warbler, wood thrush, chestnut-sided warbler, Canada warbler, and American woodcock. This CFA is in the core range for these species, and many other species of conservation concern including black-throated blue warbler, black-throated green warbler, veery, purple finch and broad-winged hawk. The wetlands in the CFA support nesting and migrating American bittern, a state SGCN, and great blue heron.

3. **Waterfowl**
   The Dead Branch CFA wetland and riparian habitats provide potential breeding and foraging areas for American black duck, a PRRC species, as well as green-winged teal, common merganser, wood duck, and mallard.

4. **Diadromous fish and other aquatic species**
   The Dead Branch is an important cold-water tributary of the East Branch Westfield River. This tributary provides important cold water habitat for brook trout and Atlantic salmon. These species are PRRC, SGCN and a conservation concern for the Service's Northeast Region. Other cold aquatic species that occur within this watershed include slimy sculpin, lake chub, and many species of invertebrates, including the State rare riffle snaketail dragonfly.

5. **Wetlands**
   The Dead Branch CFA contains 187 acres of hardwood swamp, 113 acres shrub-swamp, and floodplain forest, and 75 acres of freshwater marsh. Many of these wetlands occur along slow-moving streams or small ponds, and are extensive beaver-controlled wetlands that support abundant odonates (dragonflies and damselflies), amphibians, waterfowl, and waterbirds. Habitat patches range from 2 acres to over 100 acres in size.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse and appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- In open water (stream, rivers, ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, environmental education, and interpretation. Map A.30 below depicts the snowmobile trail that crosses the refuge.

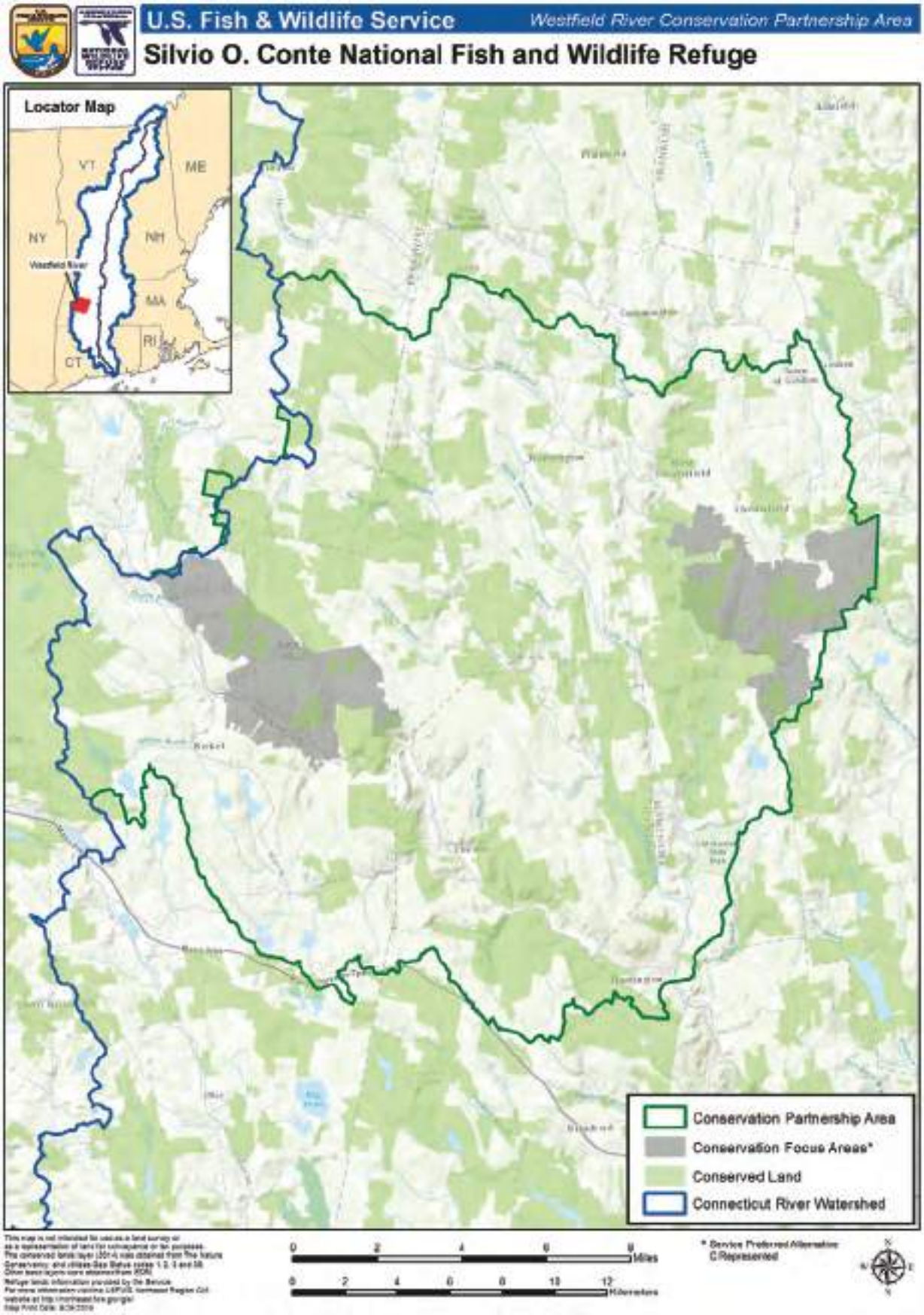
Were there other special considerations in delineating the CFA boundary?

The Westfield River Watershed has been recognized by The Nature Conservancy, the State of Massachusetts and the National Wild and Scenic Rivers program as one of the most intact river systems in Massachusetts and one of the healthiest tributaries to the Connecticut River. The watershed is currently over 80% forested and only 4% developed, remarkable for southern New England.

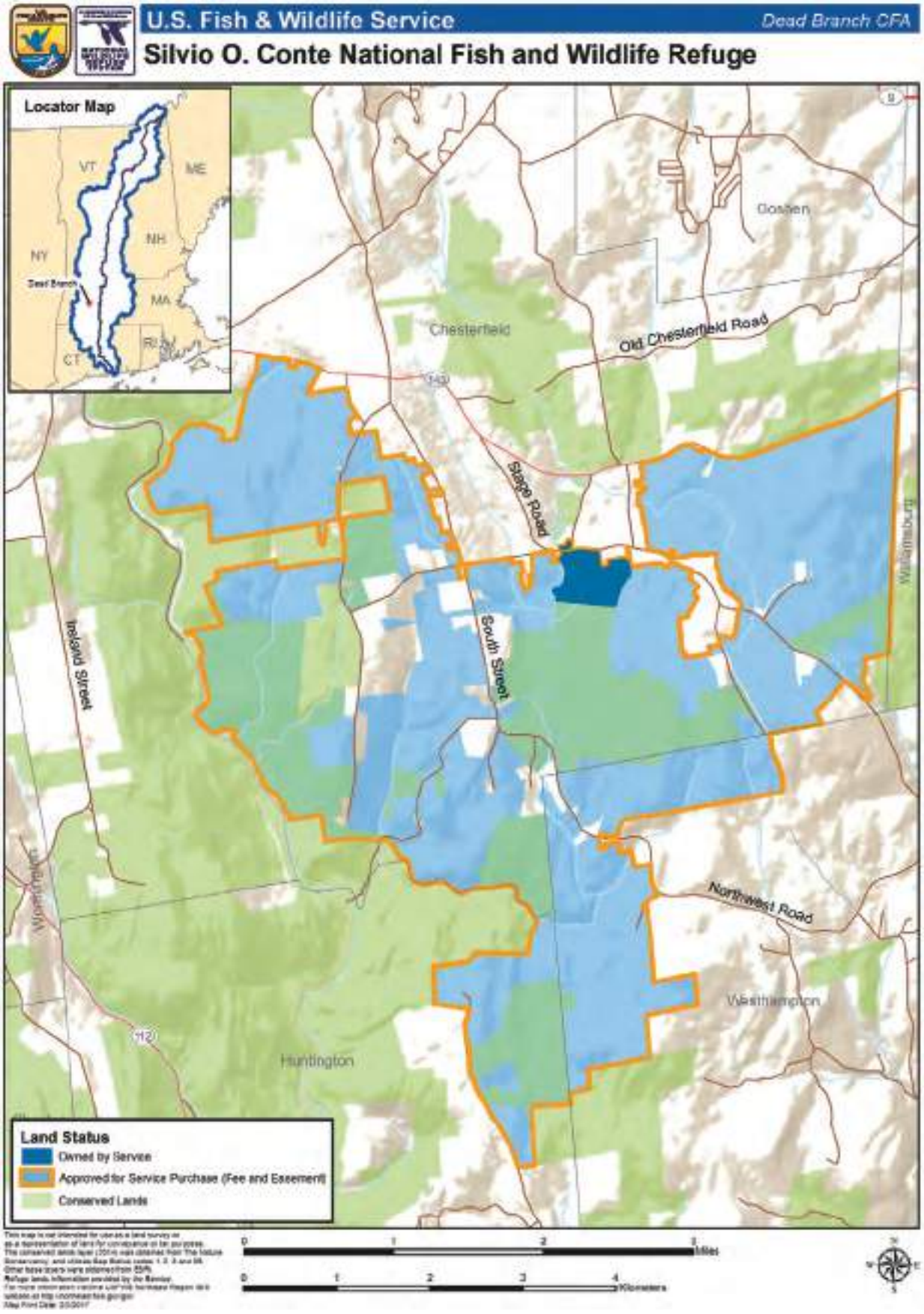
The migratory fish runs of the Westfield River are a subject of ongoing research by Conte Anadromous Fish Research Laboratory, and the Westfield is used as a "quality river" reference for Target Fish Community analyses in other large river systems. Westfield State University uses the rivers and forests as an outdoor laboratory for study of physical and biological sciences and environmental education.

The East Branch of Westfield River/Westhampton area is striking in its beauty and offers access for recreation compatible with the protection of the significant natural resources it supports. Such uses include hiking, birding and wildlife observation, catch-and-release fly fishing between Chesterfield Gorge and the Knightville dam, whitewater and flatwater paddling, photography, snowshoeing, cross-country skiing, and environmental education.

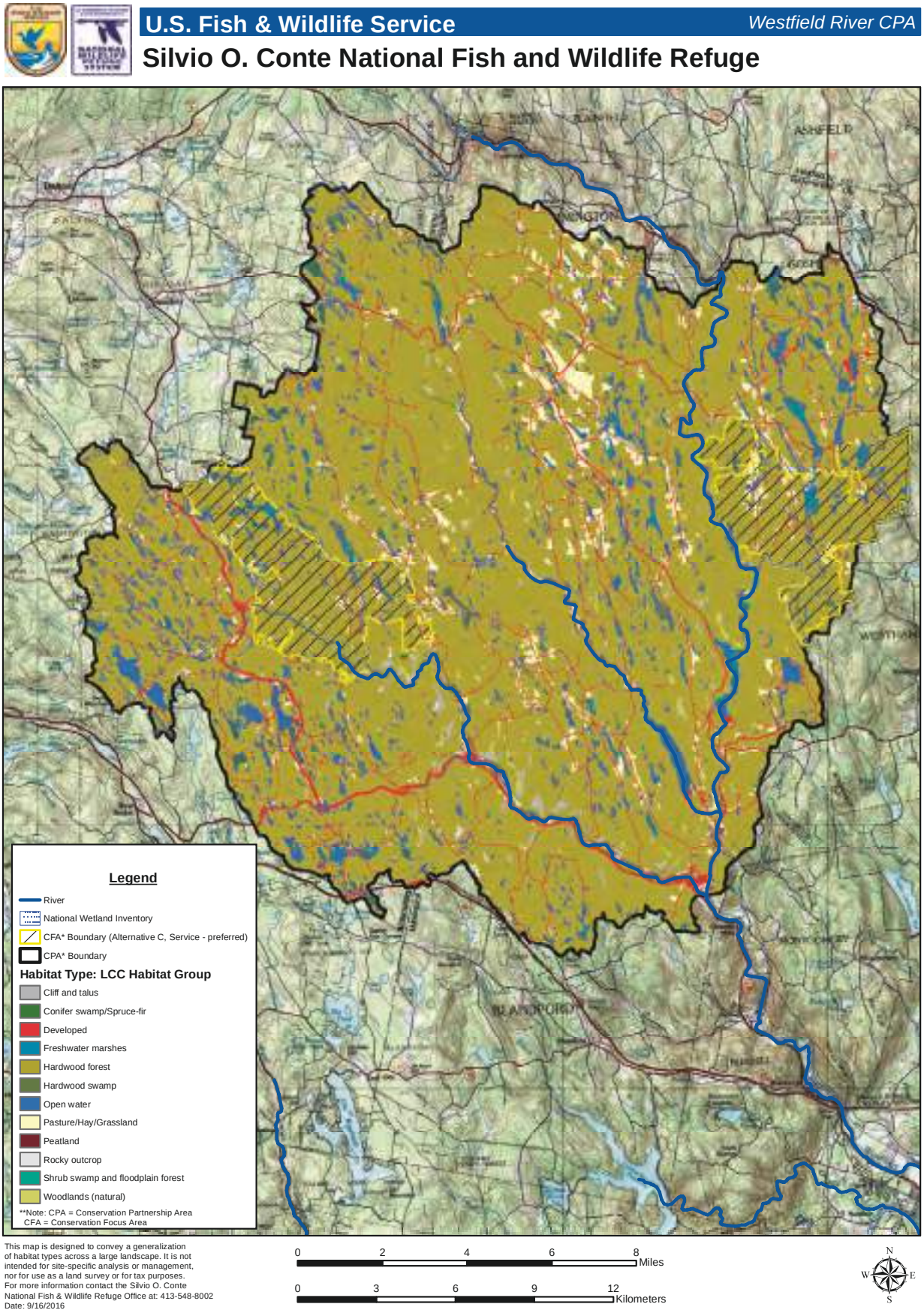
Map A.27. Westfield River CPA.



Map A.28. Dead Branch CFA – Location.



Map A.29. Westfield River CPA – Habitat Types (includes the Dead Branch CFA).



Map A.30. Snowmobiling at Dead Branch CFA.

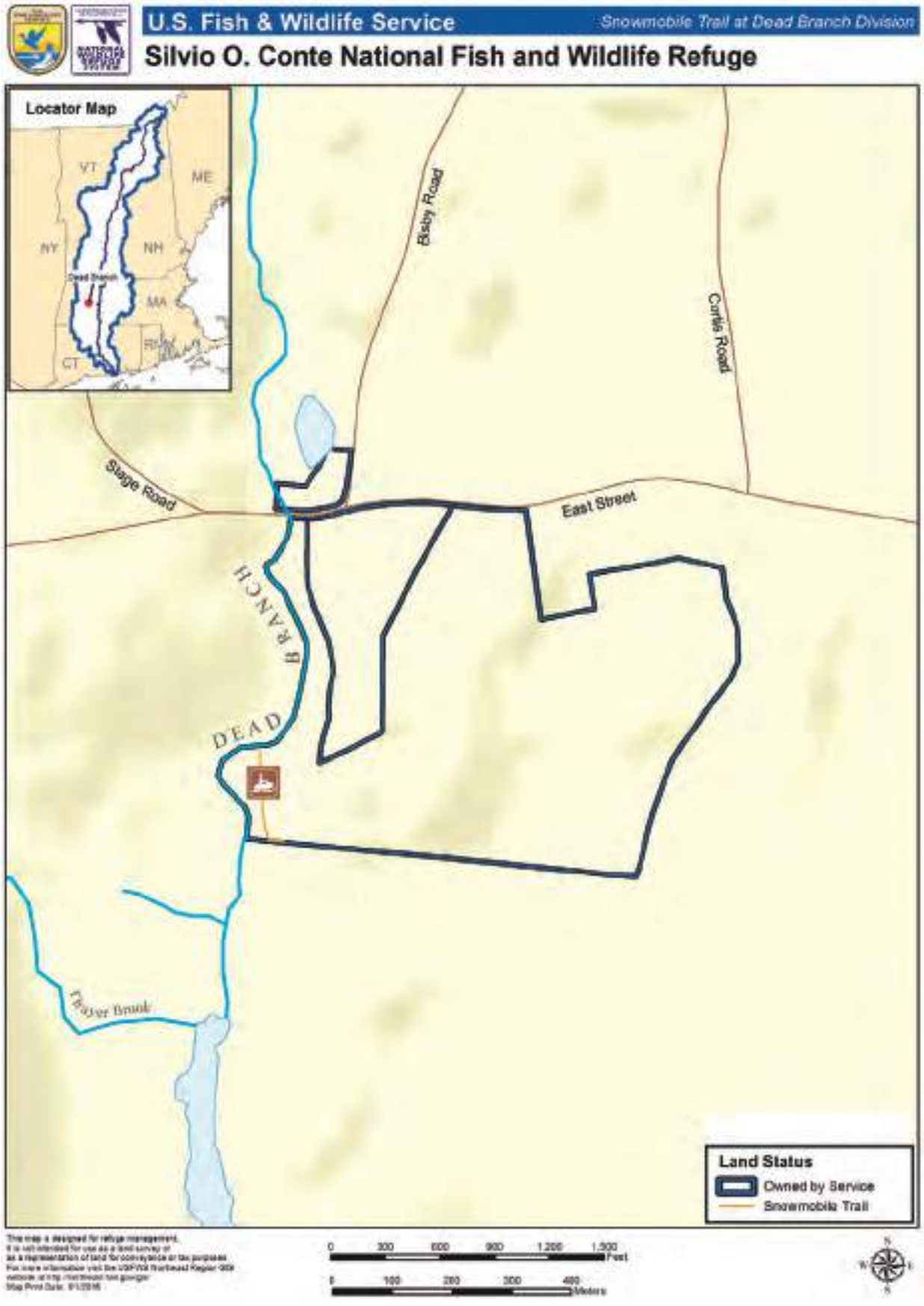


Table A.18. Westfield River CPA/Dead Branch CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	1,710	1.1%	-	-	-	0.0%	0.0%
Hardwood forest	127,135	85.3%	6,774	1,772	85	88.3%	5.3%
Hardwood swamp	2,445	1.6%	186	50	-	2.4%	7.6%
Shrub swamp and floodplain forest	1,018	0.7%	112	63	-	1.5%	11.0%
Woodlands (natural)	562	0.4%	5	5	-	0.1%	0.8%
Forested uplands and wetlands subtotal	*132,871*	*89.1%*	*7,077*	*1,891*	*85*	*92.2%*	*5.3%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	775	0.5%	5	3	-	0.1%	0.6%
Freshwater marshes	676	0.5%	75	34	1	1.0%	11.1%
Pasture/hay/grassland	6,224	4.2%	337	94	6	4.4%	5.4%
Peatland	4	0.0%	-	-	-	0.0%	0.0%
Rocky outcrop	256	0.2%	-	-	-	0.0%	0.0%
Non-forested uplands and wetlands subtotal	*7,935*	*5.3%*	*417*	*132*	*7*	*5.4%*	*5.3%*
Inland aquatic habitats[9]							
Open Water	1,547	1.0%	16	10	-	0.2%	1.0%
Inland aquatic habitats subtotal	*1,547*	*1.0%*	*16*	*10*	-	*0.2%*	*1.0%*

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Other							
Developed	6,751	4.5%	163	19	3	2.1%	2.4%
Other subtotal	*6,751*	*4.5%*	*163*	*19*	*3*	*2.1%*	*2.4%*
TOTAL[10]	**149,103**	**100.0%**	**7,673**	**2,052**	**95**	**100.0%**	**5.1%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.19. Westfield River CPA/Dead Branch CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 6,773 acres		
Wood Thrush[A,B,C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Black-billed Cuckoo[A,J] Broad-winged hawk[I,J] Purple Finch[A] Northern Flicker[A, J] Ruffed Grouse[A, I] Whip-poor-will[A, I, J] Black-throated Blue Warbler[A] **Louisiana Waterthrush**[I] Brown Thrasher[I] **Ovenbird**[A] **Eastern Red Bat**[I] American Redstart[A, J] Veery[A] Little Brown Bat[I] Sharp-shinned Hawk[J] Yellow-bellied Sapsucker[A,J] Black Racer[I] Tricolored Bat[I] Little Brown Bat[I] Bobcat[I] Jefferson Salamander[I,J] Moose[I] Black Bear[I] Rose-breasted Grosbeak[A]
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	
Chestnut-sided Warbler[A, B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Hardwood Swamp[5] - 187 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	**Northern Waterthrush** Red-shouldered Hawk[J] Rose-breasted Grosbeak[J] Veery[A,J] White-eyed Vireo[J] Northern Parula[A,I] Wood Duck[J]
Shrub Swamp and Floodplain Forest[5] - 113 acres		
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands, and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	Chestnut-sided Warbler[A,B] Ruffed Grouse[A, I] Eastern Ribbon Snake[I] **Warbling Vireo** **Spotted Turtle**[I] American Redstart[A, J] Eastern Kingbird[J] Gray Catbird[J] Eastern Towhee[I] White-throated Sparrow[I] **Willow Flycatcher** Black Racer[I] Wood Duck[J] **Wood Turtle**[I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	
Woodlands (natural)[5] - 5 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Cliff and Talus[5] - 5 acres		
North-central Appalachian acidic cliff and talus[H] North-central Appalachian circumneutral cliff and talus[H]	The *North Central Appalachian acidic cliff and talus system* comprises sparsely vegetated to partially wooded cliffs. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. Vegetation in seepage areas tends to be comparatively well-developed and different from the surrounding dry cliffs. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places. Eastern red cedar is a characteristic tree species, poison ivy a characteristic woody vine, and common polypody a characteristic fern. Substrates within the *circumneutral cliff and talus system* include limestone, dolomite and other rocks. The vegetation varies from sparse to patches of small trees, in places forming woodland or even forest vegetation. Ash, basswood, and American bladdernut are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., yellow jewelweed, purple cliffbrake, ebony spleenwort, or bluntlobe cliff fern. (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Freshwater Marshes[5] - 75 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**Marsh Wren** **American Bittern**[A,I] Northern Harrier[A,I,J] Spotted Turtle[I] Bridle Shiner[I] Northern Leopard Frog[I] Spatterdock Darner[I] Wood Turtle[I] Canada Goose[A,J] Wood Duck[J]
Pasture/Hay/Grassland[5] – 337 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[I,J] Northern Harrier[A,I,J] **Bobolink**[A,I] **Eastern Meadowlark**[I] **Grasshopper Sparrow**[I] Black Racer[I] White-throated Sparrow[I] American Kestrel[I] Northern Leopard Frog[I] Prairie Warbler[I]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Open Water[5] – 14 acres		
Brook Trout[B,F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/ streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Longnose Sucker[I] Bridle Shiner[I] **Slimy Sculpin**[I] Creek Chubsucker[I] Longnose Dace[I] Riffle Snaketail[I] **Spring Salamander** Lake Chub[I] Wood Turtle[I]
Atlantic Salmon[B,F,G]	Spawn in cold freshwater moving streams w/coarse clean gravel and adequate food/ cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 Massachusetts Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Dead Branch CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, American woodcock, chestnut-sided warbler, Canada warbler, blackburnian warbler, and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
We envision healthy forests within the Dead Branch CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Massachusetts wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Dead Branch CFA hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is certainly available within the CFA. To date, our review of the Dead Branch CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Dead Branch comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Dead Branch are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Dead Branch will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like refuge priority species of concern American woodcock, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, eastern red bat, and—if wetlands and riparian areas are present—Canada warbler (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Dead Branch's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0 to 5 feet in height) are of particular importance to species like Canada warbler. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who dwell in the upper canopies of conifers, and are thought to be strongly associated with the hemlock forests within Dead Branch. Blackburnian warblers have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and—where softwood inclusions are abundant—blackburnian warbler. Our efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney and Waller 2003, Côté et al. 2004, see also Rawinski 2008).

Management to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy— provide special habitats that are utilized by species like the northern goshawk. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure and/or composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Identify forest stands where soils and species composition will support woodcock management.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible. In particular:

  ✓ Conduct a thorough inventory of invasive plants.

  ✓ Prevent garlic mustard from spreading and evaluate the threat of multiflora rose to important habitats.

  ✓ Collaborate with partners within the Westfield River Watershed Invasive Species Partnership (WISP) to strategically prevent and manage invasive species within the watershed, including on refuge land.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.

- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.

- Map natural communities; protect rare or exemplary examples.

- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for priority refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the Dead Branch CFA, hardwood swamps have undergone significant alteration and have great potential for restoration. This habitat type is often in basins, or on gently sloping seepage lowlands. Examples of this forest type may be found in small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the watertable and the nutrient-poor soils drive complexes of forest upland and wetland species including eastern hemlock, red maple, and black gum. Within the Connecticut River watershed, including the CFA, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions and soil compaction remain as threats.

Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Dead Branch will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Many species of conservation concern use forested swamps, including northern parula, willow flycatcher, white-eyed vireo, and rose-breasted grosbeak. Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert and Faccio 2005, Reitsma et al.

2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well-developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Hardwood swamps in the Dead Branch CFA are within a matrix of contiguous forest, where fragmentation is not currently a concern. Hardwood swamp patches of 10 acres or greater are thought to provide suitable breeding habitat for Canada warbler in the Dead Branch CFA, and allow monitoring of population response to management actions (Dettmers personal communication 2013).

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites. Hardwood swamp stands with relatively large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American woodcock and American black duck.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

American woodcock are dependent on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat

conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

Management of the shrub swamp communities may be required to maintain shrub dominance and stem densities. Tree species, such as red maple, tend to replace mature shrub species and established invasive plants compete for nutrients and space. These invading species require management in order to maintain the native shrub diversity of the community. A high shrub stem density is also important as it provides birds with cover from predators and more leaf surface area for gleaning. Cover for American woodcock, for example, is ideal in a 10-15 year old shrub swamp (USDA 2001). Shrub species, in particular alder, tend to die back as they reach maturity, and as a result stem density decreases. Periodic rejuvenation of shrubs is necessary to maintain required stem densities. Management priority will be given to shrub swamps that are part of a woodcock management area. Management of these shrub swamps will benefit other species that use these communities, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season, and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests in the vicinity of foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Survey wildlife utilization of existing wetlands.
- Map natural communities; protect rare or exemplary examples.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such

as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Dead Branch CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily and narrow-leaved cattail (Gawler 2008). Our coarse-scale habitat analysis of this CFA identifies freshwater marsh habitat as part of a larger wetland complex along the Dead Branch and within Dead Swamp.

This particular wetland complex is adjacent to a slow moving stream, and open water, providing foraging, and potentially breeding habitat for American black duck, and other waterfowl species. Black ducks use wetlands such as these for breeding and foraging habitat. Well-concealed nests are placed on the ground in adjacent uplands or hummocks within the wetland. Adults and their broods feed on seeds and herbaceous vegetation, including sedges, rushes, and submerged aquatic vegetation, as well as invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for American black duck.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Evaluate wetland hydrology for impacts to natural flow regimes.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Inventory wetland plant communities.
- Survey wildlife use of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat for grassland birds and pollinators, if present and appropriate.

Rationale:
Over four percent of the Dead Branch CFA is pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow, as well as pollinator species. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow. American woodcock, a refuge priority resource of concern, will use both habitat conditions when managed in conjunction with their other habitat needs.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population

breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches, or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Shrubland and grassland habitats will also be used by American woodcock, which require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Small clearings with minimal vegetation is required for courtship areas, and shrublands with clumps of tall vegetation or sparse shrubs will provide roosting habitat.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, and grassland acres can provide quality habitat, for these species, and American woodcock, if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed."

Rationale:
See the rationale for sub-objective 1.1d.

Habitats that occur within the Dead Branch CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout and Atlantic salmon.

Rationale:
The Dead Branch CFA is located in the Westfield River watershed, which has been recognized by The Nature Conservancy, the State of Massachusetts and the National Wild and Scenic Rivers program as one of the most intact river systems in Massachusetts and one of the healthiest tributaries to the Connecticut River. The Dead Branch is an important cold-water tributary of the East Branch Westfield River, and the conservation of its watershed is the focus of the Dead Branch CFA. The Dead Branch provides important cold water habitat for brook trout and Atlantic salmon. These species are sensitive to extreme temperature fluctuations, and require water temperatures between 40-70 degrees Fahrenheit for spawning, growth, and survival. Other cold aquatic species that occur within this watershed include slimy sculpin, lake chub, and many species of invertebrates, including the rare riffle snaketail dragonfly. Wood turtle, a state species of greatest conservation need also occurs in this CFA.

We will work with partners to provide aquatic habitat with clear aquatic species passage to spawning and wintering habitat and structurally diverse in-stream habitat. Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Aquatic species survival and breeding success is dependent on not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of the water resources in the CFA will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity, and health.
- Conduct stream assessments to identify man-made physical barriers (e.g., impassable road crossings, culverts, and dams) to the movement of fish and other aquatic organisms.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Dead Branch Division as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Dead Branch Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Dead Branch Division as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Dead Branch Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Dead Branch Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

***Rationale*:**
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Dead Branch Division will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Dead Branch Division's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Dead Branch Division.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See the rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Through partners, and a Friends group, annually provide quality interpretive programs, exhibits, printed media at the Dead Branch Division.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures (e.g., general brochure and bird checklist) that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Dead Branch Division will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Becuase the Dead Branch Division will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations and division-specific regulations, if necessary.

Rationale:
Hunting is priority public use on national wildlife refuges and a popular outdoor recreational activity. The Dead Branch Division has been a popular area with hunters for many years prior to acquisition by the Service. All of the division is currently open to hunting under an interim pre-acquisition compatibility determination, excluding safety zones around buildings. Retaining hunting opportunities at this division conforms to historic use on this property and much of the surrounding land in the area. Popular game species include white-tailed deer, black bear, ruffed grouse, and cottontail rabbits. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
Continue to:

- Allow hunter access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are discernable.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to determine whether opportunities exist for state-recognized disable hunters.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Dead Branch Division kiosks, through a friends group, and in local businesses.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.
- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Offer to host hunter education field courses.
- Work with Massachusetts Department of Fish and Game to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Dead Branch Division after completing all administrative procedures to officially open refuge lands to fishing, based on Massachusetts Department of Fish and Game regulations, and division-specific conditions, if necessary.

Rationale:
Fishing is a priority public use on national wildlife refuges and a popular outdoor recreational activity. The division has been open to fishing, following acquisitions, through pre-acquisition compatibility determinations, but no formal opening package or fishing plan has been completed. The Dead Branch and other tributaries of the Westfield River are popular with anglers.

Management Strategies:
Continue to:

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Dead Branch Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of CCP approval:

- Work with the Massachusetts Department of Fish and Game to inventory and assess fish populations on the division.
- Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
This division currently includes a reach of the Dead Branch River that supports populations of brook trout. Anglers will benefit from division-specific information on this fishery.

Management Strategies:
Within 5 years of CCP approval:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Dead Branch Division.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in western Massachusetts. Currently, there is no infrastructure in place at the division to support this use, and consequently, visitation for wildlife viewing and photography is limited and dispersed.

Management Strategies:
Continue to:

- Allow public access at the Dead Branch Division daily from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers, consistent with the final compatibility determination.

Within 5 years of CCP approval:

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 10 years of CCP approval:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of CCP approval:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the division.

Rationale:
The entire division is available for wildlife observation and photography; however, there are steps the refuge can take to enhance their time on the division. Visitation increases are expected as this division expands and becomes better known. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of CCP approval:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of CCP approval:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Produce a list of wildlife species and associated habitats and other conservation information on the division for distribution at informational kiosks, the refuge website, and other popular media.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups to offer wildlife-related trips to the division.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Dead Branch Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that are part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Dead Branch Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Dead Branch Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division. Each of these must be found to be both appropriate and compatible to be an authorized use of the refuge.

Management Strategies:
Continue to:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.

Within 1 year of CCP approval:

- Work with users to delineate winter cross-country skiing trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Allow snowmobiling on existing snowmobile trails (e.g., trails depicted on the Snowmobile Association of Massachusetts trail map) that are groomed by an established snowmobile organization and is compatible and consistent with applicable Service laws, policy and guidelines. The responsible snowmobile club will maintain trails under a special use permit. Designated snowmobile trails on refuge land are available in accordance with Massachusetts Department of Conservation and Recreation regulations and, where applicable, MassWildlife snowmobile guidelines.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Fort River Conservation Focus Area (Existing Refuge Division)

Hadley and Amherst, Massachusetts

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	1,660	77 %
■ *Existing Refuge Ownership in CFA*[1]	*261*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*1,399*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	614	23%
Total Acres in CFA[2, 4]	2,274	100%

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers

What specific criteria and/or considerations drove the selection of this CFA?

The Fort River CPA (map A.31) encompasses the Fort River CFA (map A.32) which was a SFA in the 1995 Conte FEIS. The refuge's Fort River Division was established in 2005. The Fort River CFA presents two major opportunities. The first is to restore grassland and early successional habitat (shrubland habitat) to benefit declining species, such as bobolinks and other grassland-nesting species. The second opportunity is to protect floodplain forest along the Fort River and create a connection between these forests and adjacent conserved upland habitat within the Holyoke Range. The Fort River CFA overlaps two terrestrial Tier 1 Core and the Connector lands linking them, as identified in the *Connect the Connecticut* landscape conservation design.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Pasture/Hay/Grassland – 60.4%
- Hardwood Swamp – 3.4%
- Shrub Swamp and Floodplain Forest – 2.3%

See map A.33 and table A.20 for more detailed habitat information for the CFA.

What are the resources of conservation concern for the CFA?

As noted in table A.21 below, there are four priority refuge resources of concern (PRRC) species that may rely on habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity, Diversity, and Environmental Health (BIDEH) of the landscape. This includes potential for a large tract of contiguous grasslands to benefit declining grassland dependent species, and floodplain, a habitat that has undergone significant alteration within the Connecticut River watershed. The refuge will seek to protect and restore (if necessary) these, and other PRRC habitat types. Additionally, we recognize the value of this area to State species of greatest conservation need (SGCN) and migratory landbirds. These species and habitats are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large ($\geq$ 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species and other bat species.

   Dwarf wedgemussel and small whorled pogonia occur within the vicinity of the CFA boundary. The dwarf wedgemussel occurs in a portion of the Fort River between Plum and Hop Brooks, about a mile from the CFA boundary, and small whorled pogonia occurs about a mile from the boundary within adjacent forested lands. These listed species have not been documented in the CFA, and will be added as PRRC species if it is documented in the CFA in the future.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Fort River CFA is situated on the Connecticut River, and can provide significant stopover habitat for migrants in the spring and fall.

   This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

3. **Diadromous fish and other aquatic species**
   The PRRC species for the Fort River CFA includes American eel, a species of conservation concern for the Service and an SGCN species. This species occurs in the lower reaches of the Fort River, which meanders through the CFA. The Fort River is the longest free-flowing tributary to the Connecticut River in Massachusetts, and ranks near the top among all New England rivers for overall freshwater mussel diversity. The federally endangered dwarf wedgemussel occurs in a portion of the river but has not been documented in the CFA.

4. **Wetlands**
   Seventy-eight acres of hardwood swamp, 53 acres of shrub swamp and floodplain forest, and 19 acres of freshwater marshes add to the diversity in the landscape. The majority of these wetland acres are within the floodplain of the Fort River. According to The Nature Conservancy, the floodplain forests along the Fort River main stem contain high species richness, and have undergone significant alternation (Marks et al 2011). The floodplain habitat within the CFA has great potential for restoration. Intact floodplain forests in the Fort River CFA will provide high-quality habitat for neo-tropical migratory birds, restore forest connectivity and travel corridors for wildlife, and increase water quality and shade for aquatic species.

5. **Other**
   Over 60 percent of the Fort River CFA is in pasture, hay, grassland, and habitat consisting mostly of large fields between 200 and 400 acres. Management of these fields as grassland habitat will benefit declining grassland bird species. Grasslands are a high priority habitat for the State of Massachusetts. These habitats provide breeding and nesting habitat for several State threatened and endangered species, including northern harrier, upland sandpiper, barn owl, and grasshopper sparrow. Upland sandpipers historically nested in the Fort River CFA, and can be seen on occasion during migration. Many grassland birds are area sensitive, and require large grassland acres (greater than 25 acres) including grasshopper sparrows, bobolinks, eastern meadowlarks, and upland sandpiper (Vickery et al. 1994). A contiguous block of grassland habitat in the Fort River Division will benefit these species, as well as declining pollinators such as the yellow-banded bumble bee and monarch butterfly, both of which are petitioned for listing under the ESA.

What habitat management activities will be a priority on refuge lands within the CFA?

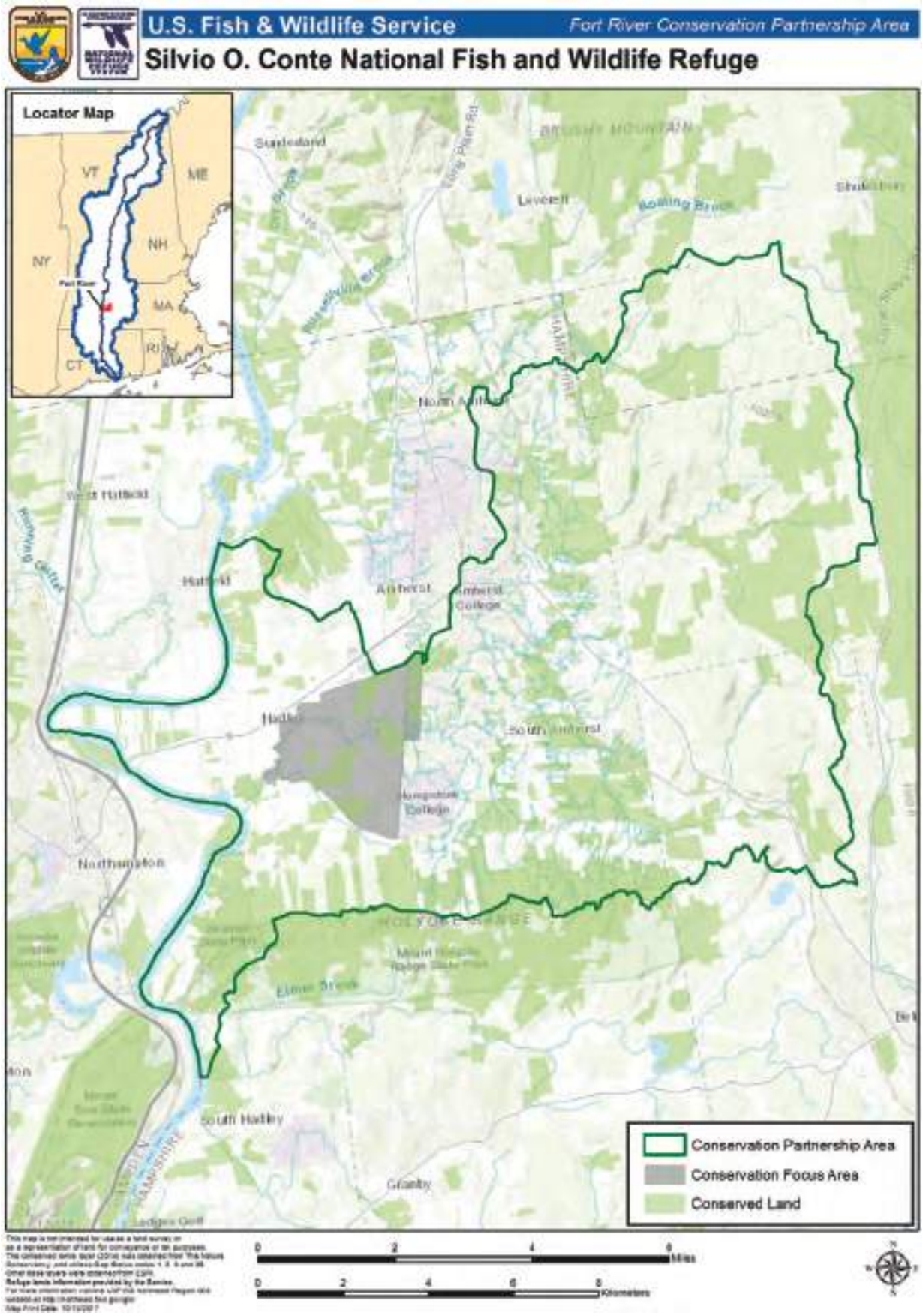
We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will focus on restoration of degraded floodplains, including where appropriate, restoring the primary natural disturbance mechanism (seasonal flooding) and species composition and structure to accepted historical conditions. Management of upland forests will improve structural diversity and species composition will be appropriate for site conditions and location.
- Where appropriate, and feasible, we will maintain large, contiguous acres of warm season grasses (map A.34).
- Our management activities in emergent and shrub wetland habitats will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- In open water (stream, rivers) habitats, we will focus on maintaining stream connectivity, establishing riparian buffers, and reducing run-off from the surrounding landscape.

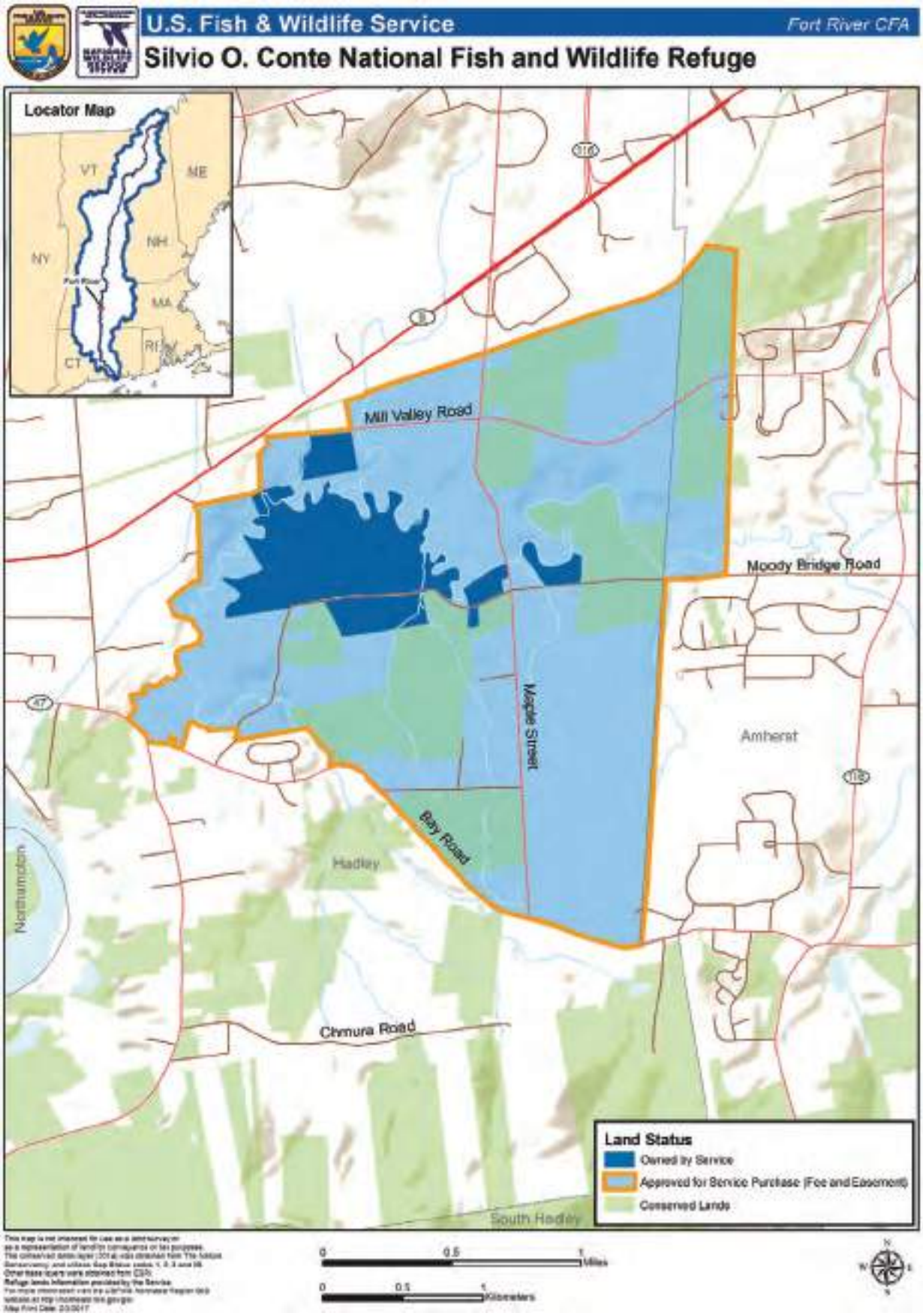
What public use opportunities will be a priority on refuge lands within the CFA?

Our priority will be to continue offering the six, priority public uses: wildlife observation and photography, environmental education, interpretation, fishing, and hunting. Hunting and fishing are allowed through pre-acquisition compatibility determinations. We will complete all administrative procedures to officially open the refuge to these activities. We recently completed a 1.1 mile ADA-accessible trail on the division (map A.35). It is very popular and is used regularly as a site to host conservation events and programs.

Map A.31. Fort River CPA.



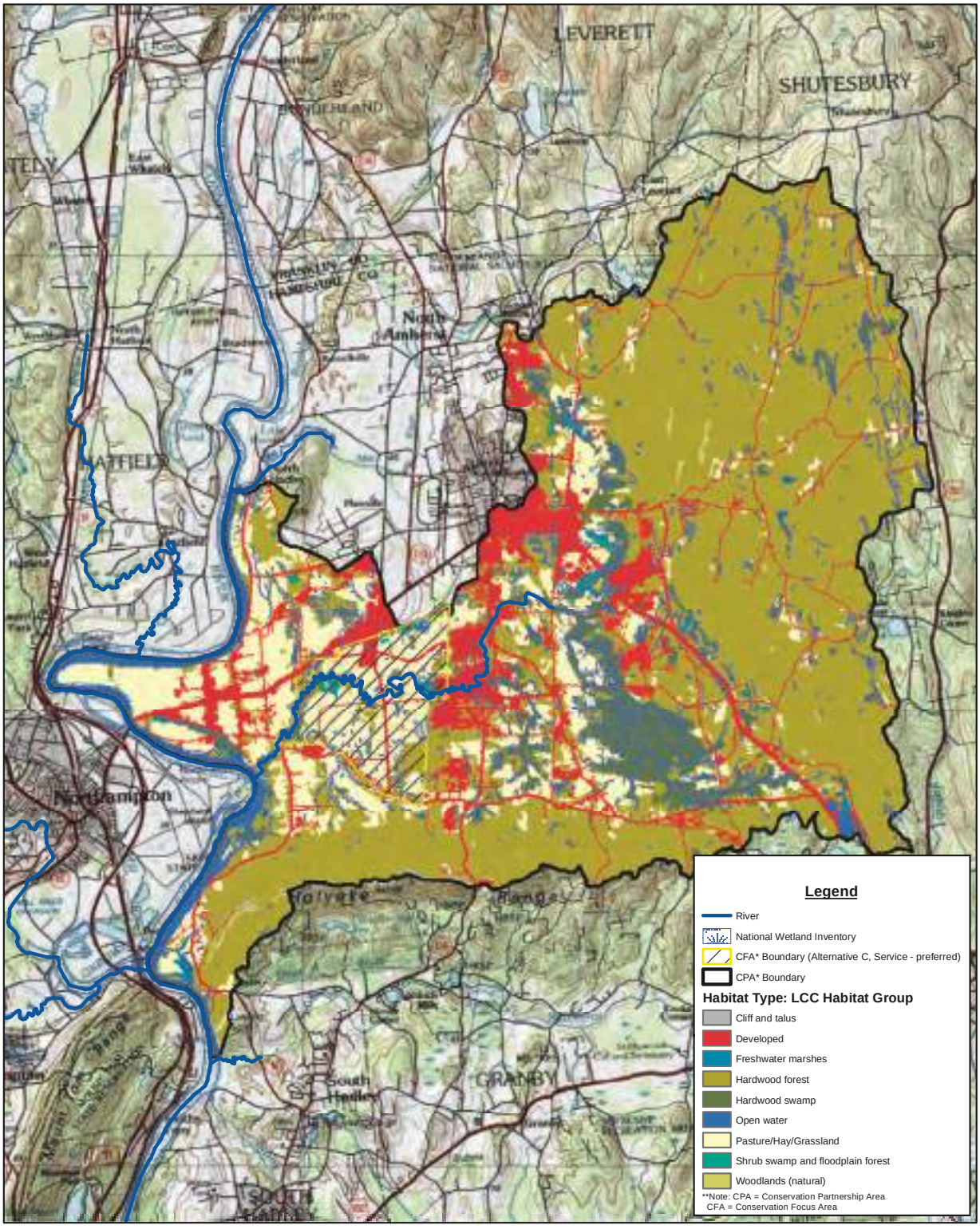
Map A.32. Fort River CFA – Location.



Map A.33. Fort River CFA/CPA – Habitat Types.

U.S. Fish & Wildlife Service *Fort River CPA*

Silvio O. Conte National Fish and Wildlife Refuge



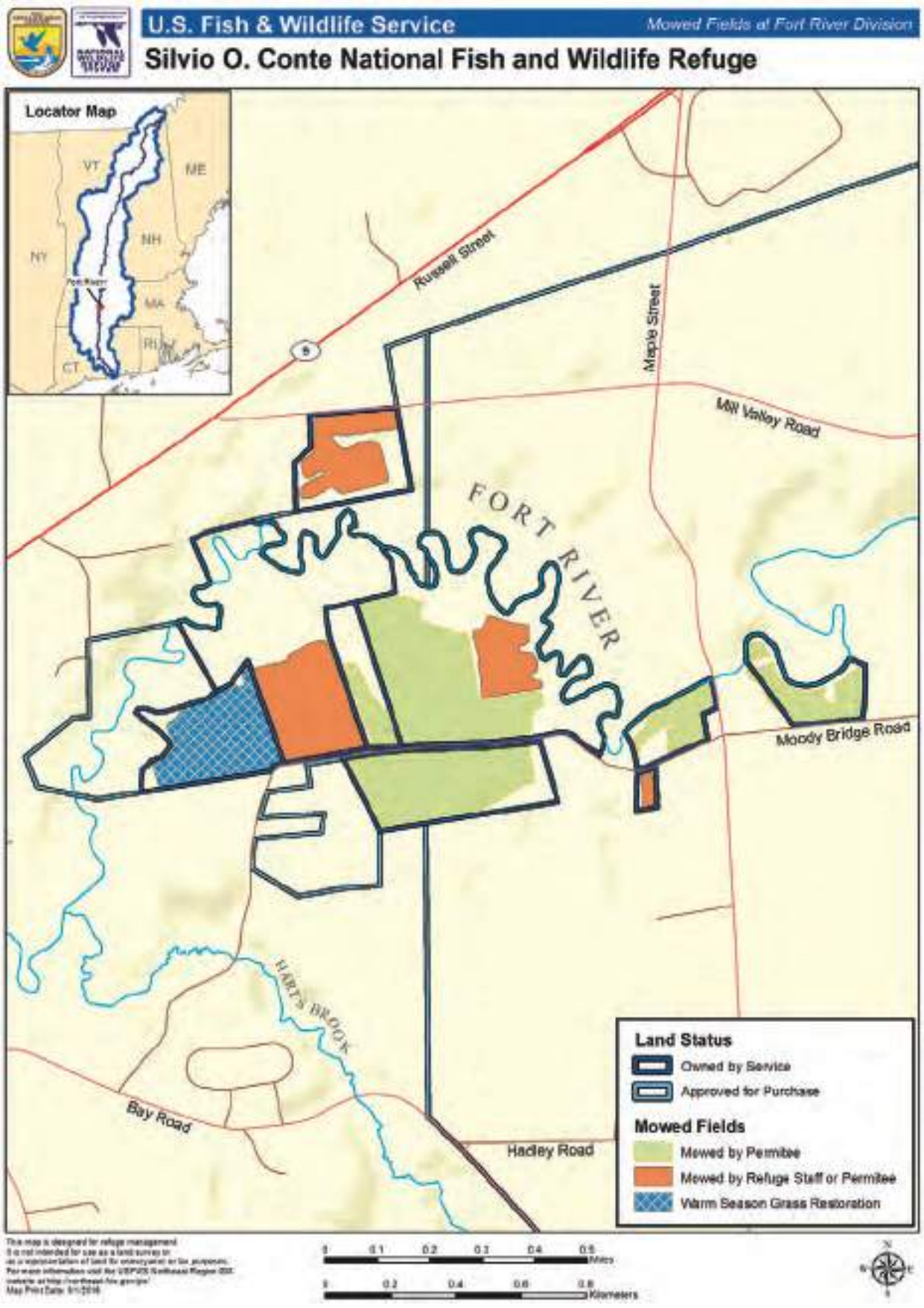
This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes. For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 1 2 3 4 Miles

0 1.5 3 4.5 6 Kilometers

N W E S

Map A.34. Fort River CFA – Fields Mowed and Hayed.



Map A.35. Fort River CFA – Fort River Trail.

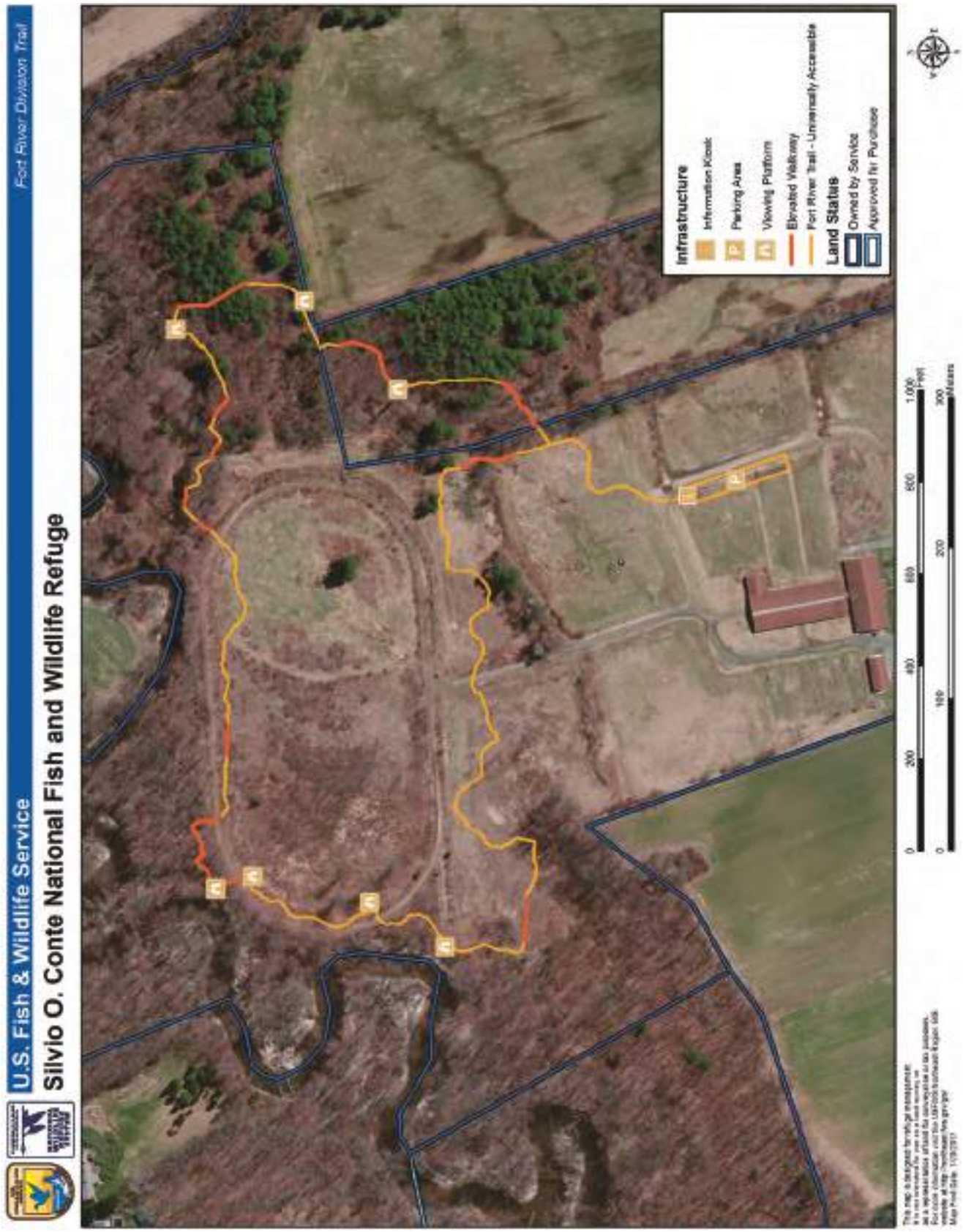


Table A.20. Fort River CFA/CPA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Hardwood forest	25,145	59.7%	510	81	58	22.5%	2.0%
Hardwood swamp	3,092	7.3%	79	30	13	3.5%	2.5%
Shrub swamp and floodplain forest	184	0.4%	53	16	30	2.3%	28.9%
Woodlands (natural)	108	0.3%	-	-	-	0.0%	0.0%
Forested uplands and wetlands subtotal	*28,528*	*67.7%*	*642*	*127*	*101*	*28.3%*	*2.3%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	75	0.2%	-	-	-	0.0%	0.0%
Freshwater marshes	85	0.2%	19	0	0	0.8%	22.3%
Pasture/hay/grassland	6,972	16.5%	1,374	446	149	60.5%	19.7%
Non-forested uplands and wetlands subtotal	*7,132*	*16.9%*	*1,393*	*447*	*149*	*61.3%*	*19.5%*
Inland aquatic habitats[9]							
Open Water	1,061	2.5%	-	-	-	0.0%	0.0%
Inland aquatic habitats subtotal	*1,061*	*2.5%*	-	-	-	*0.0%*	*0.0%*

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Other							
Developed	5,412	12.8%	236	42	8	10.4%	4.4%
Other subtotal	*5,412*	*12.8%*	*236*	*42*	*8*	*10.4%*	*4.4%*
TOTAL[10]	**42,133**	**100.0%**	**2,271**	**615**	**258**	**100.0%**	**5.4%**

Notes:

5 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

6 Conservation Partnership Area

7 Conservation Focus Area

8 Percentage of the CPA represented by the habitat type

9 Acres in the CFA currently conserved by others (TNC 2014)

10 Acres in the CFA currently owned by the Service

11 Percentage of the CFA represented by the habitat type

12 Percentage of a given habitat within the CPA protected within the CFA

13 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

14 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.21. Fort River CFA – Priority Refuge Resources of Concern

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 509 acres		
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically ≥ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	Migratory Species Little Brown Bat[I]
Hardwood Swamp[5] - 78 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory species
Shrub Swamp and Floodplain Forest[5] - 53 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory species
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 19 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Migratory species

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Pasture/Hay/Grassland[5] – 1,373 acres		
Where appropriate, maintain as contiguous block of grassland habitat	Grasslands include fields managed for warm season grasses, such as switch grass, Indian grass, and blue stem, hayfields/pastures that are intensively managed for cool season grasses and active pastures.	American Woodcock[A, I, J] **Bobolink**[A,I] **Upland Sandpiper**[A, I] Northern Harrier[I, J] **Grasshopper Sparrow**[I] **Eastern Meadowlark**[I] Wood Turtle[I, E,J] Field Sparrow[A,I] American Kestrel[I] Eastern Kingbird[A] Yellow Banded Bumble Bee[E] Monarch Butterfly[E] Regal Fritillary[E]
Inland Aquatic Habitats[4]		
Open Water[5] – *GIS data did not capture acreage due to dense forest cover along small stream and river corridors*		
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	Sea Lamprey[I] Longnose Dace[I] Fallfish[I] Harpoon Clubtail[I] Rapids Clubtail[I] Wood Turtle[I]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.

I: 2015 Massachusetts Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD - These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Fort River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for spring and fall migrants, and potential roosting and foraging areas for the northern long-eared bat and tricolored bat.

Rationale:
We envision healthy forests within the Fort River CFA where a diverse seral structure provides suitable habitat conditions for a suite of Massachusetts wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Fort River CFA hardwood forests provide a diversity of habitats for wildlife. To date our review of the Fort River CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to use characteristics common to these habitats. Our understanding of the forest structure within Fort River comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Fort River are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Moore et al. 1990, Petit 2000, Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Moore et al. 1990, Noss 1991). Clearly, structurally complex habitats will not be suitable for all migratory species, but our conservation goal is to provide those habitat characteristics used most frequently by migrating birds, suggesting relatively tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990, Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. While our management goals may create a relatively old forest, hardwood forests within Fort River will contain a variety of patches

in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated (i.e., forest-agricultural edge and suburban forest of the type within Fort River) and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al. 2004).

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches of greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Live, dead or dying trees that are >3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the northern flicker.

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Fort River's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of foraging opportunities. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (>75-80% closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991, DeGraaf et al. 2006). Efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney and Waller 2003, Côté et al. 2004, see also Rawinski 2008).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:

Within 5 years of CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function.

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complements adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices.

- Protect hard and soft mast producing species such as American beech inclusions, oak and hickory species, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible. Management priorities include oriental bittersweet, glossy buckthorn, garlic mustard, and multi-flora rose.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrant birds, as well as wintering habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Fort River Conservation Focus Area (CFA) have undergone significant alteration and have great potential for restoration. This habitat type is often found in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the watertable drives complexes of forest upland and wetland species including pin oak, red maple, sweetgum, and black gum. The examples identified within the Fort River CFA are limited and largely occur within the floodplain of the Fort River. Agricultural practices, development pressures, and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in hardwood swamps are not well understood. One possibility in the north-central Appalachian acidic swamps is that these areas once had a higher proportion of softwoods such as hemlock. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Fort River will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Where appropriate, restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan (HMP).

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State of Massachusetts in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Evaluate hydrologic regime to inform restoration efforts.

- Identify forest stands where management is necessary to improve species composition.

Within 10 years of CCP approval:

- Implement identified forest management opportunities to improve species composition.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories including surveys for rusty blackbirds during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Restore native species composition and structure, and improve the natural hydrology, as needed, to support natural and rare shrub swamp and floodplain forest ecological communities. Management will provide stopover habitat for spring and fall migrant birds, as well as wintering habitat for rusty blackbirds and breeding habitat for wood turtle.

Rationale:
The shrub swamps in the Fort River CFA are restricted to poorly drained areas and small seepage zones along the Fort River and within the hardwood swamp communities in the CFA. These shrub swamp systems usually have a patchwork of shrub and grass dominance, and may include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). Based on our coarse-scale habitat analysis, the shrub swamps are also adjacent to agricultural land, and impacts to the wetland hydrology may be factor. Water pollution and invasive species introductions are also threats for shrub swamp communities.

Restoration of shrub swamp communities, as well as the surrounding forested habitat, will create high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Fort River CFA is situated on the Connecticut River, and can provide significant stopover habitat for migrants in the spring and fall. Neo-tropical migrants typically use similar habitats during migration as they do during the breeding season (Petit 2000). Species such as gray catbird, yellow-rumped warbler, white-eyed vireo, eastern phoebe, eastern kingbird and common yellowthroat will use shrubland communities (McCann et al. 1993). Native shrubs will provide migrants with soft mast and abundant insects to replenish fat reserves, and structure to provide rest and adequate cover from predators and inclement weather.

This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Wood turtle was petitioned for federal protection in 2012. This species uses aquatic and adjacent terrestrial habitats throughout the year. This species has been documented in the river and floodplain habitats of the Fort River CFA. Wood turtles are thought to be experiencing population declines exceeding 50% over the past 100 years. Populations live primarily in and around river habitats which are often heavily impacted by human development. Habitat degradation, fragmentation and destruction are the main causes for population declines (van Dijk and Harding, J. 2016).

We have conducted an invasive plant inventory at the Fort River Division, and there are substantial invasive plant infestations. Invasive multiflora rose is a predominant shrub in both riparian floodplain forests and grassland fields and some control of this species has been undertaken by the Youth Conservation Corps. Volunteers have helped control efforts for garlic mustard, which is beginning to spread in the floodplain forests, adjacent wetlands, and forest edge. Oriental bittersweet threatens the health of floodplain trees. Other invasive species present include Japanese barberry, purple loosestrife, glossy buckthorn, reed canary grass, autumn olive, and black locust, among others.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Continue to:

- Control known invasive plant infestations such as oriental bittersweet, multiflora rose, and garlic mustard.
- Work with TNC to plant American elms on the Fort River Division as part of floodplain restoration.

Within 5 years of CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Coordinate with the Massachusetts Natural Heritage and Endangered Species Program and town Conservation Commission to ensure invasive plant management complies with the Massachusetts Endangered Species Act and the Massachusetts Wetland Protection Act.
- During the development of the Habitat Management and Integrated Pest Management Plans, assess the threats to native plants from invasive plants and develop priority invasive plant management strategies to limit these threats.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Survey wildlife utilization of wetlands including surveys for rusty blackbirds during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marshes)
Restore native species composition and structure, and improve the natural hydrology, as needed, to support natural and rare ecological freshwater marsh communities. Management will provide stopover habitat for spring and fall migrant birds.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily and narrow-leaved cattail (Gawler 2008). Based on our coarse-scale habitat analysis, freshwater marsh communities occur in swales within the agricultural fields of the Fort River CFA. Water pollution, altered hydrology, and invasive species introductions are threats for freshwater marsh communities.

Restoration of freshwater marsh communities, as well as the surrounding forested habitat, will provide a diversity of habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Fort River CFA is situated on the Connecticut River, and can provide significant stopover habitat for migrants in the spring and fall. Neo-tropical migrants typically use similar habitats during migration as they do during the breeding season (Petit 2000). These freshwater marshes are not large, and may not provide adequate stopover habitat for species such as rails, bitterns, and egrets, but add to the diversity in the landscape and foraging opportunities for species using adjacent habitats.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Survey wildlife use of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Where appropriate, maintain a contiguous block of grassland habitat for breeding and migrating grassland bird species and pollinators; areas not managed for grassland birds and pollinators will be allowed to revert to natural conditions.

Rationale:
Over 60 percent of the Fort River CFA is typed as pasture, hay, and grassland, consisting mostly of large fields between 200 and 400 acres. Management of these fields as grassland habitat will benefit declining grassland bird and pollinator species, and provide a habitat that is increasingly rare in the region.

Native grasslands were once more widespread in North America. A deterioration of rangelands, the conversion of prairies to agriculture, and afforestation of the eastern United States are significant factors to the decline of grassland bird populations. During European settlement, millions of acres of forests were cleared for agriculture in the eastern U.S., creating habitat for grassland dependent birds. As agricultural activities declined, open areas dominated by herbaceous vegetation began to convert back to forests, causing a drastic decline in grassland species in the region (Brennan and Kuvlesky Jr 2005). Habitat loss is also a factor for declining populations of pollinator species, including the yellow banded bumble bee, regal fritillary, and monarch butterfly. These species are petitioned for listing under the Endangered Species Act.

In fact, several grassland species are listed as threatened or endangered by the state of Massachusetts, including northern harrier, upland sandpiper, barn owl, and grasshopper sparrow, and four bumble bee species are listed as SGCN. Grasslands are a high priority habitat for the state, and maintaining large, contiguous acres of warm season grasses at the Fort River CFA will benefit these species.

We also support the protection of high-value, productive agricultural lands identified by local communities and the State. It is not the refuge's intention to target these lands for acquisition. Instead, our priority will be to work with individual landowners, states, and other Federal agencies to protect these lands and ensure they continue

to be part of the working landscape. There are many State and Federal programs that protect agricultural lands and help promote farming practices that benefit wildlife and help protect water quality. Through our private lands program, we will help direct landowners who are interested in these programs to the proper state and Federal agencies and programs. In rare cases, we may acquire agricultural lands from willing sellers, when other options to keep the land in agricultural production are not available, or if habitats for Federal trust resources are in jeopardy from development or other land use changes.

Due to our unfamiliarity with the habitat conditions in the CFA, a comprehensive, multi-scale habitat and wildlife inventory will be necessary to implement refuge strategies. This inventory will need to encompass all habitats within the CFA and associated landscape. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Assess the condition of pasture, hay and grassland habitats, as well as the overall size and location in the CFA, and proximity to other forest openings, to inform more detailed management strategies in an HMP.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including American eel.

Rationale:
The lower reaches of the Fort River meanders through the agricultural lands of the Fort River CFA. The Fort River is the longest free-flowing tributary to the Connecticut River in Massachusetts, and ranks near the top among all New England rivers for overall freshwater mussel diversity. The federally endangered dwarf wedgemussel occurs in a portion of the river between Plum and Hop Brooks, about a mile from the CFA boundary. The Fort River also supports American eel, a species of conservation concern for the Service and an SGCN species. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit streams, lakes, and ponds. They feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

The Fort River floodplain communities and forested buffers within the Fort River CFA have been cleared for agricultural use or are being threatened by nonnative invasive plant species. Restoration of floodplain communities and forest buffers will improve the water quality of the Fort River by decreasing erosion and siltation, and provide shade for aquatic species. A comprehensive, multi-scale habitat and wildlife inventory will be necessary to understand aquatic and surrounding habitat conditions in the CFA. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity, and health.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable to the Fort River CFA

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable to the Fort River CFA

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to: develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively towards solutions; model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Work with communities, school systems, public and non-profit organizations, and private educational organizations to facilitate and develop quality model environmental education curricula, as well as to develop highly trained individuals to conduct quality environmental education. Priority will be given to residents of urban communities as participants and other visitors within a 1-hour commute of the Fort River Division who might not otherwise visit a refuge. Environmental education programs will be designed to:

- Take into account the needs of the target audience, as well as the relevance to the target audience's everyday lives.
- Be student and community-centered.
- Be curriculum-based, with goals and measurable objectives.
- Be inquiry driven and involve direct experiences with nature.
- Involve educators in the development and implementation.
- Be linked to multiple state relevant learning standards.
- Coordinate with state and private environmental educations programs.
- Relate to refuge management goals, objectives, and purposes.
- Have tools for evaluation and measurable outcomes throughout development and execution.
- Involve repeated contact with the same students.
- Be sustainable (i.e., have the resources necessary to continue over the long term).
- Involve interactions that occur in the natural, the built, and the social environment.
- Aim to develop awareness, attitudes, understanding, skills, and feelings of empowerment.

Additionally, the refuge will work with partners to develop and implement quality professional development for educators, to promote the training of refuge staff and volunteers in the knowledge, skills, and abilities of environmental education and to use volunteers, including Friends members, to enhance environmental education opportunities.

Rationale:
The long-term vision for the Fort River Division is that it will house an outdoor environmental education facility. This facility will be used by the refuge for environmental education, by local schools looking to use the division as an outdoor classroom, and by local nature centers and conservation organizations working toward shared conservation goals. The Fort River Division will be actively managed, making it a good outdoor laboratory/active management demonstration site. Further, an ADA-compliant trail will provide wildlife dependent recreation opportunities for a wide range of visitors.

As stated in the Chapter 4 rationale for Goal 2, environmental education is an important aspect of the Conte Refuge that helps the refuge to meet one of its founding purposes to "provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access." The Fort River Division is located within a 1-hour radius of several population centers including the cities of Springfield, Hartford, Holyoke, Keene, Brattleboro, and their surrounding suburbs. Given this proximity, refuge staff and partners have the ability to work with urban audiences who would not normally visit a refuge on their own. Similarly, the Fort River Division is geographically well situated for the refuge to sustain partnerships with a diversity of local organizations. To name a few, the Fort River Division is located a short distance from facilities and lands owned by: Massachusetts Audubon, the Massachusetts Department of Conservation and Recreation, the Massachusetts Division of Fisheries and Wildlife, the Trustees of Reservation, private nature centers, several colleges and universities, and private science museums. Given its central location within the Connecticut River watershed, the Fort River Division has the potential to be an important dissemination point for visitor services related activities for the refuge. Further, the division is located a short distance from Interstate 91 and Route 9, making it an easy commute for schools looking to partake in environmental educations.

This CFA is well suited for an outdoor environmental education facility because of its location near headquarters and population centers, and because of the ability to re-develop sites currently occupied by derelict buildings, resulting in minimal ecological impacts.

Management Strategies:
Within 5 years of EE facility completion:

- Design or adapt curricula for the Fort River Division that focuses on watersheds and local natural and cultural resources. Curricula will:

  ✓ Incorporate multiple relevant learning standards.

  ✓ Coordinate with existing state and national environmental educations programs.

  ✓ Take into account student and teacher needs by researching and analyzing demographics and the geographic area by taking into consideration cultural differences, student life experiences, specific learning needs, assessing what is relevant to student's lives, and by addressing the needs of school systems).

  ✓ Be refuge/place-based.

  ✓ Incorporate nationally recognized education initiatives, when appropriate.

  ✓ Be designed with specific goals and objectives.

  ✓ Promote refuge purposes.

  ✓ Contain consistent interpretive messages and themes.

  ✓ Promote other refuge divisions and units, partner-conserved lands, and facilities such as state parks, science museums, and nature centers as environmental educations resources.

  ✓ Incorporate nationally recognized initiatives (e.g., North American Association of Environmental Education (NAAEE), and Science, Technology, Engineering, and Math (STEM)).

  ✓ Incorporate national based curricula (e.g., Project WILD, Project Aquatic WILD, Project WET, Flying Wild, Project Learning Tree.

- Identify and strive to engage non-traditional audiences regarding environmental education opportunities.
- Support the Service's initiatives with regards to environmental education.
- Contribute to professional educator development by hosting and/or instructing at least two educator continuing education trainings.
- Promote the Fort River Division as a destination for field trips and increase the number of students by two percent per year for the 5 five years.
- Develop an outreach program to promote the Fort River Division as a fieldtrip destination.
- Conduct a needs assessment of after school programs, and summer camps to determine community demand for these types of programs at the refuge.
- Be viewed as a valuable environmental education resource within the community that:
  - ✓ Has staff trained in environmental education and natural resources;
  - ✓ Provides educators with state-of-the-art education resources;
- Develop specific environmental education goals and objectives for each program/lesson and identify appropriate educational strategies for environmental education participants.
- Work with after school programs and summer camps to incorporate existing state watershed curricula.
- Provide support for curriculum-based programs such as Scouts, 4H, Boys and Girls Clubs, Road Scholar (former ElderHostel program).
- Support state environmental education programs (e.g., Hunter and Angler Education, Furbearer Education, Becoming an Outdoors Woman).
- Keep current with state-of-the-art technologies and incorporate them into environmental education programming.
- Work with partners to create issue-oriented experiential activities and programs for use at the Fort River Division.

Within 10 years of EE facility completion:

- Coordinate with each state to share environmental education resources.
- Provide the Fort River CFA as an outdoor classroom.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop an evaluation system to assess the effectiveness of all environmental education curricula.

Sub-objective 2.1b. (Environmental Education Delivery)
Work with communities, school systems, public and non-profit organizations, private educational organizations, staff, volunteers, and members of friends groups to offer quality environmental education programs at the Fort River Division and at schools and partner facilities within the watershed. Priority will be given to residents of urban communities as participants and other visitors within a 1-hour commute of the Fort River Division who might not otherwise visit a refuge.

The refuge will seek to:

- Formally partner with local schools within a 1-hour commute of the Fort River Division and to conduct environmental education to these audiences multiple times per year.

- Promote partner lands as outdoor classrooms, and to help deliver priority educational programs.
- Facilitate the use of refuge and partner lands by educator-, teacher-, and student-led classes.

Rationale:
See rationale for sub-objective 2.1a.

Management Strategies:
Within 5 years of CCP approval:

- Use staff, volunteers, and members of Friends groups to facilitate teachers and students at the Fort River Division. The intention is to host up to ten classes the first year and increase the number of students by two percent per year for the next 5 years.
- Partner with other education centers, state-sponsored programs and other government agencies to meet environmental education objectives.
- Collaborate with the Recreation and Education committee of the Friends of Conte to identify, package, and promote applications for alternative sources of funding for environmental education partnerships.
- Promote partner lands and facilities as outdoor classrooms; help deliver priority educational programs at those partner facilities.

Within 10 years of CCP approval:

- Formalize cooperative relationships with environmental education providers through development of agreements and MOUs.
- Develop more detailed environmental education objectives and strategies as part of a Visitor Services Plan.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Formally evaluate the quality of existing environmental education programs and as a result of evaluation, plan for the next 5 years.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
Work with communities, public and non-profit organizations, staff, volunteers, and members of Friends groups to offer quality interpretive programming and training at the Fort River Division.

Rationale:
As stated in the Chapter 4 rationale for Goal 2, interpretation is an important aspect of the Conte Refuge that helps the refuge to meet one of its founding purposes to "provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access." The Fort River Division is located a short distance from Interstate 91 and Route 9, and within a one-hour radius of several urban areas including Springfield, Hartford, Holyoke, Keene, Brattleboro, and their surrounding suburbs. The geographic location of the Fort River Division makes it easy for visitors to access the property, to partake in wildlife dependent activities, and to learn about the habitats and wildlife present at the location. As an outdoor classroom developed on the site will orient visitors to the refuge and to the various divisions available to visit in the watershed. Further, the Fort River will include an ADA-compliant trail for both self-guided interpretation as well as guided interpretive experiences.

Management Strategies:
Within 1 year of CCP approval:

- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.
- Collaborate with partners to create meaningful, consistent, thematic statements to be used in the delivery of programming at the Fort River Division.
- Develop more detailed interpretive objectives and strategies as part of a Visitor Services Plan.
- Develop a core set of interpretive programs that can be modified on an as needed basis.
- Provide resources and trainings to refuge staff, Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval:

- Develop self-guided interpretive services, such as interpretation for the trail and kiosks, exhibits, and printed media.
- Establish relationships with Tribes and local and watershed historians to incorporate cultural history into interpretive programs.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members, and the general public, with priority given to refuge affiliates.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with partners to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Annually provide quality interpretive programs, exhibits, printed media at the Fort River Division.
- Provide roving interpretation at visitor center to initiate discussion and encourage engagement in key refuge messages.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Develop self -guided interpretive messages and use state-of-the-art, as well as traditional media such as pamphlets and signs.

Within 10 years of CCP approval:

- Design, fabricate, and install an interpretive Conte Corner at the Fort River Division.

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Sub-objective 2.3a. (Local Residents, Community Leaders, and Elected Officials)
Through effective outreach, the refuge will work to increase public awareness of the benefits of the Fort River Division within the surrounding communities. Individuals will become aware of public offerings, resources, and programs offered at the Fort River Division, and of the interpretive messages of the Silvio O. Conte National Fish and Wildlife Refuge.

Rationale:
The Conte Refuge is unique with its jurisdictional boundaries encompassing the entire Connecticut River watershed. The 2.3 million residents of the Connecticut River watershed live in urban, suburban, and rural areas, and make up a diverse demographic with varying attitudes and interests. When Congressman Silvio O. Conte proposed the creation of the refuge, his desire was to restore and maintain a swimmable, boatable, and fishable Connecticut River for his children and grandchildren. This dream is still a primary guiding factor for management at the refuge; yet, the full dream can only be realized through the cooperation and combined effort of watershed residents, Federal, state, and local agencies, non-profit organizations, and other community organizations. Strategic, quality outreach targeted at specific audiences is vital to communicate with individuals about watershed and refuge concerns, to work toward a shared vision for the Connecticut River watershed and to gain support for refuge activities.

Management Strategies:
Within 5 years of CCP approval:

- Develop outreach messages.
- Maintain good lines of communication with Fort River Division neighbors and local community leaders.
- Create special programming that will draw local residents and media.
- When possible, participate in community events and festivals within a 1-hour commute of the Fort River Division.
- Cooperate with neighboring landowners whenever practical and appropriate to conduct land management activities for mutual benefit.
- In conjunction with the Friends group, conduct open houses that showcase center achievements and key center supporters.
- Work quickly to resolve points of conflict between the refuge and its neighbors over issues such as visitor trespass and other inappropriate public use.
- Attend select board meetings, and visit town clerks, mayors, planners, and other elected officials as needed to keep them apprised of refuge issues and projects.

Within 10 years of CCP approval:

- Proactively meet with elected officials to share and update each other on constituent concerns and opportunities.
- Develop messages and actions that frame refuge units as an asset to the local community. Example benefits that the refuge provides the community include: environmental education and interpretation programming, special events hosted for the community, employment for local youth through Youth Conservation Corps (YCC), mutual aid agreements, etc.
- Develop and implement an outreach plan for communicating with area residents about the importance of this area to the larger watershed and describe how they can contribute to improving watershed quality. Possible components will include demonstration sites, behind-the-scene tours, special open houses, and technical publications.
- Monitor and evaluate the need for future outreach efforts.

Sub-objective 2.3b. (State and National-level Elected Officials)
Through effective outreach to Congress and State officials, as needed, the refuge will work to increase awareness of the benefits of the Fort River Division and the Silvio O. Conte National Fish and Wildlife Refuge.

Rationale:
See rationale for sub-objective 2.3a.

Management Strategies:
Continue to:
- Provide briefings to members of Congress and state officials, or their staff as needed or as requested.

Within 5 years of CCP approval:
- Evaluate and modify outreach efforts, as necessary.

Sub-objective 2.3c. (Media)
Through effective outreach to the media, the refuge will work to increase public awareness of the Fort River Division and the Silvio O. Conte National Fish and Wildlife Refuge within the surrounding communities. Individuals will become aware of public offerings, resources, and programs offered at the Fort River Division, and of the interpretive messages of the refuge.

Management Strategies:
Within 1 year of CCP approval:
- Write press releases detailing large refuge projects and accomplishments, and the joint efforts and accomplishments of the refuge and refuge partners.

Within 5 years of CCP approval:
- Develop and implement an outreach plan that uses state-of-the-art technology to disseminate program information and Fort River Division offerings to the public.
- Host local media representatives at the Fort River Division.
- Create special programming that will draw the media.
- Routinely use community-based outreach methods such as newspapers and local access television to publicize refuge events and run public service programming on environmental issues.

Within 10 years of CCP approval:
- Evaluate media outreach efforts to develop future strategies customized to the division.

Sub-objective 2.3d. (Greater Watershed Community)
Through effective outreach, the refuge will work to increase public awareness of the Fort River Division and the Silvio O. Conte National Fish and Wildlife Refuge within the greater watershed communities. Individuals will become aware of public offerings, resources, and programs offered at the Fort River Division, and of the interpretive messages of the Silvio O. Conte National Fish and Wildlife Refuge.

Management Strategies:
Continue to:
- Coordinate effectively with partners, particularly through the Friends of Conte, to disseminate key messages to their membership.

Within 1 year of CCP approval:
- Encourage landowners to take advantage of cooperative land management programs available through the Service and other agencies such as Natural Resources Conservation Service (NRCS) as a way of enhancing environmental quality on and around the refuge.
- On an ongoing basis, but at least annually, use appropriate media to introduce residents to the refuge, describe refuge accomplishments, detail visitor opportunities, and discuss refuge operations and current and future refuge projects.

Within 5 years of CCP approval:
- Implement an Adopt-a-Habitat program to be used in part as an outreach tool for schools and community residents to learn about and become stewards of their local environment.

- Conduct open houses on refuge divisions and partnership areas to introduce residents and local officials to the refuge.

- Train Friends, and other volunteers to make presentations on topics of mutual interest to community groups such as Chambers of Commerce, Rotary Clubs and other civic and non-profit organizations.

Within 10 years of CCP approval:

- Develop and implement an outreach plan for communicating conservation messages with landowners. Plan will include tools and strategies. Tools could include landowner workshops, behind-the-scene tours, special open houses, and relevant publications.

- Write issue driven outreach plans to keep elected officials informed of refuge and partner accomplishments and of issues within the watershed that have possible impacts to the refuge.

- Develop at least one Conte Corner within the Pioneer Valley.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Rationale:
One of the six legislative purposes guiding the establishment of the Silvio O. Conte National Fish and Wildlife Refuge was "…to provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access to the extent compatible with other purposes ..." The Fort River Division is situated in the "Five College" area of western Massachusetts and is within a short commute of the University of Massachusetts. The number of nearby local colleges, as well as the abundance of natural and cultural resources in the local area makes the Fort River Division a key resource for students seeking mentoring experiences, and for students looking to conduct research projects relating to conservation, wildlife management, resource protection, and human dimensions. Similarly, student research will benefit the refuge by answering management questions, and helping to guide management strategies.

Sub-objective 2.4a. (Institutions of Higher Learning and Other Partners)
Develop and/or enhance relationships with institutions of higher learning, particularly those within a 1-hour commute of the Fort River Division.

Management Strategies:
Continue to:

- Collaborate with professors at local institutions of higher learning to use the Fort River Division to perform wildlife-related research of interest to the refuge.

- Work with partners to conduct research relevant to refuge management issues.

Within 5 years of CCP approval:

- Become an active partner in the Five Colleges Consortium.

- Conduct classes, seminars, and workshops at local colleges that deal with refuge purposes and lands.

Sub-objective 2.4b. (Technology and Information Exchange)
Participate, coordinate, and/or host professional conferences, workshops and seminars related to wildlife biology, wildlife management, environmental education and interpretation at the Fort River Division.

Management Strategies:
Within 5 years of CCP approval:

- Encourage staff to participate in relevant environmental education and interpretation conferences to share exemplary practices.

- Promote the Fort River Division as a venue for institutes of higher learning and professional societies to disseminate information on important watershed issues.

Sub-objective 2.4c. (Mentoring)
Provide quality mentoring opportunities for local students and interested individuals.

Management Strategies:
Within 5 years of CCP approval:
- Offer student internships and host field trips.
- Continue to participate periodically in presenting information to classes at local universities, colleges, and high schools.
- Seek opportunities to participate in student workshops, trainings, and events.

Within 10 years of CCP approval:
- Mentor students to help them identify their career goals and introduce career paths within the Service.
- Participate in undergraduate and graduate level classes at local universities and colleges, presenting information on various topics and issues of the refuge.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following State and refuge division-specific regulations.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. The Fort River Division has been a popular area with hunters for many years prior to acquisition by the Service. All of the division is currently open to hunting under an interim pre-acquisition compatibility determination, excluding safety zones around buildings. Retaining hunting opportunities at this division, consistent with the final compatibility determination, conforms to historic use on this property and much of the surrounding land in the area. Popular game species include white-tailed deer, Eastern wild turkey, and Eastern cottontail rabbits. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
Continue to:
- Allow hunter access to the refuge outside of the normal division open hours, which are 30 minutes before sunrise and 30 minutes after sunset, as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Allow temporary tree stands and blinds that meet State hunting regulations and do not harm trees or other vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunting season.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain hunting consistent with State hunting regulations and the following d-specific regulation:

  ✓ Temporary blinds and tree stands are permitted, but must have the owner's name and address visible on the stand and the stand must be removed at the end of the hunting season.

- Install an informational kiosk to post information on hunting seasons and other notices to visitors.

Within 5 years of CCP approval

- Work with Massachusetts Department of Fish and Game to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Fort River Division kiosks, through a friends group, and in local businesses.

Within 5 years of CCP approval:

- Offer to host hunter education field courses.

- Work with Massachusetts Department of Fish and Game to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Fort River Division after completing all administrative procedures to officially open refuge lands to fishing, based on Massachusetts Department of Fish and Game regulations, and division-specific conditions, if necessary.

Rationale:
Fishing is a priority public use on national wildlife refuges and a popular outdoor recreational activity. The division has been open to fishing through pre-acquisition compatibility determinations, but no formal opening package or fishing plan has been completed. Although fishing is not as popular as hunting at the Fort River Division, there still are opportunities for visitors to fish the reach of the Fort River that flows through the division.

Management Strategies:
Continue to:
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

Within 1 year of CCP approval:
- Complete all administrative requirements to maintain fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Fort River Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of CCP approval:
- Work with the Massachusetts Department of Fish and Game to inventory and assess fish populations on the division.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine whether the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Although most dedicated anglers will be drawn to the nearby Connecticut River, or other areas better known for fishing, the reaches of the Fort River on the division do offer opportunities.

Management Strategies:
Within 1 year of CCP approval:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at the division kiosk, through friends groups, and in local businesses.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Fort River Division.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in this part of the state. Refuge staff, volunteers, and interns recently completed construction of a one-mile long, fully accessible loop trail. This trail is extremely popular destination trail and attracts people from both within and outside the watershed, thus broaden the visibility and support for the refuge.

Management Strategies:
Continue to:
- Allow wildlife observation and photography at the Fort River Division.
- Allow public access at the Fort River Division daily from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

Within 1 year of CCP approval:
- Construct an informational kiosk to post information and notices for visitors.

Within 5 years of CCP approval:
- Construct an interpreted loop trail meeting ADA guidelines, a new parking lot east of the riding arena, and an informational kiosk at the parking lot.

Within 10 years of CCP approval:
- Develop a public access strategy and required planning (i.e., NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of CCP approval:
- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the division.

Rationale:
The entire division is available for wildlife observation and photography; however, there are steps the refuge can take to enhance their time on the division. Visitation increases are expected as this division expands and becomes better known. By providing new visitors a quality experience, they are more likely to return and tell friends. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of CCP approval:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of CCP approval:
- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Produce a wildlife and plant species guide for the Fort River Division that will be available on the refuge website, at the refuge headquarters, and at division kiosks.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.

- Encourage local schools and groups to offer wildlife-related trips to the division.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Fort River Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Not applicable at Fort River Division

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Fort River Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote and distribute information about these opportunities.

Management Strategies:
Within 5 years of acquiring new lands:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Fort River Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate, and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division. Each of these must be found to be both appropriate and compatible to be an authorized use of the refuge.

Management Strategies:
Continue to:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.

- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.

Within 1 year of CCP approval:

- Work with users to delineate winter cross-country trail opportunities and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of the priority public uses by special use permit.

Within 5 years of CCP approval

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Mill River Conservation Focus Area (Existing Refuge Division)

Northampton and Easthampton, Massachusetts

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	2,300	71%
■ *Existing Refuge Ownership in CFA*[1]	249	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	2,051	
Existing Acres in CFA Permanently Conserved by Others[2,3]	931	29%
Total Acres in CFA[2, 4]	3,231	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Mill River CPA (map A.36) encompasses the Mill River CFA (map A.37). The Mill River area was a SFA in the 1995 Conte FEIS and the refuge's Mill River Division was established in 2007. The Mill River CFA offers the opportunity to restore a functioning floodplain wetland complex along the westbank of the Connecticut River. Most of the Mill River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional protection in this CFA by the Service will help better connect existing conserved lands, including MassAudubon's Arcardia Wildlife Sanctuary and Mt. Tom State Reservation.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Swamp – 19.8%
- Freshwater Marsh – 2.4%
- Pasture/Hay/Grassland – 43.8%

For more information on the habitats in the unit, see map A.38 and table A.22.

What are the resources of conservation concern for the CFA?

As noted in table A.23 below, there are seven priority refuge resources of concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity, Diversity, and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and migratory landbirds. These species and others are discussed further below

1. **Federal Threatened and Endangered Species**

The Puritan tiger beetle, a federally listed species, occupies beach habitat in the northeast portion of the CFA along the Connecticut River. The river flow dynamics of the Connecticut River restricts woody plant growth, provides sparsely vegetated and open sandy beaches required by these beetles. This beach habitat is owned by Massachusetts Division of Fisheries and Wildlife and the city of Northampton. The recovery criteria in the USFWS Puritan Beetle Recovery Plan specifies that a minimum of three metapopulations, at least two of which are large (500 to 1000 or more adults) are maintained or established (i.e., self-maintained for at least 10 years) within the species historical range along the Connecticut River, and habitat they occupy is permanently protected (Hill and Knisley 1993). The 2007 5-year review recommended that a high priority be given to identifying private landowners that would be willing to enter into conservation easements for the protection and management of Connecticut River shoreline habitat supporting beetles (USFWS 2007). The current tiger beetle population in the CFA is below 100 individuals, and population levels seem to be declining (Davis 2012). This single population is isolated from the metapopulation in Connecticut.

There is a historic location of dwarf wedgemussel, a federally listed species, in the Mill River Division near Pynchon Meadows located west of the CFA. This species requires stable bank conditions afforded by gravel or sandy substrates, and good water quality (Hill and Knisley 1993, Nedeau et al. 2000). An inventory of this area will be necessary to determine dwarf wedgemussel presence, and to assess current habitat suitability.

This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

Small whorled pogonia occurs about three miles from the CFA boundary within adjacent forested lands. This plant inhabits upland sites in maturing stands of deciduous or mixed deciduous and coniferous forests with sparse-to-moderate ground cover (due to nutrient poor soils), a relatively open understory, and proximity to persistent openings in the forest canopy, such as logging roads and streams. This listed species has not been documented in the CFA, and will be added as PRRC species if it is documented in the CFA in the future.

This section of the Connecticut River is important migratory habitat for shortnose sturgeon. This species prefers large rivers and estuaries where there is an abundance of crustaceans, mollusks and insects to feed on. They are a long-lived fish that are threatened by pollution, habitat alterations and overfishing.

2. **Migratory Birds**

The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006).The Mill River CFA is situated on the Connecticut River, and the hardwood swamps and upland forested acres provide stopover habitat for migrants in the spring and fall such as wood thrush, Canada warbler, black-throated blue warbler, black-throated green warbler, red-eyed vireo, American redstart, and yellow-bellied sapsucker. Restoration and connectivity of floodplain communities in the CFA will provide additional quality migratory and breeding habitat.

This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

3. **Waterfowl**
   The freshwater marshes, hardwood swamps, and open water habitats provide important stop-over areas for migrating and wintering waterfowl. Large concentrations of American black ducks, green-wing teal, mallard, and American wigeon use habitats in this CFA. Other species include Canada geese, bufflehead, canvasback, wood duck, northern pintail, gadwall, and mergansers.

4. **Diadromous fish and other aquatic species**
   The Mill River CFA is located along the Connecticut River which provides important habitat for PRRC species including American shad, shortnose sturgeon, American eel, blueback herring, and Atlantic salmon. The lower portion of the Mill River also supports river herring. Sea lamprey, another species of conservation concern, also occurs in this CFA providing important ecological benefits to aquatic systems.

5. **Wetlands**
   There are approximately 2,000 acres of floodplain habitat in the Mill River CFA. This floodplain is adjacent to the city of Northampton, and due to the rich soils, has mostly been converted to agriculture land. Six hundred and thirty-seven acres of hardwood swamp, 31 acres of shrub swamp and floodplain forest, and 76 acres of freshwater marsh are the current wetland habitats in the floodplain. The Nature Conservancy considers the floodplain forest that occurs in this CFA, and in other areas along this section of the Connecticut River, as ecologically important. These remnant floodplain forests contain some of the largest floodplain trees, and likely the most fertile soils in the watershed (Marks et al 2011).

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will focus on restoration of degraded floodplains, including where appropriate restoring the primary natural disturbance mechanism (seasonal flooding) and species composition and structure to accepted historical conditions. Management of upland forests will improve structural diversity and species composition will be appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

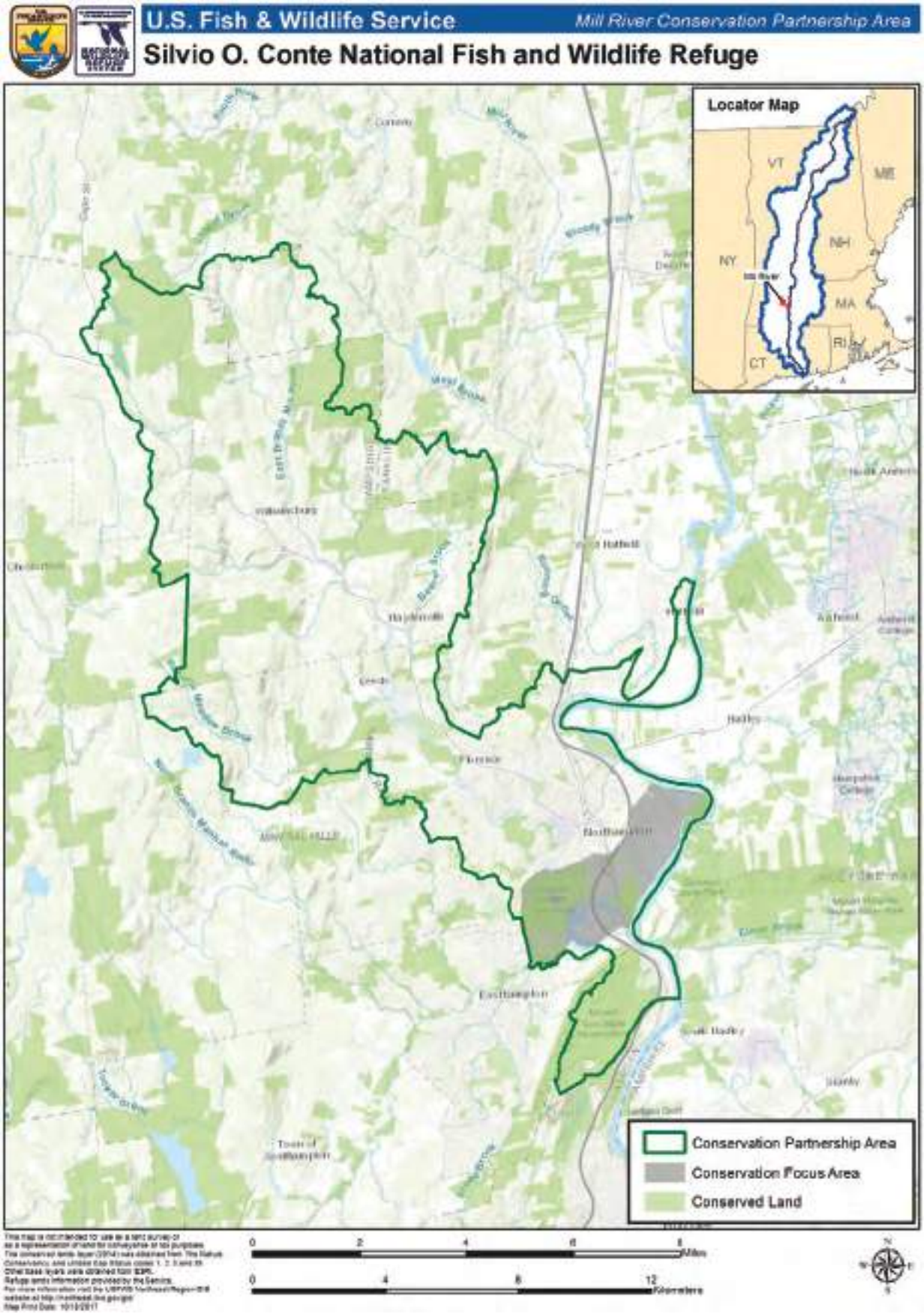
- We will also manage the emergent and shrub wetland habitats, and will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (stream, rivers, and coves) habitats, we will focus on maintaining stream connectivity, establishing riparian buffers, and reducing run-off from the surrounding landscape. Continue to support research projects, and work with partners, including the Service's Endangered Species Office, to manage and monitor the Federally listed species that occur in the CFA.

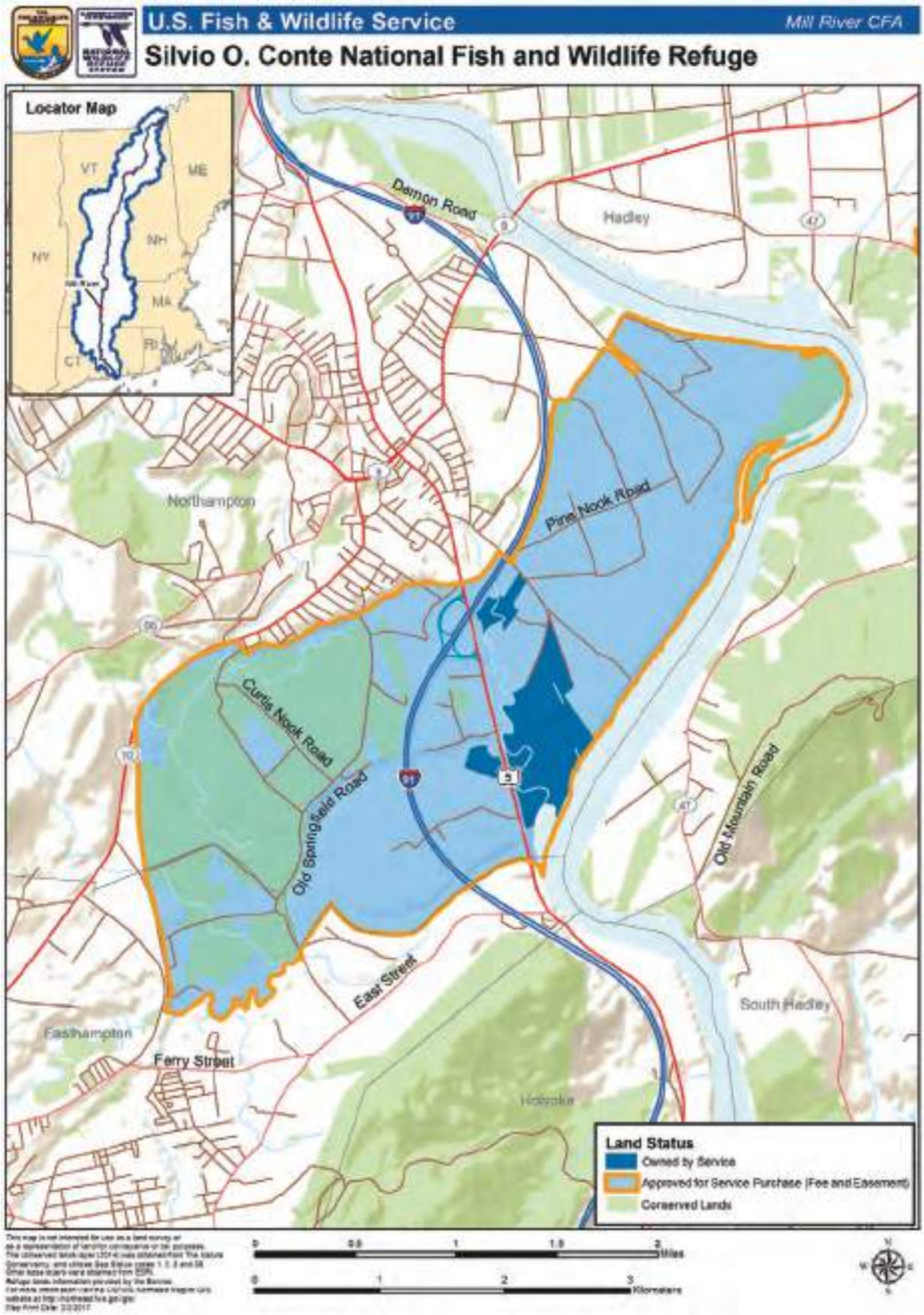
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: fishing, hunting, wildlife observation and photography, interpretation, and environmental education.

Map A.36. Mill River CPA.



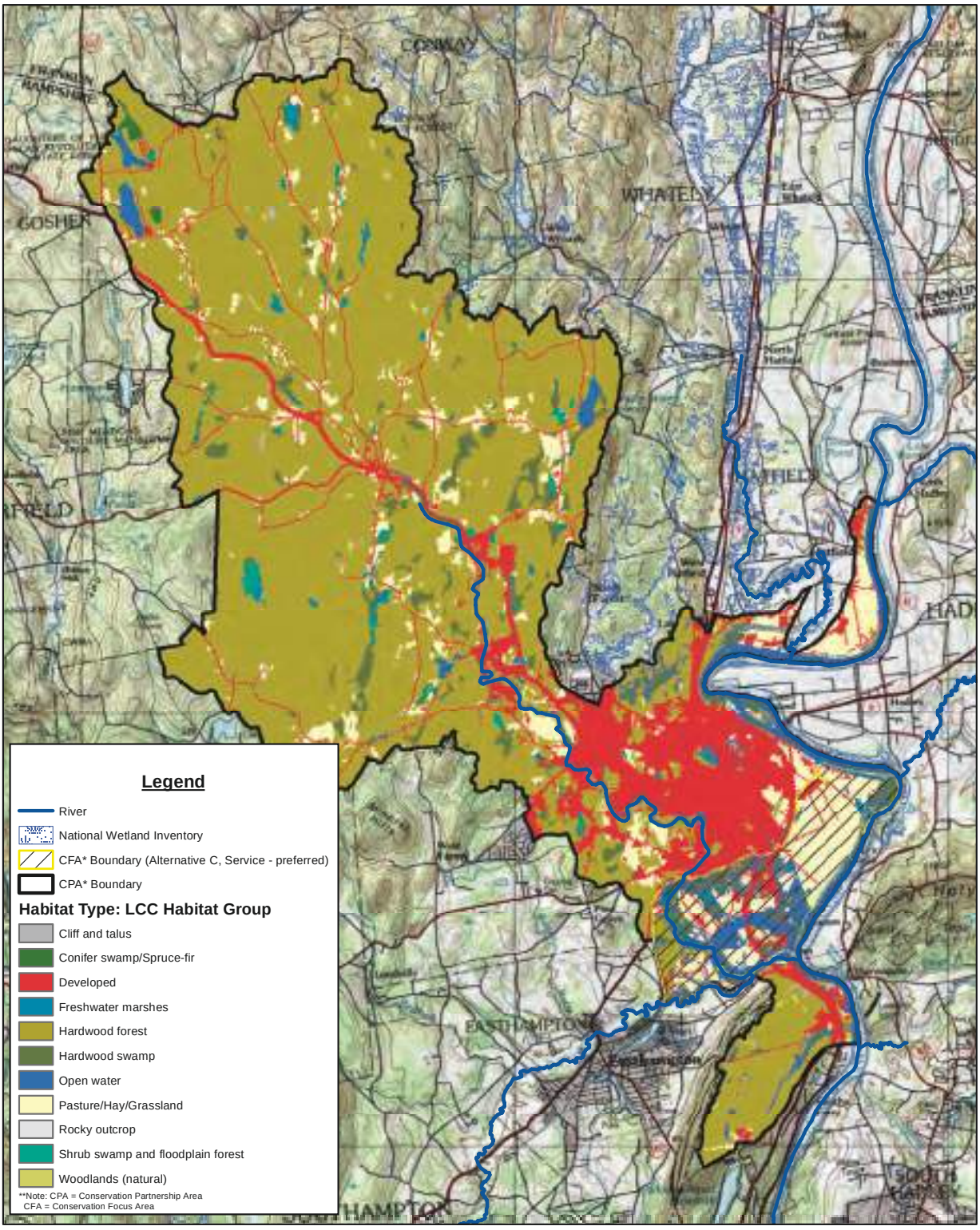
Map A.37. Mill River CFA – Location.



Map A.38. Mill River CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Mill River CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes. For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 1 2 3 4 Miles

0 1.5 3 4.5 6 Kilometers

N W E S

Table A.22. Mill River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	78	0.2%	-	-	-	0.0%	0.0%
Hardwood forest	29,640	65.6%	285	178	8	8.8%	1.0%
Hardwood swamp	2,209	4.9%	638	345	103	19.8%	28.9%
Shrub swamp and floodplain forest	303	0.7%	31	13	0	1.0%	10.4%
Woodlands (natural)	140	0.3%	-	-	-	0.0%	0.0%
Forested uplands and wetlands subtotal	*32,370*	*71.7%*	*954*	*536*	*112*	*29.6%*	*2.9%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	62	0.1%	-	-	-	0.0%	0.0%
Freshwater marshes	275	0.6%	76	57	6	2.4%	27.8%
Pasture/hay/grassland	4,282	9.5%	1,412	240	18	43.8%	33.0%
Rocky outcrop	2	0.0%	-	-	-	0.0%	0.0%
Non-forested uplands and wetlands subtotal	*4,621*	*10.2%*	*1,489*	*297*	*24*	*46.1%*	*32.2%*
Inland aquatic habitats[9]							
Open Water	1,504	3.3%	330	24	63	10.2%	22.0%
Inland aquatic habitats subtotal	*1,504*	*3.3%*	*330*	*24*	*63*	*10.2%*	*22.0%*
Other							
Developed	6,661	14.8%	454	65	4	14.1%	6.8%
Other subtotal	*6,661*	*14.8%*	*454*	*65*	*4*	*14.1%*	*6.8%*
TOTAL[10]	**45,156**	**100.0%**	**3,227**	**922**	**203**	**100.0%**	**7.1%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.23. Mill River CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 286 acres		
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically ≥ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	Migratory Species Little Brown Bat[I]
Hardwood Swamp[5] - 637 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory Species
Shrub Swamp and Floodplain Forest[5] - 31 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory Species
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 76 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Migratory species

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Pasture/Hay/Grassland[5] – 1,412 acres		
Where appropriate and supported by the local community, restore to floodplain forest	*Laurentian-Acadian floodplain forest* occur along medium to large rivers, and include a matrix of upland and wetland habitats. Floodplain forests, with silver maple are characteristic, as well as herbaceous sloughs and shrub wetlands. Most areas are underwater each spring; micro-topography determines how long the various habitats are inundated. Associated trees include red maple and American hornbeam, the latter frequent but never abundant. On terraces or in more calcium rich areas, sugar maple or red oak may be locally prominent, with yellow birch and ash, black willow is characteristic of the levees adjacent to the channel. Common shrubs include silky dogwood and viburnum. The herb layer in the forested portions often features abundant spring ephemerals, giving way to a fern-dominated understory in many areas by mid-summer. Non-forested wetlands associated with these systems include shrub-dominated and grass-non-woody vegetation (Gawler 2008).	Migratory species
Inland Aquatic Habitats[4]		
Water, including River Shoreline Habitat[5] – 321 acres		
Puritan Tiger Beetle[B, D]	Breeding and wintering habitat includes sparsely vegetated or open sandy beaches along large rivers where river flow dynamics restrict woody plant growth (USFWS 1993).	Sea Lamprey[I] Eastern Silvery Minnow[I] Burbot[I] Black Dace[I] Longnose Sucker[I] **Slimy Sculpin**[I] Creek Chubsucker[I] Longnose Dace[I] Brook Snaketail[I]
Dwarf Wedgemussel[B, D, F]	Inhabits creeks and small rivers, prefers the stable bank conditions afforded by gravel or sandy substrates, and good water quality (Nedeau et al. 2000, USFWS 1993).	
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	
Shortnose Sturgeon[B, D, F, G]	Spawn in slow-moving, 48 F water of large rivers, and feed in fresh and brackish water along the river bottom (USFWS 1996).	
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58 F (USFWS 1996).	
American Shad[B, F, G]	Spawn when the water temperature is above 60° F in shoal area of river and lower reaches of larger tributaries (USFWS 1996).	
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/ coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A:2008 Bird Conservation Region 30.

I: 2015 Massachusetts Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Objectives and Strategies for Refuge Lands in the Mill River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for spring and fall migrants, and potential roosting and foraging areas for the northern long-eared bat and tricolored bat.

Rationale:
We envision healthy forests within the Mill River CFA where a diverse seral structure provides suitable habitat conditions for a suite of Massachusetts wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011)

Mill River CFA hardwood forests provide a diversity of habitats for wildlife. To date our review of the Mill River CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Mill River comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Mill River are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Moore et al. 1990, Petit 2000, Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Moore et al. 1990, Noss 1991). Clearly, structurally complex habitats will not be suitable for all migratory species, but our conservation goal is to provide those areas used most frequently by migrating birds, suggesting relatively tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990, Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. While our management goals may create a relatively old forest, hardwood forests within Mill River will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated (i.e. forest-agricultural edge and suburban forest of the type within Mill River) and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al. 2004).

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches of greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Live, dead or dying trees that are >3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the northern flicker.

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Mill River's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of foraging opportunities. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991, DeGraaf et al. 2006). Efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney and Waller 2003, Côté et al. 2004, see also Rawinski 2008).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible. In particular, focus on:

  - ✓ Managing invasive species that weaken or kill native trees (such as oriental bittersweet) or prevent their regeneration (such as exotic bush honeysuckle).

  - ✓ Removing amur corktree before it reproduces and spreads.

  - ✓ Regularly monitoring for Japanese stiltgrass, mile-a-minute vine, and other new invaders.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants, as well as wintering habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Mill River Conservation Focus Area (CFA) represent a number of natural communities. Historically they have undergone significant alteration, and have great potential for restoration. Where this habitat occurs along riparian and floodplain areas it is often found in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the watertable drives complexes of forest upland and wetland species including pin oak, red maple, swamp white oak, sweetgum, and blackgum. The examples identified within the Mill River CFA largely occur within the floodplain of the Connecticut River. Within the Mill River floodplain, hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Saturation remains seasonal and unique species mixtures result, including eastern hemlock, red maple, and blackgum.

These two systems do share a common disturbance history; agricultural practices, development pressures, and selective logging have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Mill River will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, backwater sloughs, and oxbow lakes will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This CFA may also provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complements adjacent land management.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories including surveys for rusty blackbirds during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Restore native species composition and structure, and improve the natural hydrology, as needed, to support natural and rare shrub swamp and floodplain forest ecological communities. Management will provide stopover habitat for spring and fall migrants, as well as wintering habitat for rusty blackbirds.

Rationale:
The shrub swamps in the Mill River CFA are restricted to poorly drained areas and small seepage zones within the hardwood swamp communities in the CFA. These shrub swamp systems can have a patchwork of shrub and grass dominance, and may include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). Based on our coarse-scale habitat analysis, the shrub swamps are also adjacent to development and agricultural land, which may have impacted the hydrology of the wetland. Water pollution and invasive species introductions are also threats for shrub swamp communities.

Restoration of shrub swamp communities, as well as the surrounding forested habitat, will create high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Mill River CFA is situated on the Connecticut River, and can provide significant stopover habitat for migrants in the spring and fall. Neo-tropical migrants typically use similar habitats during migration as they do during the breeding season (Petit 2000). Species such as gray catbird, yellow-rumped warbler, white-eyed vireo, eastern phoebe, eastern kingbird, and common yellowthroat will use shrub habitats during migration (McCann et al. 1993). Native shrubs will provide migrants with soft mast and abundant insects to replenish fat reserves, and structure to provide rest and adequate cover from predators and inclement weather.

This CFA also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

In 2003, before this unit was purchased, refuge staff began leading volunteers to control invasive water chestnut in one of the ponds. The patch of forested floodplain between the two ponds is one of the few places on the division devoid of invasive plant species, perhaps due to frequent or long-term inundation. However, along the edge of this patch, Oriental bittersweet is taking hold and could pose a possible threat in the event of a local hydrological alteration. In 2012, refuge staff and Youth Conservation Corps crews began cutting bittersweet that was threatening overstory trees. Success in protecting the mature floodplain forest trees from bittersweet will be a long-term process. Other invasive species on the division include exotic bush honeysuckle, garlic mustard, purple loosestrife, Japanese barberry. One early detection species, Amur corktree, was identified within the floodplain forest.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Continue to control known invasive plant infestations. In particular:
  - ✓ Control oriental bittersweet that threatens canopy trees and young floodplain trees by pulling smaller plants and cutting larger stems of bittersweet. Follow-up cutting by treating cut stems and resprouting foliage with herbicide.
  - ✓ Treat black locust using herbicides and by following best management practices *(http://mnfi.anr.msu.edu/invasive-species/BlackLocustBCP.pdf)*.
  - ✓ Control Amur corktree and other new invasive species that are known to withstand flooding to protect the regeneration of floodplain forest.
- Coordinate with the Massachusetts Natural Heritage and Endangered Species Program and the local Conservation Commission to ensure invasive plant management complies with the Massachusetts Endangered Species Act and the Massachusetts Wetland Protection Act.
- During the development of the Habitat Management and Integrated Pest Management Plans, assess the threats to native plants from invasive plants and develop priority invasive plant management strategies to limit these threats.
- Minimize refuge activities that disturb wetland communities.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Survey wildlife utilization of wetlands including surveys for rusty blackbirds during the migration and wintering periods.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.1a. (Freshwater Marshes)
Restore native species composition and structure, and improve the natural hydrology, as needed, to support natural and rare ecological freshwater marsh communities. Management will provide stopover habitat for spring and fall migrants.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail (Gawler 2008). Based on our coarse-scale habitat analysis, freshwater marsh habitat occurs in the hardwood swamp communities of the Mill River CFA. These wetlands (hardwood swamps and freshwater marshes) are adjacent to development and agricultural land, which may have impacted their hydrology. Water pollution and invasive species introductions are also threats for freshwater marsh communities.

Restoration of freshwater marsh communities, as well as the surrounding forested habitat, will create high-quality habitat for neotropical migratory birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Mill River CFA is situated on the Connecticut River, and can provide significant stopover habitat for migrants in the spring and fall. Neo-tropical migrants typically use similar habitats during migration as they do during the breeding season (Petit 2000). These freshwater marshes may provide stopover habitat for rails, egrets, and bitterns.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Minimize refuge activities that disturb wetland communities.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Survey wildlife utilization of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Restore historic composition and structure, and improve the natural hydrology and landscape connectivity to support natural and rare ecological communities. Management will provide stopover habitat for migratory species.

Rationale:
Sixty-four percent of the Mill River CFA is agricultural land, which is grouped in the more practical Pasture/Hay/Grassland habitat type for the CCP. These agricultural fields lay within the active floodplain of the Connecticut River. This floodplain encompasses the lower portion of the Mill River, and is a natural flood storage area for the surrounding communities.

The topography and natural processes of floodplain systems result in the development of complex upland and wetland vegetation on generally flat topography, and soils deposited by the river. The Mill River CFA has this diversity of habitats in areas not cleared for agricultural use. Hardwood forests and swamps, shrub swamps, and freshwater marsh are part of the floodplain. Silver maple is a characteristic species of a floodplain forest, as well as red maple, ash, red oak, and yellow birch. Common shrubs include black willow, silky dogwood, and viburnums. The herbaceous layer within the forested portions of the floodplain, include spring ephemerals and ferns (Gawler 2008).

Restoration of this floodplain will provide a more contiguous and diverse breeding and migratory habitat for a variety of wildlife species. The Mill River CFA is significant migration habitat as it is located along the Connecticut River, an important migratory corridor (Smith College 2006). A restored floodplain will also improve its function to retain and slow flood waters, reducing the extent of damage to the surrounding communities, and thereby improving water quality.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Restore agricultural land as it becomes available and with local support, either through tree plantings or natural processes.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water and River Shore)
In collaboration with partners, identify and implement habitat restoration opportunities within the Mill River CFA and Connecticut River to benefit priority refuge resources of concern including American shad, shortnose sturgeon, American eel, blueback herring, Atlantic salmon, dwarf wedgemussel, and Puritan tiger beetles, as well as other species of conservation concern such as sea lamprey.

Rationale:
The Mill River CFA provides habitat for a diversity of aquatic and river shoreline species. The Connecticut River and associated tributaries provides migration and feeding habitat for American shad, shortnose sturgeon, American eel, blueback herring, and Atlantic salmon. The main stem shoreline within the CFA supports a population of federally listed Puritan tiger beetles. Dwarf wedge mussel, also a federally listed species, occurred historically in the CFA near Pynchon Meadows.

Shortnose sturgeon, a federally listed species, and Atlantic salmon use this section of the Connecticut River during migration. Blueback herring, American shad and American eel use the main stem and the Mill River which runs through the CFA. American eel feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

Another species of conservation concern that utilize freshwater aquatic habitats in this CFA is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

The Puritan tiger beetle, a federally listed species, uses beach habitat in the northeast portion of the CFA along the Connecticut River. The river flow dynamics of the Connecticut River restricts woody plant growth, provides sparsely vegetated and open sandy beaches required by these beetles. This beach habitat is owned by MA Wildlife and the city of Northampton. The recovery criteria in the USFWS Puritan Beetle Recovery Plan specifies that a minimum of three metapopulations, at least two of which are large (500-1000+ adults) are maintained or established (ie. self-maintained for at least 10 years) within the species historical range along the Connecticut River, and habitat they occupy is permanently protected (Hill and Knisley 1993). The current tiger beetle population in the CFA is below 100 individuals, and population levels seem to be declining (Davis 2012). Encroaching vegetation and recreational activities on the beach and Connecticut River are contributing factors toward this instability.

There is a historic location of dwarf wedgemussel, a federally listed species, in the Mill River Division near Pynchon Meadows. This species requires stable bank conditions afforded by gravel or sandy substrates, and good water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000). An inventory of this area will be necessary to determine dwarf wedgemussel presence, and to assess current habitat suitability.

Restoration of upland and wetland habitats in the Mill River CFA will improve water quality of these river systems by eliminating erosion, and providing forest or wetland buffers to reduce sedimentation and filter out contaminants in riparian areas. We will work with partners to provide clear aquatic species passage to spawning habitat, and assist with fish population research and monitoring. We will also assist with conducting education of the local community to decrease recreational impacts on the Puritan tiger

beetle, and remove vegetation from beach habitat to improve conditions for beetle larvae. Baseline information on the condition of the water resources, and associated upland and wetland habitats in the CFA will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan (HMP).

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to reduce combined sewer overflow affecting aquatic resources.
- Work with adjacent landowners to eliminate barriers to aquatic species passage.
- Continue to support Puritan tiger beetle research opportunities.
- Hand-pull or apply herbicide to encroaching vegetation in Puritan tiger beetle larval habitat.

Within 10 years of land acquisition and CCP approval:

- Work with partners to protect and increase "hard bottom" (e.g., gravel, cobble, or bedrock) for spawning aquatic species.
- Work with partners to educate the general public about recreational use impacts on Puritan tiger beetle populations using outreach, visitor contact, restricted access and other tools, as warranted.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with the USFWS New England Endangered Species Office to inventory area for dwarf wedgemussel, and assess habitat conditions to determine if restoration of aquatic habitat is appropriate.
- Work with partners, to continue to inventory Puritan tiger beetle populations to allow further analysis of population trends.

Within 10 years of CCP approval:

- Monitor recreational use activities to address recurring issues and impacts to Puritan tiger beetle populations

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Mill River Division as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Mill River Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Mill River Division as an outdoor classroom.

Rationale:
Because this division will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Mill River Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Mill River Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Mill River Division will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Mill River Division's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Mill River Division.

- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Mill River Division.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Mill River Division will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Mill River Division will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. The Mill River Division has been a popular area with hunters for many years prior to acquisition by the Service and has been open under a pre-acquisition compatibility determination. Retaining hunting opportunities at this division conforms to historic use on this property and much of the surrounding land in the area. Popular game species include white-tailed deer, Eastern wild turkey, waterfowl, and cottontail rabbits. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
Continue to:

- Allow hunter access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Install an informational kiosk to post information on hunting seasons and other notices to visitors.

Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Mill River Division kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Offer to host hunter education field courses.

- Work with Massachusetts Department of Fish and Game to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Mill River Division after completing all administrative procedures to officially open refuge lands to fishing, based on Massachusetts Department of Fish and Game regulations, and division-specific conditions, if necessary.

Rationale:
Fishing is a priority public use on national wildlife refuges and a popular outdoor recreational activity. The division has been open to fishing, following acquisitions, through a pre-acquisition compatibility determination, but no formal opening package or fishing plan has been completed. Fishing from the banks of the Connecticut River and Magnolia and Triangle ponds on the division are popular recreational activities.

Management Strategies:
Continue to:

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Mill River Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Although most anglers will be drawn to the Connecticut River or other areas better known for fishing, the Mill River offers the opportunity to fish for game fish including sunfish and bullhead. Visitors unaware of this available resource may choose to participate while on the division.

Management Strategies:
Within 5 years of CCP approval:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Mill River Division.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in this part of the state. Currently, there is no infrastructure in place at the division to support this use, and consequently, visitation for wildlife viewing and photography is limited. Allowing people to engage in wildlife observation and photography is in keeping with the nature of the area.

Management Strategies:
Continue to:

- Allow wildlife observation and photography at the Mill River Division.
- Allow public access at the Mill River Division daily from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

Within 1 year of CCP approval:
- Construct an informational kiosk to post information and notices for visitors.

Within 10 years of CCP approval:
- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of CCP approval:
- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the division.

Rationale:
The entire division is available for wildlife observation and photography; however, there are steps the refuge can take to enhance their time on the division. Visitation increases are expected as this division expands and becomes better known. By providing new visitors a quality experience they are more likely to return and tell friends. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of CCP approval:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of CCP approval:
- Produce a wildlife and plant species guide for the Mill River Division that will be available on the refuge website, at the refuge headquarters, and at division kiosk.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups to offer wildlife-related trips to the division.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Mill River Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route.

Within 5 years of CCP approval:

- Work with public and private partners to determine whether and what roles this division might contribute to a Connecticut River waterway trail.

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Mill River Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Mill River Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate, and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division. Each of these must be found to be both appropriate and compatible to be an authorized use of the refuge.

Management Strategies:
Continue to:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.

- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.

Within 1 year of CCP approval:

- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.

- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Westfield River Conservation Focus Area (Existing Refuge Division)

Washington, Middlefield, and Becket, Massachusetts

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	6,177	84 %
■ *Existing Refuge Ownership in CFA*[1]	*125*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*6,052*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	1,162	16%
Total Acres in CFA[2,4]	7,339	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Westfield River CPA (map A.39) encompasses the Westfield River CFA (map A.40). The refuge's existing Westfield River Division was established in 2013. The Westfield River CFA is part of an area identified by the State of Massachusetts as a priority for conservation. It will offer the opportunity to conserve lands along a high-quality segment of the Westfield River that supports cold-water fisheries, such as eastern brook trout. The CFA is located in an area with an extensive conserved lands network, including the Gilbert A. Bliss and Dead Branch State Forests, the Chesterfield Gorge Reservation (Trustees of Reservations, the Hiram H. Fox, Brewer Brook, and Fisk Meadows Wildlife Management Areas, and U.S. Army Corps of Engineers Land (Knightville Dam and Indian Hollow). Virtually all of the Westfield River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional land protection by the Service in this area will help better connect these conserved lands.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 90.4%
- Shrub swamp and floodplain forest – 0.8%
- Conifer Swamp/Spruce-Fir – 2.1%

For more information on the habitats in the CFA, see map A.41 and table A.24.

What are the resources of conservation concern for the CFA?

As noted in table A.25 below, there are nine priority refuge resources of concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity, Diversity, and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and species that require large contiguous forest tracts including forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem. Migrants become more evenly distributed in watershed habitats beyond the Connecticut River main stem (Smith College 2006). The Westfield River CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat as well.

   The Westfield River CFA is within the West Branch of the Westfield River Watershed which provides a contiguous core of mostly undeveloped forested acres. The mosaic of habitat types and undeveloped contiguous forested acres in the Westfield River CFA supports a diversity of breeding landbirds, including species of conservation concern and forest interior dwelling species. These include PRRC species such as wood thrush, blackburnian warbler, chestnut-sided warbler, American woodcock, and Canada warbler. This CFA is in the core range for many other species of conservation concern including black-throated blue warbler, black-throated green warbler, ruffed grouse, ovenbird, veery and purple finch.

3. **Waterfowl**
   Potential breeding and foraging habitat for American black duck, a PRRC species, wood duck, Canada geese, and other waterfowl species within wetlands adjacent to slow moving streams and open water habitats.

4. **Diadromous fish and other aquatic species**
   The West Branch of the Westfield River flows through the town of Becket along the southwest portion of the CFA. This branch is a free-flowing river with very few aquatic barriers along its tributaries. The West Branch, and two of its tributaries, Coles Brook and Factory Brook provide important cold water habitat for PRRC including brook trout and Atlantic salmon. Other cold aquatic species that occur within this watershed include slimy sculpin, lake chub, and many species of invertebrates such as mayflies, stoneflies, caddisflies. American eel, species of conservation concern for the Service and state SGCN, also occurs in the Westfield River CFA.

5. **Wetlands**
   The Westfield River CFA contains 19 acres of hardwood swamp, 157 acres of conifer swamp, 63 acres shrub-swamp, and floodplain forest, and 10 acres of freshwater marsh. Many of these wetlands occur along slow moving streams or small ponds. Habitat patches range from 2 acres to 57 acres in size.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide a diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse and species composition will be appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- In open water (stream, rivers, ponds) habitat, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

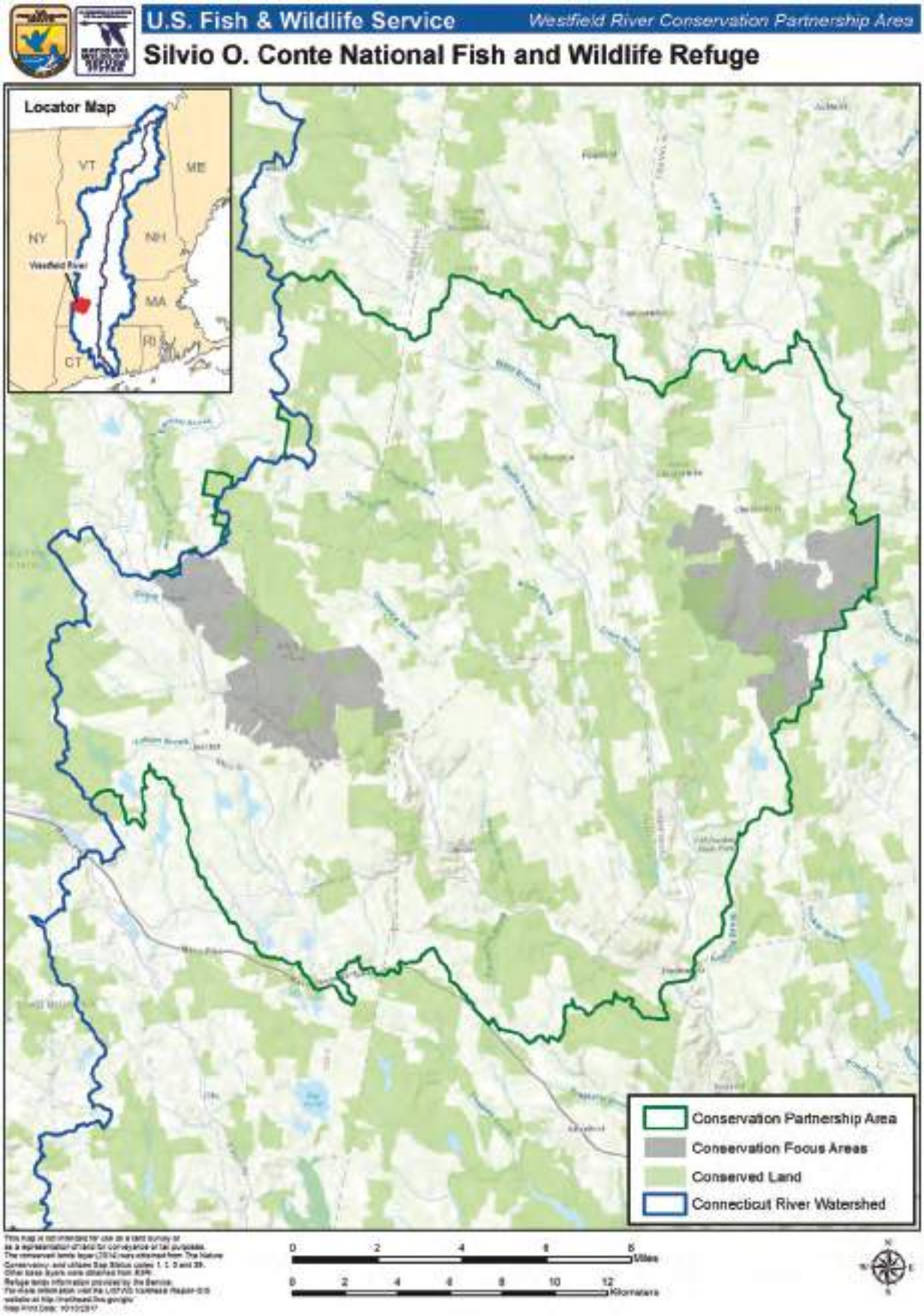
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, interpretation, and environmental education.

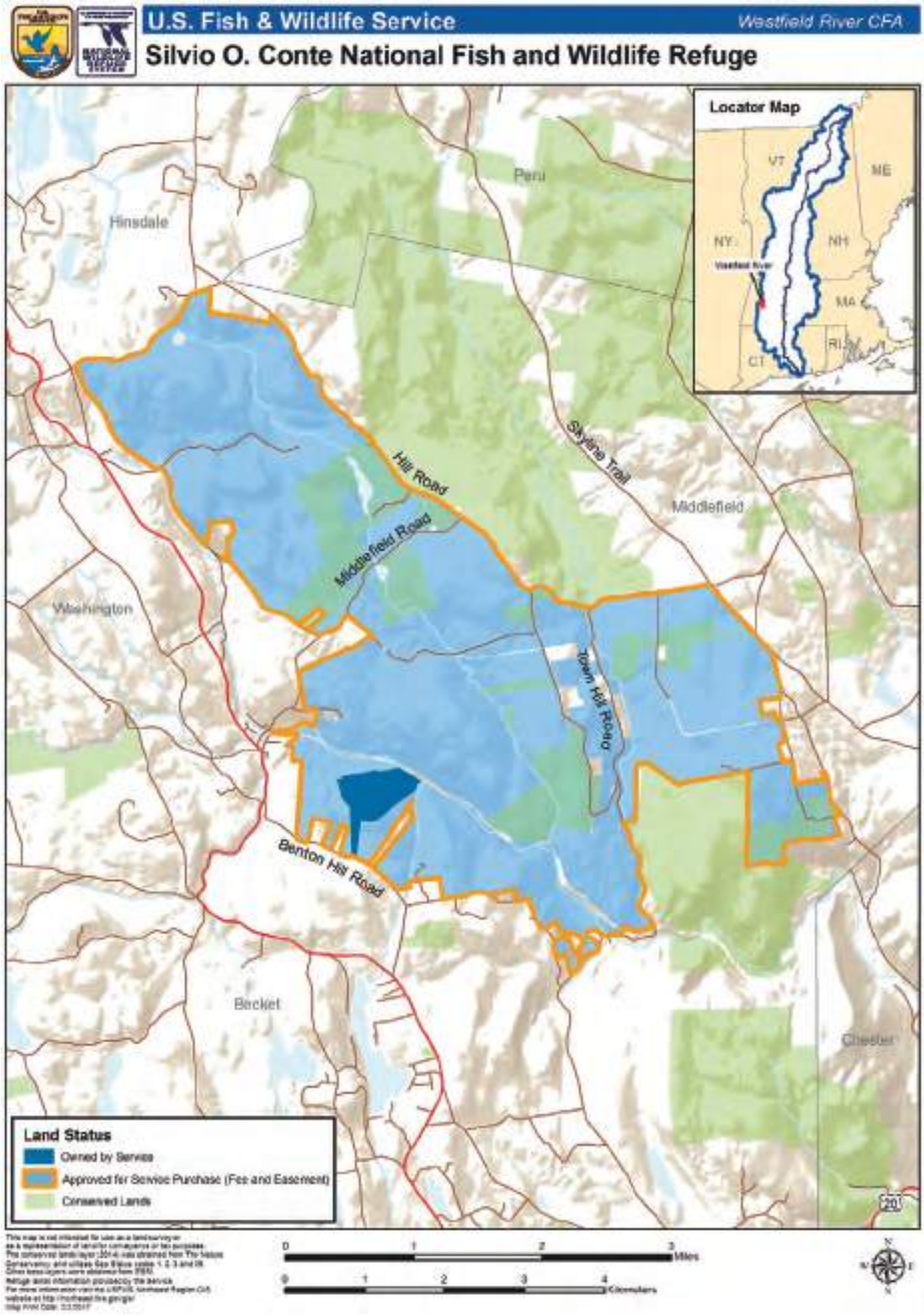
Were there other special considerations in delineating the CFA boundary?

The Westfield River Watershed has been recognized by The Nature Conservancy, the State of Massachusetts, and the National Wild and Scenic Rivers program as one of the most intact river systems in Massachusetts and one of the healthiest tributaries to the Connecticut River. The watershed is currently over 80 percent forested and only 4 percent developed, remarkable for southern New England. The West Branch within the Westfield River CFA is 91 percent forested, 6 percent in wetlands and other natural cover, and only 3 percent developed.

Map A.39. Westfield River CPA.



Map A.40. Westfield River CFA – Location.



Map A.41. Westfield River CPA/CFA – Habitat Types.

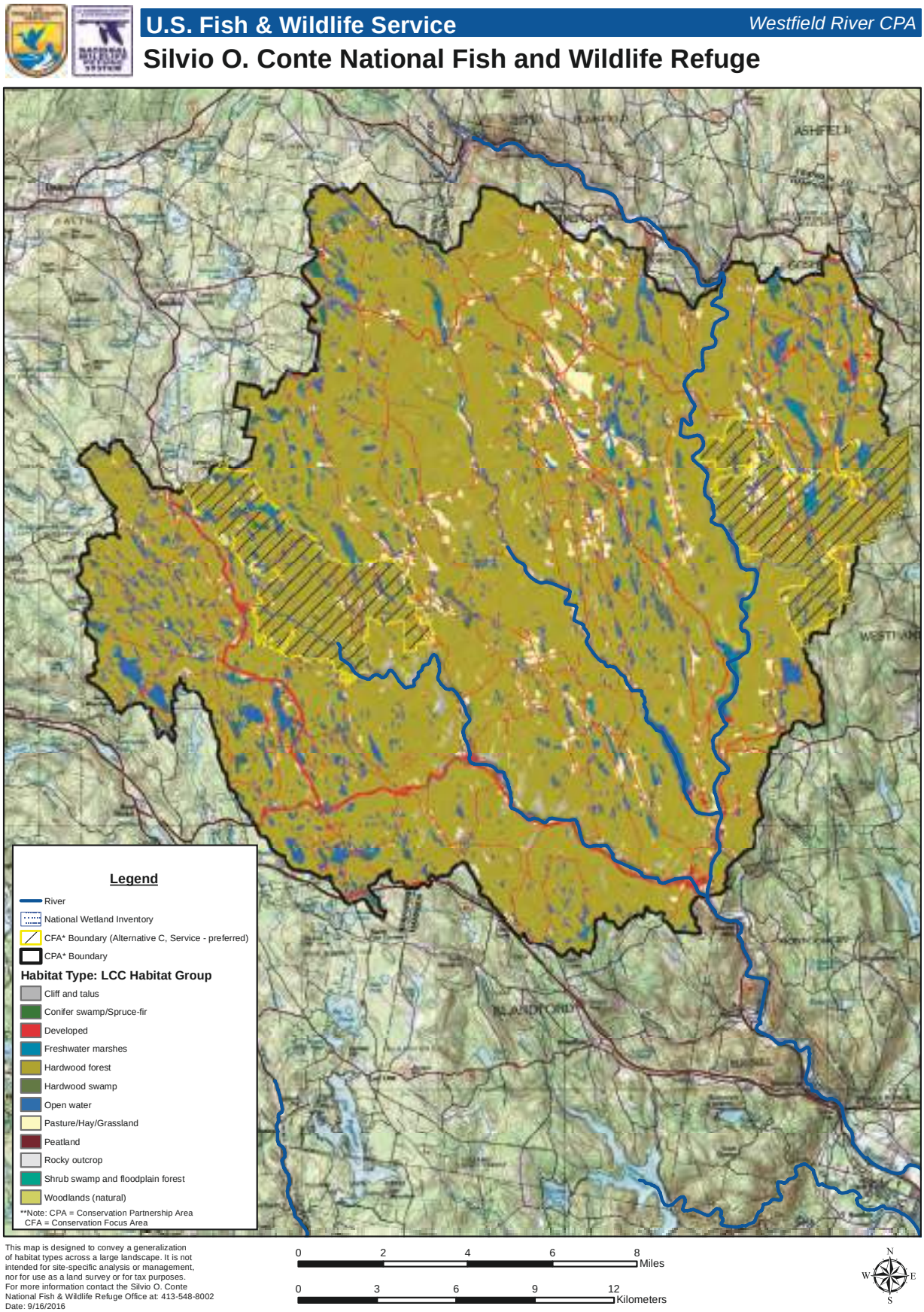


Table A.24. Westfield River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	1,710	1.1%	157	34	–	2.1%	9.2%
Hardwood forest	127,135	85.3%	6816	1,060	125	90.5%	5.4%
Hardwood swamp	2,445	1.6%	19	–	–	0.3%	0.8%
Shrub swamp and floodplain forest	1,018	0.7%	63	6	–	0.8%	6.2%
Woodlands (natural)	562	0.4%	32	16	–	0.4%	5.8%
Forested uplands and wetlands subtotal	*132,871*	*89.1%*	*7087*	*1,116*	*125*	*94.1%*	*5.3%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	775	0.5%	14	4	–	0.2%	1.9%
Freshwater marshes	676	0.5%	10	2	–	0.1%	1.5%
Pasture/hay/grassland	6,224	4.2%	169	23	–	2.2%	2.7%
Peatland	4	0.0%	0	–	–	0.0%	0.0%
Rocky outcrop	256	0.2%	39	–	–	0.5%	15.3%
Non-forested uplands and wetlands subtotal	*7,935*	*5.3%*	*233*	*28*	–	*3.1%*	*2.9%*
Inland aquatic habitats[9]							
Open Water	1,547	1.0%	60	27	–	0.8%	3.9%
Inland aquatic habitats subtotal	*1,547*	*1.0%*	*60*	*27*	–	*0.8%*	*3.9%*

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Other							
Developed	6,751	4.5%	155	16	–	2.1%	2.3%
Other subtotal	*6,751*	*4.5%*	*155*	*16*	–	*2.1%*	*2.3%*
TOTAL[10]	**149,103**	**100.0%**	**7534**	**1,187**	**125**	**100.0%**	**5.1%**

Notes:

5 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

6 Conservation Partnership Area

7 Conservation Focus Area

8 Percentage of the CPA represented by the habitat type

9 Acres in the CFA currently conserved by others (TNC 2014)

10 Acres in the CFA currently owned by the Service

11 Percentage of the CFA represented by the habitat type

12 Percentage of a given habitat within the CPA protected within the CFA

13 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

14 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.25. Westfield River CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 6,815 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Black-throated Blue Warbler[A] Broad-winged hawk[I,J] Black-billed Cuckoo[A, J] Black-throated Green Warbler[A] Ruffed Grouse[A, I] Whip-poor-will[A, I, J] **Louisiana Waterthrush**[I] Brown Thrasher[I] **Ovenbird**[A] **Eastern Red Bat**[I] Veery[A] American Redstart[A, J] Eastern Box Turtle[I] Four-toed Salamander[I] Sharp-shinned Hawk[J] Little Brown Bat[I] Purple Finch[A] Yellow-bellied Sapsucker[A,J] Black Racer[I] Bobcat[I] Moose[I] Black Bear[I] Rose-breasted Grosbeak[A]
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Chestnut-sided Warbler[A, B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	
Hardwood Swamp[5] – 19 acres		
North-Central Appalachian acidic swamp[H] North Central Interior and Appalachian rich swamp[H]	*North-Central Appalachian acidic swamps* are found in basins or on gently sloping seepage lowlands. Eastern hemlock is usually present and may be dominant. It is often mixed with deciduous wetland trees such as red maple or black tupelo. Species of the genus Sphagnum are an important component of the moss layer. *North Central Interior and Appalachian rich swamps* are found in basins where higher p[H] and/or nutrient levels are associated with a rich flora. Species include red maple, black ash, as well as calcium loving herbs. Conifers include American larch, but typically not northern white cedar, which is characteristic of more northern wetland systems. There may be shrubby or herbaceous openings within the primarily wooded cover. The substrate is primarily mineral soil, but there may be some peat development (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Conifer Swamp[5] - 157 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	Purple Finch[A,I] Northern Parula[A,I]
Shrub Swamp and Floodplain Forest[5] - 63 acres		
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands, and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	Chestnut-sided Warbler[A,B] Ruffed Grouse[A, I] **Warbling Vireo** **Spotted Turtle**[I] American Redstart[A, J] Eastern Kingbird[J] Gray Catbird[J] Wood Duck[J] Eastern Towhee[I] White-throated Sparrow[I] **Willow Flycatcher** Canada Goose[A]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	
Woodlands (natural)[5] - 32 acres		
Central Applachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Cliff and Talus[5] - 14 acres		
Laurentian-Acadian acidic cliff and talus[H] North-central Appalachian circumneutral cliff and talus[H]	These cliff systems occur at low to mid elevations, well below treeline. The vegetation within the *Laurentian-Acadian acidic cliff and talus system* is patchy and often sparse, punctuated with patches of small trees such as birches and spruce species. Species that prefer calcium rich soils are absent. In north-facing or other sheltered settings where cold air accumulates at the bottom of slopes, a shrubland of heaths and reindeer lichens can develop. Eastern red cedar is a characteristic tree species, poison ivy a characteristic woody vine, and common polypody a characteristic fern. Substrates within the *circumnuetral cliff and talus system* include limestone, dolomite and other rocks. The vegetation varies from sparse to patches of small trees, in places forming woodland or even forest vegetation. Ash, basswood, and American bladdernut are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., yellow jewelweed, purple cliffbrake, ebony spleenwort, or bluntlobe cliff fern (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Freshwater Marshes[5] - 10 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**Marsh Wren** **American Bittern**[A,I] Northern Harrier[A,I,J] Spotted Turtle[I] Northern Leopard Frog[I] Canada Goose[A,J] Eastern Ribbon Snake[I] Wood Duck[J]
Pasture/Hay/Grassland[5] – 168 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[I,J] Northern Harrier[A,I,J] **Bobolink**[A,I] **Eastern Meadowlark**[I] **Grasshopper Sparrow**[I] Black Racer[I] White-throated Sparrow[I] American Kestrel[I] Northern Leopard Frog[I] Prairie Warbler[I] Chestnut-sided Warbler[A,B]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Rocky Outcrop[5] – 39 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	*The Northern Appalachian-Acadian rocky heath outcrop system* occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including Sheep laurel, Low-bush blueberry, Black huckleberry, and Black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Inland Aquatic Habitats[4]		
Open Water[5] – 60 acres		
American Eel[E, F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	Longnose Sucker[I] Black Dace[I] **Slimy Sculpin**[I] Creek Chubsucker[I] Longnose Dace[I] Lake Chub[I] Arrow Clubetail[I] Riffle Snaketail[I]
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.
B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.
C: 2008 USFWS Birds of Conservation Concern.
D: Federal Threatened and Endangered status as of 2016, including Candidate Species
E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016
F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan
G: Silvio O Conte Refuge Purpose Species.
H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.
I: 2015 Massachusetts Comprehensive Wildlife Conservation Strategy
J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Westfield River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, chestnut-sided warbler, American woodcock, Canada warbler, blackburnian warbler, and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
We envision healthy forests within the Westfield River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Massachusetts wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Forests of the Westfield River CFA blanket a watershed recognized by The Nature Conservancy, the State of Massachusetts, and the National Wild and Scenic Rivers program as one of the most intact river systems in Massachusetts. This intact mosaic of habitats is among the most diverse and productive for wildlife in the Connecticut River watershed, and abundant, high-quality habitat is certainly available within the CFA. To date our review of the Westfield River CFA habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Westfield River comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of the Westfield River are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Westfield River will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like refuge priority species of concern American woodcock, are declining as remaining patches of young forest mature(Sepik

et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, eastern red bat, and—if wetlands and riparian areas are present—Canada warbler (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Hardwood forests within the Westfield River CFA should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance to species like Canada warbler. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who dwell in the upper canopies of conifers, and are thought to be strongly associated with the hemlock forests within Westfield River. Blackburnian warblers have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (>75-80% closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. Efforts to regenerate a diversity of species must contend with evidence of reduced diversity or damage to tree seedlings and herbaceous plants attributed to white-tailed deer (Hough 1965, Anderson and Loucks 1979, Tilghman 1989, Rooney and Waller 2003, Côté et al. 2004, see also Rawinski 2008). The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and—where softwood inclusions are abundant—blackburnian warbler.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that are utilized by species like the northern goshawk. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan (HMP).

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands where soils and species composition will support woodcock management.
- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Collaborate with partners within the Westfield River Watershed Invasive Species Partnership to strategically prevent and manage invasive species within the watershed, including on refuge land.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Conifer Swamps)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for refuge resources of concern including Canada warbler.

Rationale:
To date our review of the softwood swamps within the Westfield River CFA has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. These forested wetlands are found on mineral soils that are nutrient-poor; there may be an organic layer, but generally not deep peat. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. Red maple, ash species, red spruce, and balsam fir are often the most typical overstory species present. Where soils tend more to alkaline conditions white cedar is a common tree species, and the shrub layer is generally more diverse. Historically, development pressure and selective logging have removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in softwood swamps are not well understood. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within Westfield River will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures where the natural hydrology has been disrupted.

Where needed, restoration of softwood swamp habitats will create high-quality habitat for neotropical migratory birds. Closed canopy softwood forests that include white cedar and other softwoods provide important mast, food, nesting, and cover. Softwood swamp stands with large average stand diameters, a variety of tree conditions

(including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Conifer swamps in the Westfield River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Conifer swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the Westfield River CFA, and allow monitoring of population response to management actions (R. Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition, forest structure, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Map vernal pools and seeps.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American woodcock and American black duck.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008).

These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. Our coarse-scale habitat analysis of this CFA identifies a shrub swamp wetland complex along Cole Brook and Depot Brook. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

American woodcock are dependent on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

Management of the shrub swamp communities may be required to maintain shrub dominance and stem densities. Tree species, such as red maple, tend to replace mature shrub species and established invasive plants compete for nutrients and space. These invading species require management in order to maintain the native shrub diversity of the community. A high shrub stem density is also important as it provides birds with cover from predators and more leaf surface area for gleaning. Cover for American woodcock, for example, is ideal in a 10-15 year old shrub swamp (USDA 2001). Shrub species, in particular alder, tend to die back as they reach maturity, and as a result stem density decreases. Periodic rejuvenation of shrubs is necessary to maintain required stem densities. Management priority will be given to shrub swamps that are part of a woodcock management area. Management of these shrub swamps will benefit other species that use these communities, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation, and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests near foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Survey wildlife utilization of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed."

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species; however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the Service has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Westfield River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered

under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams (Gawler 2008). These marshes are also maintained over time by beaver activity, an important natural disturbance process within the Westfield River watershed.

Our coarse-scale habitat analysis of this CFA identifies freshwater marsh wetlands along Cole Brook. Cole Brook starts at Benson Pond, where approximately five acres of freshwater marsh occurs. This particular wetland may not be overly large, but being adjacent to open water and a slow moving stream may provide foraging, and potentially breeding habitat for American black duck, and other waterfowl species. A mosaic of freshwater marsh and shrub swamp also occurs near The Cove further downstream on Coles Brook. Black ducks use wetlands such as these for breeding and foraging habitat. Well-concealed nests are placed on the ground in adjacent uplands or hummocks within the wetland. Adults and their broods feed on seeds and herbaceous vegetation, including sedges, rushes, and submerged aquatic vegetation, as well as invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for American black duck.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of CCP approval:

- Evaluate wetland hydrology for impacts to natural flow regimes.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Survey wildlife use of wetlands.

- Map natural communities; protect rare or exemplary examples.
- Inventory wetland plant communities.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat for grassland birds and pollinators, if present and appropriate.

Rationale:
Over two percent of the Westfield River CFA is typed as pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow, as well as pollinator species. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow. American woodcock, a refuge priority resource of concern, will use both habitat conditions when managed in conjunction with their other habitat needs.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Shrubland and grassland habitats will also be used by American woodcock, which require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Small clearings with minimal vegetation is required for courtship areas, and shrublands with clumps of tall vegetation or sparse shrubs will provide roosting habitat.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, and grassland acres can provide quality habitat, for these species, and American woodcock, if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
See rationale for sub-objective 1.1d.

Habitats that occur within the Westfield River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout, American eel, and Atlantic salmon.

Rationale:
The West Branch of the Westfield River flows through the town of Becket along the southwest portion of the CFA. This Branch is a free-flowing river with very few aquatic barriers along its tributaries providing habitat for species of conservation concern such as Eastern brook trout, American eel and Atlantic salmon.

The West Branch, and two of its tributaries, Coles Brook and Factory Brook provide important cold water habitat for brook trout and Atlantic salmon. These species are sensitive to extreme temperature fluctuations, and require water temperatures between 40-70 degrees Fahrenheit for spawning, growth, and survival. Other cold aquatic species that occur within this watershed include slimy sculpin, lake chub, and many species of invertebrates such as mayflies, stoneflies, caddisflies. American eel, a species of conservation concern for the Service and a state species of greatest conservation need, also occurs in Westfield River CFA. American eel enter the Connecticut River as juveniles, and migrate upstream to feed in aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

Management of water resources in the Westfield River CFA will provide clear aquatic species passage to spawning and wintering habitat, as well as structurally diverse, cold in-stream habitat. Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. We will work with partners to analyze current available data, and conduct assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity, and health.
- Work with partners to conduct stream assessments to identify man-made physical barriers (e.g. impassable road crossings, culverts, and dams) to the movement of fish and other aquatic organisms.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Westfield River Division as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Westfield River Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Westfield River Division as an outdoor classroom.

Rationale:
Because this division will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Westfield River Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Westfield River Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Westfield River Division will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Westfield River Division's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 year of acquiring sufficient land:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Westfield River Division.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Westfield River Division.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Westfield River Division will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Westfield River Division will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations, except as noted under strategies below.

Rationale:
The Westfield River CFA is a popular area to hunt white-tailed deer, moose, Eastern wild turkey, black bear, and small game. Hunting will be allowed on a newly created division as long as it is found to be a compatible use. Hunting, if found to be a compatible use, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use at the division.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations
- Allow hunter access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are discernible.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with Massachusetts Department of Fish and Game to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with Massachusetts Department of Fish and Game to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Westfield River Division kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Offer to host hunter education field courses.

- Work with Massachusetts Department of Fish and Game to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

Inventory and Monitoring Strategies:
Within 5 years of acquiring sufficient land to support hunting seasons:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Westfield River Division after completing all administrative procedures to officially open refuge lands to fishing, based on Massachusetts Department of Fish and Game regulations, and division-specific conditions, if necessary.

Rationale:
There are several streams in the CFA including the West Branch Westfield River, Middle Branch Westfield River, Fuller Brook, Coles Brook, Factory Brook, and Tuttle Brook. The included branches of the Westfield River supports a cold water fishery with brook trout, brown trout, and rainbow trout. Fishing is a popular activity throughout this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
Within 1 year of CCP approval:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk to post information on fishing seasons and other notices to visitors.

- The Westfield River Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of CCP approval:

- Produce a brochure that highlights fishing opportunities for distribution at a division kiosk and the refuge website.

- Work with the Massachusetts Department of Fish and Game to inventory and assess fish populations on the division.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
Within 1 year of CCP approval:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Westfield River Division.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in western Massachusetts. A new CFA in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses at the division.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exceptions listed for hunters, anglers, and snowmobilers. The refuge manager may issue a special use permit for public uses during the closed hours.

- Install an informational kiosk to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners.

Rationale:
The entire division will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses at the division.)

Within 1 year of acquiring land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups to include wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the division for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Westfield River Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Westfield River Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Westfield River Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that the use is both appropriate and compatible at the division.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge properties.

Fannie Stebbins Unit (Existing Refuge Unit)

Longmeadow, Massachusetts

Total Unit Acres[1]	98

1 Actual surveyed acres.

What specific criteria and/or considerations drove the selection of this Unit?

Beginning more than fifty years ago, members of the Allen Bird Club worked to acquire approximately 330 acres of land between Interstate 91 and the Connecticut River in Longmeadow, Massachusetts. This property became the Fannie Stebbins Memorial Wildlife Refuge, owned and managed by a separate Board of Trustees elected by Allen Bird Club members. Eventually the Town of Longmeadow began acquiring additional property in the area, leading to the protection of over 1000 acres. The Stebbins property and the larger floodplain area known as the "Longmeadow Flats" has been designated a National Natural Landmark by the U.S. Department of the Interior and an Important Bird Area by the Massachusetts Audubon Society (Allen Bird Club 2015).

The area is subject to periodic flooding that is representative of this habitat. It includes bordering swamps, ponded water, vegetated wetlands, meadows that are maintained by mowing, hardwood forest, sandbars, riverbank, and an island. It encompasses one of the largest remaining patches of floodplain forests and wetlands along this heavily human-impacted section of the Connecticut River. The wetlands provide breeding habitat for marsh birds and stop-over habitat for migratory waterfowl. During summer and fall the shoreline offers shallows and sandbars for resting and feeding gulls, raptors, shorebirds, and herons. The woodlands and brushy areas provide important habitat for many species of breeding, migratory, and wintering land birds (Allen Bird Club 2015, Mass Audubon n.d.).

In order to ensure the protection of the Stebbins Refuge lands in perpetuity, the Fannie Stebbins Memorial Wildlife Refuge (a registered nonprofit) initiated negotiations with the Silvio O. Conte National Fish and Wildlife Refuge (Allen Bird Club 2015). Fannie Stebbins was a SFA in the 1995 Conte FEIS. The Fannie Stebbins Unit area is considered important floodplain forest by The Nature Conservancy and will allow for the restoration and conservation of the floodplain forest and associated wetland complex. Habitat conservation in this unit will help allow for the landward migration of the coastal wetland complex (salt-, brackish-, and freshwater tidally influenced wetlands) due to climate change.

What are the priority habitat types within the Unit? What percentage of the total Unit acreage do they represent?

- Hardwood Forest – 54%
- Hardwood Swamp – 15%
- Freshwater Marsh – 25%
- Open Water – 3%
- Developed – 3%

For more information on the unit's location and habitats, see map A.42, map A.43, and table A.26.

What are the resources of conservation concern for the Unit?

As noted in table A.27 below, there is potential for ten priority refuge resources of concern (PRRC) aquatic and terrestrial species that rely upon the open water and wetland habitats in this Unit. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) and migratory birds. These species and habitats are discussed further below.

1. **Federal Threatened and Endangered Species**
   This section of the Connecticut River is important migratory habitat for shortnose sturgeon. This species prefers large rivers and estuaries where there is an abundance of crustaceans, mollusks, and insects to feed on. They are a long-lived fish that are threatened by pollution, habitat alterations and overfishing.

   This unit is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the unit may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with this use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Fannie Stebbins Unit is situated on the Connecticut River, and provides important stopover habitat for landbirds, shorebirds, and waterbirds. Eight state endangered, threatened, or special concern species use this site regularly including peregrine falcon, bald eagle, least bittern, blackpoll warbler, northern parula, American bittern and pied-billed grebe. This site also contains a heron rookery, and supports a high diversity of land birds, including 227 regularly occurring species and 49 species that have been recorded at least once.

   This unit also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

3. **Waterfowl**
   The freshwater marshes, floodplain forest and open water of the Connecticut River provide important stopover areas for hundreds of migrating and wintering waterfowl including American black duck (a PRRC species), green-wing teal, mallard, Canada geese, bufflehead, northern pintail, gadwall, mergansers and American wigeon. This site also has one of the highest concentrations of breeding wood ducks in western Massachusetts (Mass Audubon n.d.)

4. **Diadromous fish and other aquatic species**
   The Fannie Stebbins Unit borders the Connecticut River, which provides migratory habitat for many species of conservation concern including American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon. The various brooks and small streams within the unit may support species of conservation concern as well, such as sea lamprey and American eel.

5. **Wetlands**
   The Fannie Stebbins Unit contains a small portion of what is known as "Longmeadow Flats", an ecologically significant floodplain habitat (Marks et al 2011) located along the Connecticut River main stem along much of the western boundary of the town of Longmeadow. It is one of the few remaining natural floodplain habitats in Massachusetts. In addition, several rare or special concern plant species are present on the unit (Mass Audubon). The remnant patches of floodplain habitat in the Fannie Stebbins River Unit are vulnerable to invasive species, especially habitats that flood infrequently. Opportunities may be available for floodplain restoration in areas where these habitats have been altered.

What habitat management activities will be a priority on refuge lands within the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e. forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once the inventory has been completed, then management will focus on maintaining the following conditions:

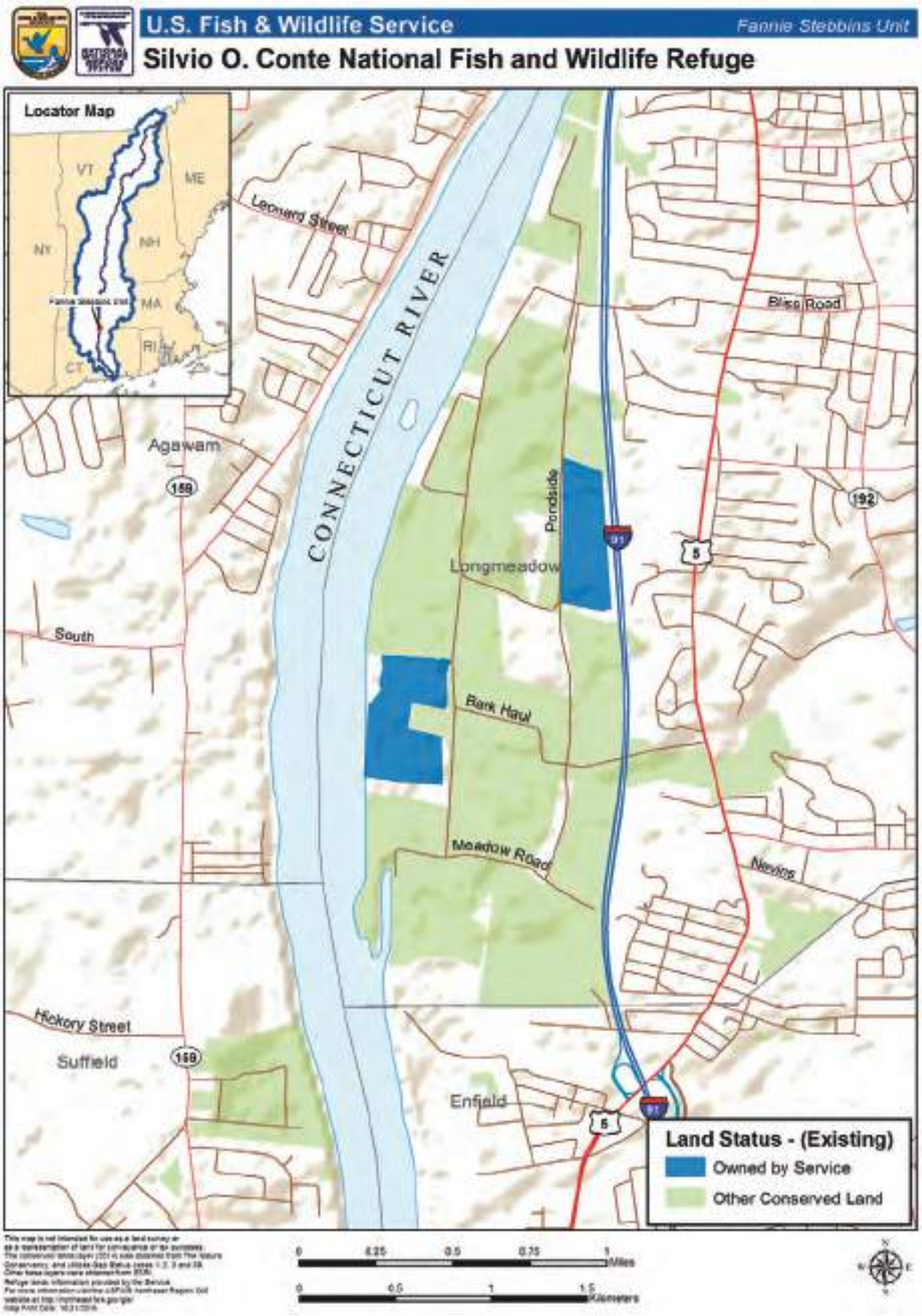
- Forest management activities will focus on restoration of degraded floodplains, including restoring the primary natural disturbance mechanism (seasonal flooding) and species composition and structure to accepted historical conditions. Management of upland forests will also provide structurally diverse habitat dominated by species appropriate to site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management. We will also manage emergent and shrub wetland habitats, and will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (stream, rivers, and coves) habitats, we will focus on maintaining stream connectivity, establishing riparian buffers, and reducing run-off from the surrounding landscape.

What public use opportunities will be a priority on refuge lands within the unit?

When compatible, we will seek to provide recreational access to the river for priority public uses (hunting, fishing, wildlife observation and photography, interpretation, and environmental education) and for boating.

Map A.42. Fannie Stebbins Unit – Location.



Map A.43. Fannie Stebbins Unit – Habitat Types.

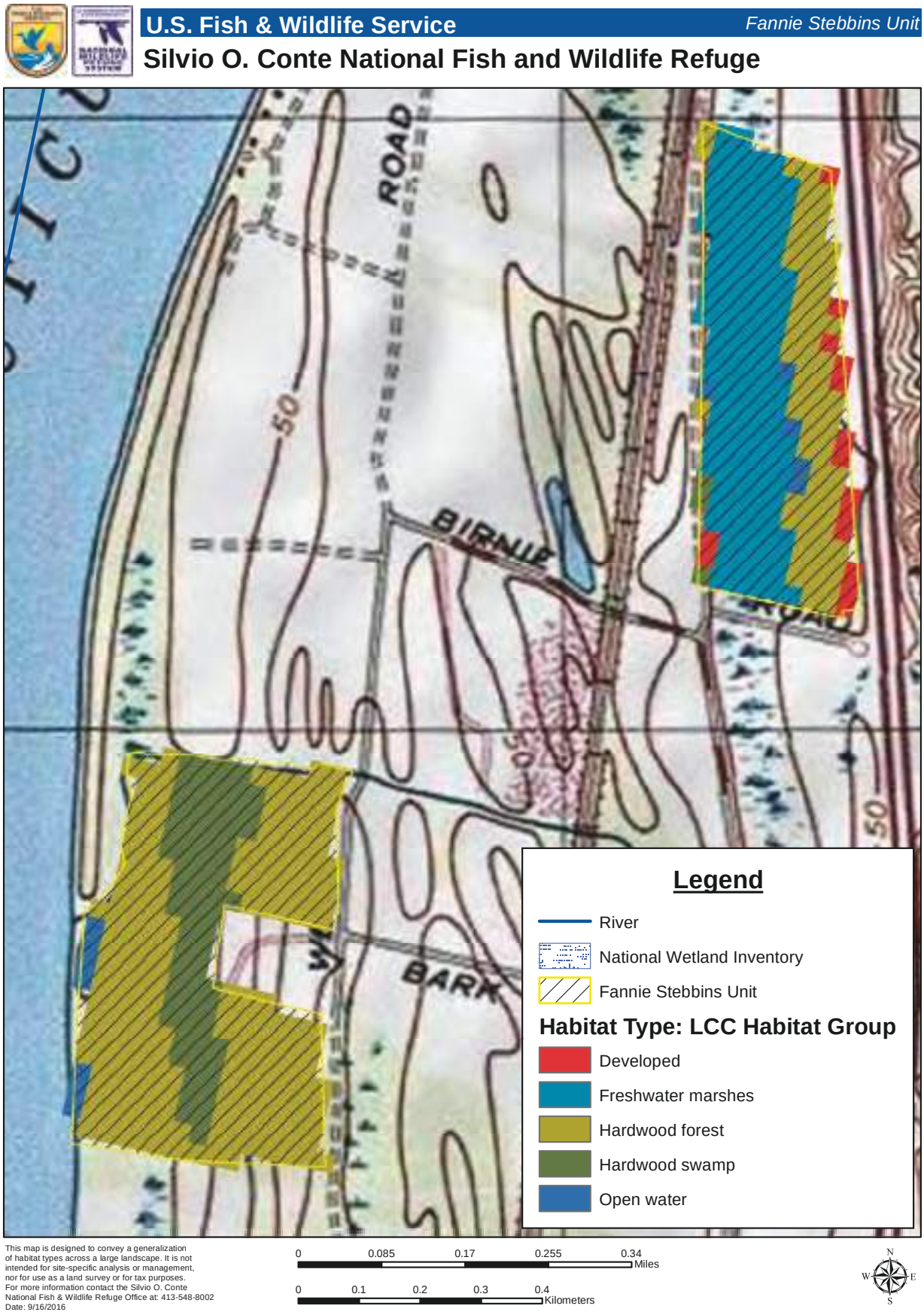


Table A.26. Fannie Stebbins Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested uplands and wetlands[2]		
Hardwood forest	53	54%
Hardwood swamp	15	15%
Freshwater marsh	24	25%
Forested uplands and wetlands subtotal	*92*	*94%*
Other		
Open Water	3	3%
Developed	3	3%
Other subtotal	*6*	*6%*
TOTAL	**98**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat typings for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies.

**All acreages are based upon GIS analysis and should be considered estimates

Table A.27. Fannie Stebbins Unit – Priority Refuge Resources of Concern

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] – 53 acres		
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically ≥ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	Migratory Species Little Brown Bat[I]
Hardwood Swamp[5] - 15 acres		
Rusty Blackbird[A, C]	Migrating and wintering habitat includes floodplain forests, hardwood swamps, and shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).	Migratory species
American Black Duck[A, B, C, G]	Migrating habitat includes herbaceous wetlands, fens, and flooded meadows, floodplain forests and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Northern Harrier[A,I,J] Wood Duck[A,J] Green-winged Teal[A, J] Snowy Egret[A,I,J] **American Bittern**[A,I] Bufflehead[A] Canada Goose, NAP[A,J] Canada Goose, AP[A,J] **Virginia Rail** Marsh Wren[A] Gray Catbird[A,J] **Willow Flycatcher**[A] **Warbling Vireo** Spotted Turtle[I] Eastern Kingbird[A,J]
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 24 acres		
American Black Duck[A, B, C, G]	Migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Northern Harrier[A,I,J] Wood Duck[A,J] Green-winged Teal[A, J] Snowy Egret[A,I,J] **American Bittern**[A,I] Bufflehead[A] Canada Goose, NAP[A,J] Canada Goose, AP[A,J] **Virginia Rail** Marsh Wren[A] Gray Catbird[A,J] **Willow Flycatcher**[A] **Warbling Vireo** **Spotted Turtle**[I] Eastern Kingbird[A,J]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 3 acres		
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	Smallmouth Bass[I] Burbot[I] Striped Bass[I] Longnose Dace[I] Yellow Perch[I]
Shortnose Sturgeon[B, D, F, G]	Spawn in slow-moving, 48° F water of large rivers, and feed in fresh and brackish water along the river bottom (USFWS 1996).	
Alewife[B, F, G]	Spawn in ponds and slow-moving streams (USFWS 1996).	
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	
Blueback Herring[F, G]	Spawn in fast moving, shallow water when the river temperature is about 58°F (USFWS 1996).	
American Shad[B, F, G]	Spawn when the water temperature is above 60°F in shoal area of river and lower reaches of larger tributaries (USFWS 1996).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the Unit. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 30.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 30.

I: 2015 Massachusetts Comprehensive Wildlife Conservation Strategy

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Fannie Stebbins Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide stopover habitat for spring and fall migrants, as well as potential roosting and foraging habitat for the northern long-eared bat and tricolored bat.

Rationale:
We envision healthy forests within the Fannie Stebbins Unit where a diverse seral structure provides suitable habitat conditions for a suite of Connecticut wildlife. Our long-term vision for the unit includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010).

Fannie Stebbins Unit hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is certainly available within the unit. To date our review of the Fannie Stebbins Unit habitats and wildlife species —and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Fannie Stebbins comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, 2002, Bellemare et al. 2002). Our sub-objective assumes the forests of the Fannie Stebbins are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and where appropriate, move succession forward to emulate later seral stage characteristics.

Migrating landbirds are typically unable to deposit sufficient fat stores to fly nonstop between breeding and nonbreeding areas (Blem 1980) and must use stopover habitats for feeding and resting before continuing migration. Studies have shown migrating birds exhibit selective use of some habitats over others (Moore et al.

1990, Petit 2000, Rodewald et al. 2004). In general, taller, more structurally diverse vegetation types within an area appear to support greater numbers of migrating birds than do habitats of lower stature and complexity (Moore et al. 1990, Noss 1991). Clearly, structurally complex habitats will not be suitable for all migratory species, but our conservation goal is to provide those areas used most frequently by migrating birds, suggesting relatively tall, structurally diverse habitats may best serve this purpose. The plasticity in habitat use exhibited by most species during migration (Moore et al. 1990, Petit 2000) suggests that many species are able to effectively use the food resources and cover afforded by structurally complex habitats. While our management goals may create a relatively old forest, hardwood forests within Fannie Stebbins will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of foraging opportunities. Patches of mature edge-dominated (i.e. forest-agricultural edge and suburban forest of the type within Fannie Stebbins) and shrub-sapling stage forests were used most frequently by fall stopover migrants in a Pennsylvania study (Rodewald et al. 2004).

In a mature forest, many migrating bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Hardwood forests within Fannie Stebbins should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of foraging opportunities. Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the unit. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral shrub-sapling habitat rich in fruits and insects important to migrating birds (Noss 1991, DeGraaf et al. 2006). Efforts to regenerate any portion of forest within the unit must account for the abundance of invasive understory species and risk of regeneration failure from white-tailed deer overbrowsing (Hochholzer 2010)

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the unit and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including the State of Connecticut, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1a. (Hardwood swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide stopover habitat for spring and fall migrants and potential winter habitat for rusty blackbirds.

Rationale:
Occurrences of hardwood swamps within the Fannie Stebbins Unit represent an acidic swamp natural community. Historically this community has undergone significant alteration, and has great potential for restoration. Acidic hardwood swamps may be found in basins, or on gently sloping seepage lowlands within small patches where an acidic substrate of mineral soil, often with a component of organic muck, creates a shallow, perched water table. Eastern hemlock is often the dominant overstory species, and the organic substrate supports an important sphagnum (moss) layer. The example identified within the Fannie Stebbins Unit occurs within the floodplain of the Connecticut River, and experiences periodic flooding.

This systems disturbance history, agricultural practices, development pressures, and selective logging, have largely removed these habitats from the landscape, or greatly simplified their historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats. Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within the Fannie Stebbins will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats, natural levees, and backwater sloughs will create high-quality habitat for spring and fall migrant birds in an otherwise agricultural landscape where small, disturbed forest fragments are the rule. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites shown to be important during the energy-intensive migration (Petit 2000). This unit also may provide important wintering habitat for rusty blackbirds, a species that has been experiencing drastic population declines since the mid-1900's (IRBWG 2016). This species is a refuge resource of concern. It breeds in the northern reaches of the Connecticut River watershed, winters in the southern reaches of the watershed, and migrates through the Connecticut River corridor. Wintering and migrating habitat for this species includes floodplain forests and scrub-shrub wetlands (C. Foss, Audubon New Hampshire, personal communication 2016).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the unit and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State of Connecticut in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest inventories.
- Survey wildlife utilization of wetlands including surveys for rusty blackbirds during the migration and wintering periods, and use by waterfowl and migrating landbirds.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marsh communities to support natural and rare ecological communities, and provide breeding, wintering and stopover habitat for American black duck and other waterfowl species.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily and narrow-leaved cattail (Gawler 2008). The freshwater marsh habitat within the Fannie Stebbins Unit is part of a larger wetland complex situated between the railroad tracks and interstate 91. This area is under intense development pressure, threatening state listed and refuge priority resources of concern.

The freshwater marshes provide breeding habitat for marsh birds and stop-over habitat for hundreds of migratory waterfowl. Canada geese, bufflehead, northern pintail, gadwall, and mergansers utilize these wetlands during migration. This area is known to have one of the highest concentrations of breeding wood ducks in western Massachusetts. American black duck, a refuge priority resource of concern, also occurs in the Fannie Stebbins Unit. Black ducks forage on aquatic vegetation in wetlands during the winter and on invertebrates and vegetation during migration.

Threats to this wetland complex are altered hydrology, contamination, and non-native invasive plant species. A multi-scale wildlife habitat inventory will be necessary to determine the condition of all habitats in the unit. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map natural communities; protect rare or exemplary examples.
- Survey wildlife use of wetlands.
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, identify and implement habitat restoration opportunities within the Fannie Stebbins Unit and Connecticut River to benefit priority refuge resources of concern including American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon, as well as other species of conservation concern such as sea lamprey.

Rationale:
A portion of the Fannie Stebbins Unit is adjacent to the Connecticut River which provides important migrating habitat for many species of conservation concern including American shad, shortnose sturgeon, American eel, alewife, blueback herring, and Atlantic salmon.

Shortnose sturgeon, a federal listed species prefers large rivers and estuaries during migration and for spawning where there is an abundance of crustaceans, mollusks and insects to feed on. They are a long-lived fish that are threatened by pollution, habitat alterations and overfishing. American shad, blueback herring and alewife spend the majority of their adult lives in the sea, and migrate to the Connecticut River to spawn in the spring. This portion of the Connecticut River may provide spawning habitat for these species.

American eel also occupy the main stem and potentially small streams within the Fannie Stebbins Unit. American eel are long lived, and spend the majority of their young life in these freshwater systems. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit bays, estuaries, streams, lakes, and ponds. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000).

Another species of conservation concern that may utilize freshwater aquatic habitats in this unit is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

The aquatic habitats in the Fannie Stebbins Unit provide habitat for many species of conservation concern, and is especially important for the federally listed shortnose sturgeon. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to maintain open channels from the Connecticut River to open water coves.

- Work with adjacent landowners to eliminate barriers to aquatic species passage.
- Reach out to established local and regional conservation partnerships with action plans in place to identify opportunities to compliment and cooperate in planning and implementation.

Within 10 years of land acquisition and CCP approval:

- Work with partners to protect and increase "hard bottom" (e.g., gravel, cobble, or bedrock) for spawning aquatic species.
- Work with partners to reduce combined sewer overflow.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate stream and fish community health.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Fannie Stebbins Unit as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Fannie Stebbins Unit as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Fannie Stebbins Unit as an outdoor classroom.

Rationale:
Because this unit will be unstaffed, the majority of environmental education opportunities on this unit will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Fannie Stebbins Unit as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Fannie Stebbins Unit. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

***Rationale*:**
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Fannie Stebbins Unit will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Fannie Stebbins Unit's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each unit to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Fannie Stebbins Unit.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Fannie Stebbins Unit.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Fannie Stebbins Unit will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Fannie Stebbins Unit will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
The Fannie Stebbins Unit is comprised of floodplain forests and wetlands adjacent to the Connecticut River. Existing public hunting in the area is limited to the Connecticut River proper for waterfowl and Kings Island Coop Wildlife Management Area which offers waterfowl hunting under a state permit. Much of the Fannie Stebbins Unit is adjacent to municipal Hartford which limits hunting opportunities. We will coordinate with Connecticut Department of Energy and Environmental Protection, Hunting Review Team following acquisition of land where hunting is feasible and has been found to be a compatible use. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contributes to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Consult with Connecticut Department of Energy and Environmental Protection, Hunting Review Team in evaluating the suitability of new acquisitions to support a safe, manageable hunt program, consistent with the final compatibility determination.
- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to determine whether opportunities exist for state-recognized disable hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with Connecticut Department of Energy and Environmental Protection to evaluate the effectiveness and success of a refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the unit and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the unit.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the unit with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Fannie Stebbins Unit kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring land sufficient land to support hunting seasons:

- Work with Connecticut Department of Energy and Environmental Protection to encourage youth hunting at the unit as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Fannie Stebbins Unit after completing all administrative procedures to officially open refuge lands to fishing, based on Connecticut Department of Energy and Environmental Protection regulations and unit-specific regulations, if necessary.

Rationale:
The principal fishing resources on this unit are the Connecticut River and the lower reaches of the Fannie Stebbins and Farmington rivers. The Podunk River, Newberry, and Stoughton brooks are also within the unit. Most people fish the Connecticut River from boats, but allowing bank fishing on a Fannie Stebbins unit will provide the public with another recreational opportunity. Fishing is a popular activity in this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic uses on the unit and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Fannie Stebbins Unit will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land with fishable waters:

- Work with the Connecticut Department of Energy and Environmental Protection to inventory and assess fish populations on the unit.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the unit.

Rationale:
Fishing is a priority public use and a traditional use in the unit. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity. Opening acquired land in this new unit to wildlife observation and photography will provide visitors a chance to see and photography a variety of wildlife species in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:
- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:
- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the unit.

Rationale:
The entire unit will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that wildlife observation and photography are compatible uses.)

Within 1 year of acquiring land:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:
- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the unit for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:
- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:
- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Fannie Stebbins Unit that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route.

Management Strategies:
Within 5 years of acquiring land:

- Work with public and private partners to determine whether and what roles this unit might contribute to a Connecticut River waterway route.
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Fannie Stebbins Unit that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Fannie Stebbins Unit that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the unit without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.
- Allow canoeing and kayaking in acquired coves and waterways.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the unit. The course should integrate orienteering with refuge interpretive messages that include linking this unit to other refuge divisions and units.

Great Falls Discovery Center, Massachusetts (Existing Partner Facility)

What is the Great Falls Discovery Center?

The Great Falls Discovery Center (GFDC) is located in the village of Turners Falls, town of Montague, Massachusetts and supports one of the refuge's founding purposes to provide opportunities for environmental education. The GFDC is a visitor information and education center for the local region and the greater Connecticut River watershed, and plays an important role in supporting the economic development of the local Turners Falls community. The GFDC is a collaborative effort between several organizations that work together to broaden the effectiveness of public education about the Connecticut River watershed's rich fish, wildlife, and cultural resources. The partners include the refuge, Massachusetts Department of Conservation and Recreation, Friends of GFDC, and the town of Montague.

The GFDC introduces and orients visitors to the Connecticut River watershed, the varied habitats and species of the watershed, and presents many of the conservation and management successes and challenges faced by watershed partners. The mission of the GFDC is to "educate visitors on the conservation and protection of the Connecticut River watershed," and to "provide opportunities to experience the natural environment; to learn about the human relationship with the river's past, present and future; and to promote stewardship of these resources." The mission is currently accomplished through environmental education programs, interpretation, and community outreach.

What public use opportunities are planned for Great Falls Discovery Center?

The GFDC provides a space for environmental education and interpretative programs. Actions in this final plan will prioritize, increase, and strengthen refuge involvement in environmental education, interpretation, and community and scientific outreach, reinforcing it as an important educational resource for the Connecticut River watershed.

Goals, Objectives, and Strategies for the Great Falls Discovery Center under Alternative C

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

This goal is not applicable to GFDC because the refuge does not own any land at the facility.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Rationale:
The rationale under goal 2 objectives for environmental education in the final plan details the paramount importance of environmental education to the Service. During the fall, winter, and spring, the amount of traditional "museum" visitation declines as families return to their school schedules. During this period, GFDC staff concentrate outreach efforts on hosting field trips and conducting quality environmental education with school and homeschool students, both on and off site. The GFDC is an excellent facility for the refuge to host field trips as it houses elaborate dioramas that depict common habitats of the Connecticut River watershed, as well as a multipurpose room that is well suited for educational programs and activities. The small museum-like atmosphere is conducive to focused lessons that allow students to experience realistic representations of the watershed. Further, the GFDC is a short distance from the Northfield Mountain Recreation facility, the Turners Falls Fishway, and other private museums providing the opportunity for partnerships with these facilities.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Work with communities, public and non-profit organizations, and private educational organizations to facilitate and develop quality model environmental education curricula, as well as to develop highly trained individuals to conduct quality environmental education. Priority will be given to urban dwellers as participants and other visitors within a 1-hour commute of the Great Falls Discovery Center who might not otherwise visit a refuge. Environmental education programs will be designed to:

- Take into account the needs of the target audience, as well as the relevance to the target audience's everyday lives.
- Be student- and community-centered.
- Be curriculum-based, with goals and measurable objectives.
- Be inquiry driven and involve direct experiences with nature.
- Involve educators in development and implementation.
- Link to relevant learning standards.
- Coordinate with state and private environmental education programs.
- Relate to refuge management, objectives, and purposes.
- Have tools for evaluation and measurable outcomes throughout development and execution.
- Emphasize repeated contact with the same students.
- Be sustainable (i.e. having the resources to occur over the long-term).
- Involve interactions that occur in the natural, the built, and the social environment.
- Aim to develop awareness, attitudes, understanding, skills, and feelings of empowerment.
- Use a variety of instructional media including traditional classrooms, online courses, field studies, WoW Express visits, Adopt-a-Habitat, etc.

Additionally, the refuge will work with partners to develop and implement quality professional development for educators, to promote the training of refuge staff and volunteers in the knowledge, skills, and abilities of environmental education and to use volunteers, including Friends members, to enhance environmental education opportunities.

Given the existing partnership and work with urban audiences through the Springfield Urban Refuge Partnership, we will use, learn, and adapt some of our environmental education strategies used in these locations to help plan and implement programs at the GFDC. The reverse is also true. We will export our program successes at GFCD to our urban and other educational partnerships.

Management Strategies:
Within 5 years of CCP approval:

- With our partners, design or adapt curricula for the GFDC that focuses on watersheds, natural, and cultural resources. Curricula will:
  - ✓ Incorporate multiple relevant learning standards.
  - ✓ Coordinate with existing state and national environmental education programs.
  - ✓ Take into account student and teacher needs.
  - ✓ Incorporate nationally recognized education initiatives, when appropriate.
  - ✓ Be designed with specific goals and objectives.
  - ✓ Promote refuge purposes.
  - ✓ Contain consistent interpretive messages and themes.
  - ✓ Promote refuge and partner-conserved lands and facilities as environmental education resources.
  - ✓ Incorporate nationally recognized initiatives (e.g., North American Association of Environmental Education (NAAEE), and Science, Technology, Engineering, and Math (STEM)).
  - ✓ Incorporate national based curricula (e.g., Project WILD, Project Aquatic WILD, Project WET, Flying Wild, and Project Learning Tree).
- Work with educators to plan curricula to use at the GFDC.
- Identify and strive to engage non-traditional audiences in environmental education.
- Support Service initiatives about environmental education.
- Contribute to professional educator development by hosting and/or instructing at least two educator continuing education trainings.
- Continue to be a destination for field trips and increase the number of students by two percent per year for the next 5 years.
- Develop an outreach program to promote the GFDC as a field trip destination.
- Be viewed as a valuable environmental education resource within the community that:
  - ✓ Has staff trained in environmental education and natural resources.
  - ✓ Provides educators with state-of-the-art education resources.
  - ✓ Offers a variety of teaching tools.
- Develop specific environmental education goals and objectives for each program/lesson and identify appropriate educational strategies for environmental education participants.
- Work with after school programs and summer camps to incorporate existing state watershed curricula.
- Provide support for curriculum-based programs such as Scouts, 4H, Boys and Girls Clubs, Road Scholar (former ElderHostel program), etc.
- Support state environmental education programs (e.g., Hunter and Angler Education, Furbearer Education, Becoming a Great Outdoors Woman, etc.).

- Keep current with state-of-the-art technologies and incorporate them into environmental education programming.

Within 10 years of CCP approval:

- Coordinate with each state to share environmental education resources.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop an evaluation system to assess the effectiveness of environmental education curricula.

Sub-objective 2.1b. (Environmental Education Delivery)
Work with communities, public and non-profit organizations, private educational organizations, staff, volunteers, and members of Friends groups to offer quality environmental education programs at the Great Falls Discovery Center, and at schools and partner facilities within the watershed. Priority will be given to urban dwellers as participants and other visitors within a 1-hour commute of the facility who might not otherwise visit a refuge.

The refuge will seek to:

- Formally partner with local schools within a 1-hour commute of GFDC to conduct environmental education multiple times per year.
- Promote partner lands as outdoor classrooms, and help deliver priority educational programs.
- Facilitate the use of refuge and partner lands by educator-, teacher-, and student-led classes.
- In partnership with urban refuge projects throughout the watershed, refuge staff will both export and import successful programs to deliver state-of-the art programming and resources where it will do reach the widest possible audiences.

Rationale:
See rationale for sub-objective 2.1a.

Management Strategies:
Within 5 years of CCP approval:

- Use staff, volunteers, and members of Friends groups to facilitate teachers and students at the GFDC. The intent is to increase the number of students by two percent per year for the next 5 years.
- Partner with other education centers, state sponsored programs and other government agencies to meet environmental education objectives.
- Collaborate with the Friends of Conte's Recreation and Education Committee to identify, package, and promote applications for alternative funding sources for environmental education partnerships.
- Promote partner lands and facilities as outdoor classrooms; help deliver priority educational programs at those partner facilities.
- In cooperation with the Vermont Institute of Natural Science (VINS), produce, disseminate, and evaluate the effectiveness of watershed education kits.
- Work with local environmental education providers to implement the refuge's Adopt-a-Habitat initiative to help schools and individuals learn about and connect with natural features their local environments.

Within 10 years of CCP approval:

- Formalize cooperative relationships with environmental education providers through development of agreements and MOUs.
- Partner with at least six local schools within the watershed and conduct high quality environmental education programs multiple times per year to these audiences. An emphasis will be placed on urban areas and other visitors within a 1-hour commute of the GFDC who might not otherwise visit a refuge.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
Collaborate with partners to develop quality interpretive programming, facilities and other media for the Great Falls Discovery Center that identify and relate natural and cultural history, and refuge management strategies of the watershed's natural systems. Information conveyed will forge emotional and intellectual connections between the interests of the audiences and the habitats and wildlife that exist within the watershed in order to instill stewardship values.

Rationale:
The rationale under goal 2 objectives for interpretation in the final plan details the importance of interpretation to the Service. Located within close proximity of Interstate 91, and State Routes 5, 10, and 2, and within an hour of several cities including Springfield, Holyoke, and their surrounding suburbs, the GFDC is a destination for travelers. The GFDC houses elaborate dioramas that depict the habitats of the Connecticut River watershed and compel visitors from all geographic areas to learn about the refuge and the watershed. Further, the historical nature of the building, as well as the rich natural, geologic, cultural, and industrial history of the surrounding communities, affords a multitude of opportunities for GFDC staff to host interpretive program for audiences of all ages. Additionally, the multipurpose room of the GFDC is well suited as a space for educational activities and local partner meetings and draws new visitors who may not visit the GFDC on their own.

The nearby Turners Falls Fishway, owned by FirstLight Power Resources, offers opportunities to view migrating fish such as sea lamprey and American shad. The fishway consists of three "fish ladders" or stair-like pools that help fish over the Turners Falls dam. Visitors view fish using the ladder from an underwater window.

Management Strategies:
Within 5 years of CCP approval:

- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, media, signs, exhibits) when creating programming for natural and cultural resource interpretation.
- Collaborate with partners to create meaningful, consistent, thematic statements to be used in the delivery of programming at the GFDC.
- Develop more detailed interpretive objectives and strategies as part of a Visitor Services Plan.
- Develop a core set of interpretive programs that can be modified on an as needed basis.
- Provide resources and trainings to refuge staff, Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval:

- Develop self-guided interpretive services, exhibits, and printed media.
- Establish relationships with Tribes and historians to incorporate cultural history into interpretive programs.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members and the general public, with priority given to refuge affiliates.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with partners to deliver natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Provide quality interpretive programs, exhibits, and printed media at the GFDC.
- Provide personal contacts with visitors to initiate discussion and answer questions.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Develop self-guided interpretive messages and use state-of-the-art technology, (e.g., cell ranger/QR codes) as well as traditional media (e.g., pamphlets and signs).
- Work with partners to create issue-oriented experiential activities and programs for use at the GFDC.

Within 10 years of CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Sub-objective 2.3a. (Local Community Residents, Leaders, and Elected Officials)
Through effective outreach, the refuge works to increase public awareness of the Great Falls Discovery Center within the surrounding communities. Individuals will become aware of public offerings, resources, and programs offered at the facility, and of the interpretive messages of the Silvio O. Conte National Fish and Wildlife Refuge.

Rationale:
The rationales under goal 2 objectives for outreach in the final plan detail the importance of outreach to the Service. The GFDC is located in the village of Turners Falls in part, to support the economic development of this former mill town. Strategic and effective outreach will sustain local support, allow the GFDC to reach new audiences, and communicate with a variety of visitors, all of which will contribute to meeting desired visitation rates.

Management Strategies:
Within 5 years of CCP approval:

- Serve on the steering committee and be an active partner of Turners Falls River Culture or other relevant organizations to promote Turners Falls and to support the local economy.
- Maintain good lines of communication with neighbors and local community leaders and elected officials.
- Develop and implement a social media strategy to communicate with audiences on a broader scale.
- Use social media to inform audiences of upcoming events, current happenings and share visual images of daily occurrences at the GFDC. Social media outlets might include Facebook, Twitter and Instagram.
- Maintain the website with the most current and up to date information about the GFDC and its programing schedule.

- Create special programming that will draw local residents and media (e.g., participating in community events and festivals, etc.).

- In conjunction with the Friends and DCR, conduct open houses that showcase the GFDC's achievements and key GFDC supporters.

Within 10 years of CCP approval:

- Evaluate and modify, as necessary, outreach efforts.

Sub-objective 2.3b. (State and National-level Elected Officials)
Not applicable. This type of outreach will occur through staff at the Sunderland Office headquarters and will not specifically occur at this site.

Sub-objective 2.3c. (Media)
Through effective outreach to the media, the refuge will work to increase public awareness of the Great Falls Discovery Center within the surrounding communities. Individuals will become aware of public offerings, resources, and programs offered at the Center, and of the interpretive messages of the Silvio O. Conte National Fish & Wildlife Refuge.

Rationale:
See rationale for sub-objective 2.3a.

Management Strategies:
Within 5 years of CCP approval:

- Develop and implement a communications plan that uses state-of-the-art technology to disseminate program information and GFDC offerings to the public.

- Write press releases detailing large refuge projects, programs and accomplishments, and the joint efforts and accomplishments of the refuge and refuge partners.

- Host local media representatives at the GFDC.

Sub-objective 2.3d. (Greater Watershed Community)
Not applicable to GFDC. This type of outreach will occur through staff at the Sunderland Office headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Collect and share information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Sub-objective 2.4a. (Institutions of Higher Learning and Other Partners)
Develop and/or enhance relationships with institutions of higher learning within a 1-hour commute of the Great Falls Discovery Center.

Rationale:
The proximity of the GFDC to five major colleges, including the University of Massachusetts, and its central location in the Connecticut River watershed, makes it a great location to bring experts in the fields of natural resources and education together to share research ideas and technical information. This information exchange mutually benefits both the refuge and participants. Further, the GFDC is within close proximity to several colleges that offer specialties in environmental education and education. Students can partake in research opportunities and internships in these fields to gain valuable experience.

Management Strategies:
Within 5 years of CCP approval:

- Collaborate with professors at local institutions of higher learning to use the GFDC as a venue to highlight and present student work that relates to refuge missions and goals.
- Continue to work with partners to conduct research relevant to refuge management issues including environmental education, interpretation, and human dimensions.
- Develop formal agreements with universities and other partners to host student projects and research in support of the refuge purposes.

Sub-objective 2.4b. (Technology and Information Exchange)
Participate, coordinate, and/or host professional conferences, workshops, and seminars related to environmental education and interpretation at the Great Falls Discovery Center.

Rationale:
See rationale for sub-objective 2.4a.

Management Strategies:
Within 5 years of CCP approval:

- Encourage staff to participate in relevant environmental education and interpretation conferences to share exemplary environmental education and interpretation practices.
- Promote the GFDC as a venue for institutes of higher learning and professional societies to disseminate information on important watershed issues.

Sub-objective 2.4c. (Mentoring)
Provide quality mentoring opportunities for local students and interested individuals.

Rationale:
See rationale for sub-objective 2.4a.

Management Strategies:
Continue to:

- Reach out to local universities to develop student internships and employment opportunities.
- Participate in presenting information to classes at local universities and colleges.

Within 5 years of CCP approval:

- Seek opportunities to participate in student workshops, trainings, and events.

Within 10 years of CCP approval:

- Develop a mentoring program to work with students to help them identify their career goals and introduce career paths within the Service.
- Participate in undergraduate and graduate level classes at local universities and colleges, presenting information on various topics and issues of the refuge.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

This goal is not applicable to GFDC because the refuge does not manage any recreational facilities here, other than those that support environmental education and interpretation.

Hatfield Unit (Existing Refuge Unit)

Hatfield, Massachusetts

Total Unit Acres[1]	19

1 Actual acres

What are the priority habitat types within the unit? What percentage of the total unit acreage do they represent?

- Hardwood forest - 17%
- Freshwater marsh – 48%

For more information on the unit's location and habitats, see map A.44, map A.45, and table A.28.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Hatfield Unit is along an oxbow of the Connecticut River main stem, comprised primarily of riparian forest and wetlands, providing stopover habitat for landbirds and waterfowl such as wood duck, mallard, alder flycatcher, swamp sparrow, veery, yellow warbler, red-tailed hawk, downy and hairy woodpecker, common yellowthroat and tufted titmouse.

2. **Wetlands**
   The Hatfield Unit includes a portion of the Connecticut River floodplain and forested upland approximately 150 to 200 feet above the floodplain. The western third of the unit, along Cronin Hill Road is primarily deciduous forest comprised of white ash (*Fraxinus americana*), red maple (*Acer rubrum*), beech (*Fagus grandifolia*), and black cherry (*Prunus serotina*) with some white pine (*Pinus strobus*). There is a steep drop east to the floodplain adjacent to Great Pond. Historically, this pond was part of the Connecticut River main stem that was cutoff, forming an oxbow. Today this wetland complex is listed as Core Habitat and a Priority Wetland and Aquatic Core by the Massachusetts Natural Heritage and Endangered Species Program. Floodplain forests were at one time quite common in the state, particularly on the extensive alluvial silt deposits of the Connecticut River Valley, but they have been largely converted to agricultural land due to their high fertility (Paveglio and Taylor 2010; UMass 2012).

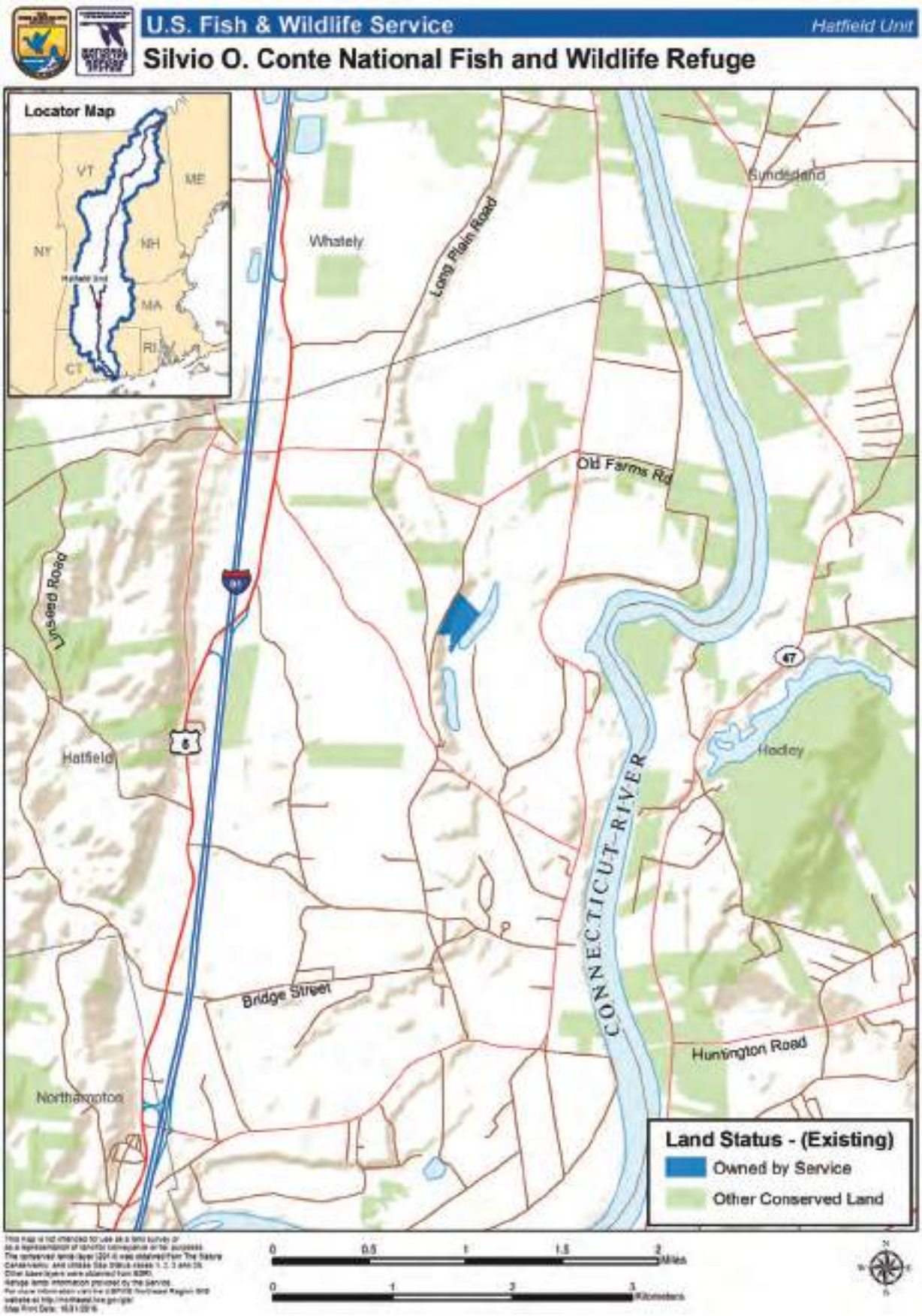
What habitat management activities will be a priority on the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on managing invasive plants to maintain native diversity.

What public use opportunities will occur on the unit?

This unit is not presently open to public access, but will be evaluated for compatible recreational opportunities when a visitor services step-down plan is undertaken

Map A.44. Hatfield Unit – Location.



Map A.45. Hatfield Unit – Habitat Types.

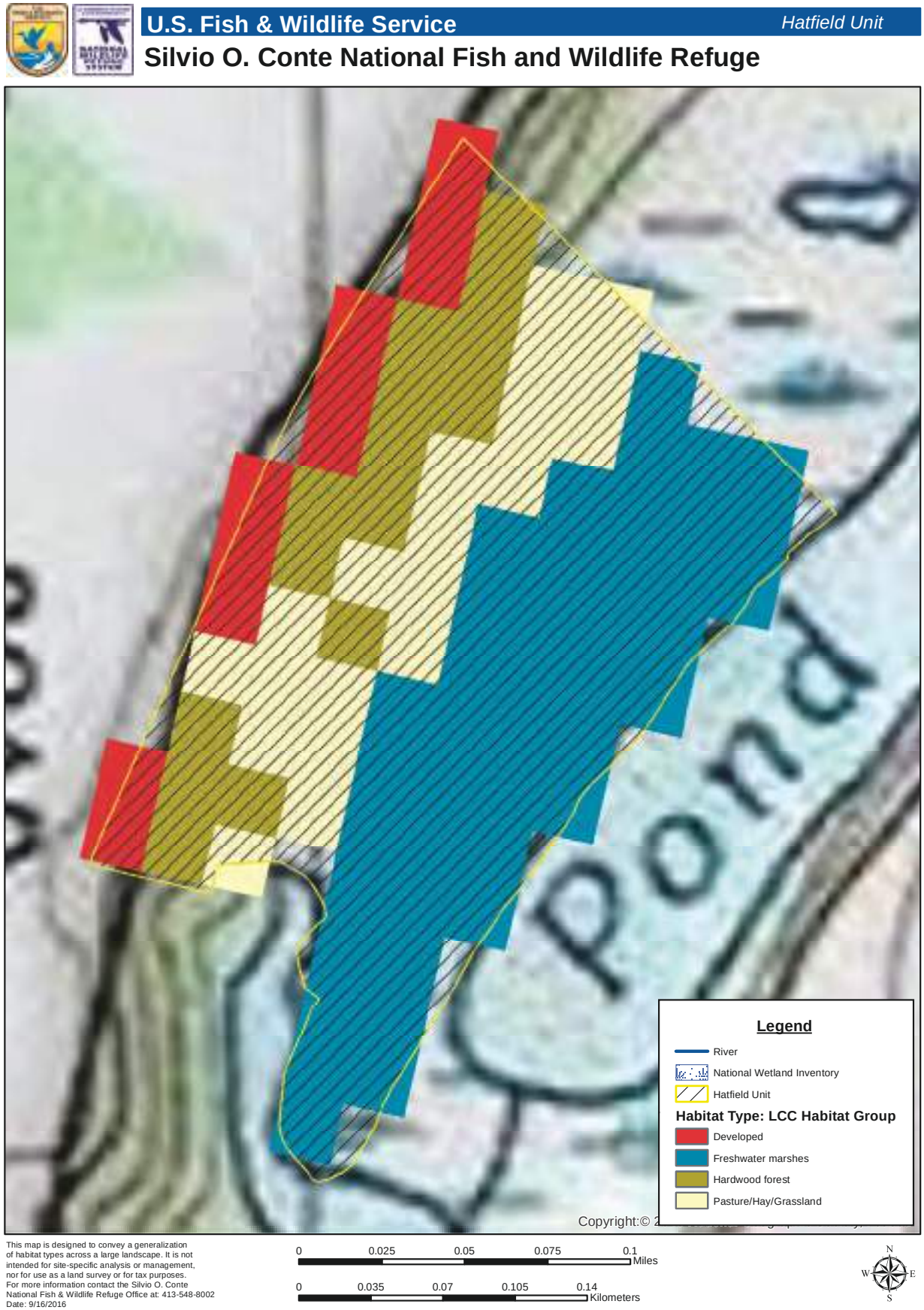


Table A.28. Hatfield Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	.5	17%
Freshwater marsh	2	48%
Forested uplands and wetlands subtotal	2.5	35.0%
Other[2]		
Pasture/Hay/Grassland	1	23%
Developed	.5	12%
Other subtotal	1.5	65.0%
TOTAL	4	100.0%

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Hatfield Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Hatfield Unit's small size and isolation from other refuge units, has led us to group our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. While achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management, the Service also has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Downed logs in a forest, a vernal pool, and a rocky outcrop in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a dead and downed logs, a vernal pool, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats within the Hatfield Unit will be managed under the umbrella BIDEH policy. The wetland and upland habitats within this Unit provide a riparian buffer along the western edge of Great Pond, and are listed as BioMap2 Core Habitat by the Massachusetts Natural Heritage and Endangered Species Program. These habitats were identified as critical to maintaining Massachusetts biodiversity, specifically for state-listed species and exemplary natural communities. The Great Pond wetland complex was identified as important habitat for various state species of greatest conservation need including potential habitat for northern leopard frog.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Fragmentation is of particular concern in the area around the Hatfield unit—parcelization by land ownership is extensive. The large number and variety of landowners—each with their own objectives, resources, and constraints—means that the future of the Hatfield landscape is far from certain. Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the unit is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible. Management priority should be given to Japanese knotweed, barberry, and honeysuckle which threaten the wetlands within the Unit.

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

This unit is not presently open to public access, but will be evaluated for compatible educational opportunities when a visitor services step-down plan is undertaken, or will be considered on a request basis.

Objective 2.2: Interpretation

This unit is not presently open to public access, but will be evaluated for compatible recreational opportunities when a visitor services step-down plan is undertaken, or will be considered on a request basis**.**

Objective 2.3: Public and Community Outreach

Because the Hatfield Unit will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Because the Hatfield Unit will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

This unit is not presently open to hunting, but will be evaluated for compatible hunting opportunities when a visitor services step-down plan is undertaken

Objective 3.2: Fishing

This unit is not presently open to fishing, but will be evaluated for compatible fishing opportunities when a visitor services step-down plan is undertaken

Objective 3.3: Wildlife Observation and Photography

- This unit is not presently open to public access, but will be evaluated for compatible recreational opportunities when a visitor services step-down plan is undertaken, or will be considered on a request basis.

Honeypot Road Wetlands Unit (Existing Refuge Unit)

Westfield, Massachusetts

Total Unit Acres[1]	21

1 Actual surveyed acres.

What are the priority habitat types within the unit? What percentage of the total unit acreage do they represent?

- Hardwood forest - 74%
- Hardwood Swamp – 22%
- Pasture/Hay/Grassland – 3%

For more information on the unit's location and habitats, see map A.46, map A.47, and table A.29.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem. Migrants become more evenly distributed in habitats in the watershed beyond the Connecticut River main stem (Smith College 2006). The Honeypot Road Wetlands Unit's hardwood forests and swamps provide stopover habitat for landbirds.

2. **Wetlands**
   The State of Massachusetts considers the American clam shrimp to be a "species of concern" under its State endangered species act. The shrimp inhabit ephemeral (vernal) pools. Small numbers of clam shrimp have been recorded at three Massachusetts habitats: a flooded depression in an old pasture field, a flooded hay field depression, and at Honeypot Road Wetlands along the weedy shoreline of an Atlantic white cedar swamp. We will work with the State to monitor and protect this species, and the vernal pool habitats they occupy.

What habitat management activities will be a priority on the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats (i.e., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on managing invasive plants to maintain native diversity.

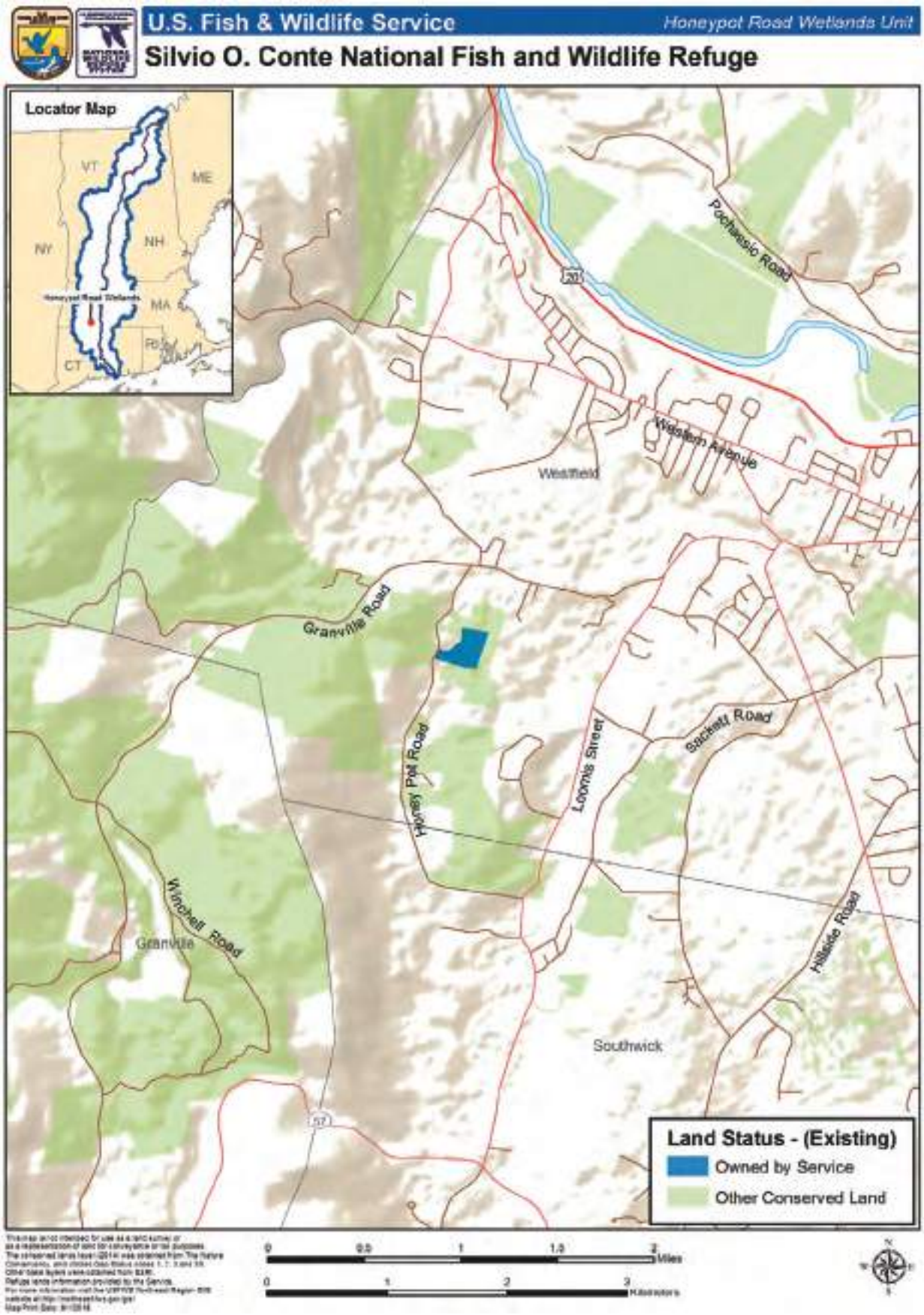
What public use opportunities will be a priority on the unit?

We will focus on providing opportunities for hunting and wildlife observation and photography.

Does the unit have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

The State-listed American clam shrimp lives within an Atlantic white cedar swamp on the unit.

Map A.46. Honeypot Road Wetlands Unit – Location.



Map A.47. Honeypot Road Wetlands Unit – Habitat Types.

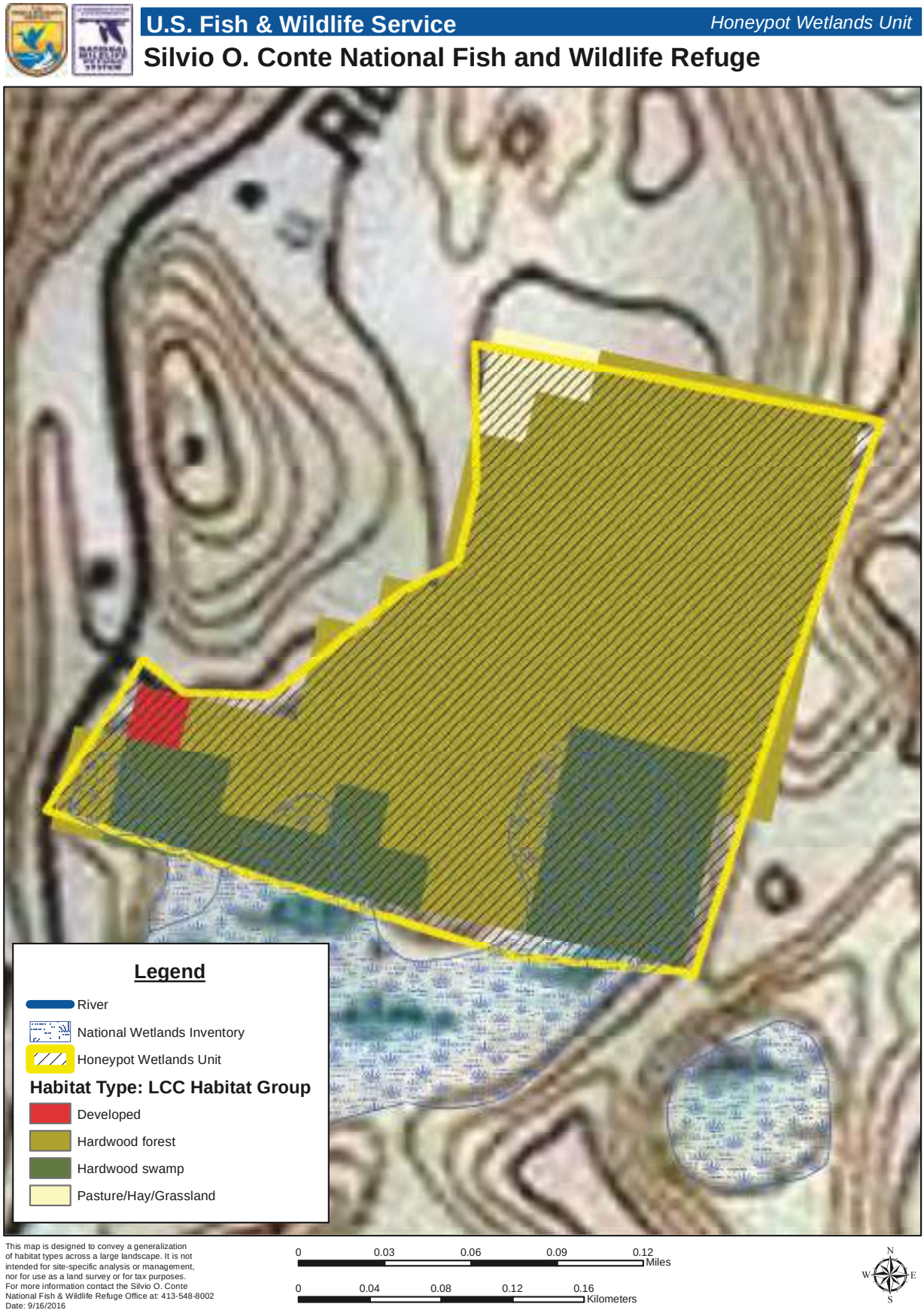


Table A.29. Honeypot Road Wetlands Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	16	74.0%
Hardwood swamp	5	21.9%
Forested uplands and wetlands subtotal	*20*	*95.8%*
Non-forested Uplands and Wetlands[2]		
Pasture/hay/grassland	1	3.1%
Non-forested uplands and wetlands subtotal	*1*	*3.1%*
Other		
Developed	0	1.0%
Other subtotal	*0*	*1.0%*
TOTAL	**21**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Honeypot Road Wetlands Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Honeypot Road Wetlands Unit's small size and isolation from other refuge units, has led us to aggregate our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. While achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management, the Service also has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Downed logs in a forest, streams, and vernal pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that

often does not recognize the commonality between maintaining a dead and downed logs, a vernal pool, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Honeypot Road Wetlands Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats, by virtue of refuge land ownership, represent small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and provide additional structural and species diversity to the matrix. A vernal pool or an herbaceous wetland, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna – providing ephemeral freshwater habitats for clam shrimp, or herbaceous wetlands for secretive bird species. One could make the case that these ephemeral freshwater habitats are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context.

Some habitats within the unit will be managed under a more classic coarse-filter approach — primarily those areas where the American clam shrimp has been documented. The State of Massachusetts considers the clam shrimp to be a "species of concern" under its State endangered species act. The shrimp inhabit ephemeral (vernal) pools. Small numbers of clam shrimp have been recorded at three Massachusetts habitats: a flooded depression in an old pasture field, a flooded hay field depression, and at Honeypot Road Wetlands along the weedy shoreline of an Atlantic white cedar swamp. The refuge will continue to monitor this known population for impacts from planned refuge activities.

Combining coarse and fine-scale conservation efforts under the rubric of BIDEH will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually, and more targeted strategies for those rare, threatened, or endangered species like the American clam shrimp. Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the unit is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Monitor impacts to sensitive habitats from public use.
- Work with partners to monitor known American clam shrimp populations.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Honeypot Road Wetlands Unit as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of CCP approval:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Honeypot Road Wetlands Unit as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Honeypot Road Wetlands Unit as an outdoor classroom.

Rationale:
Because this unit will be unstaffed, the majority of environmental education opportunities on this unit will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of CCP approval:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Honeypot Road Wetlands Unit as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Honeypot Road Wetlands Unit. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. Interpretation is an important tool that can be used to spread the refuge message to private residents and visitors to the refuge. We will develop interpretive materials with information on the unit's habitats and cultural resources.

Management Strategies:
Within 5 years of CCP approval:

- Inventory and evaluate each unit to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Honeypot Road Wetlands Unit.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval:

- Develop standardized self-guided interpretive services, such as kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Honeypot Road Wetlands Unit.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Honeypot Road Wetlands Unit will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Honeypot Road Wetlands Unit will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. The Honeypot Road Wetlands Unit (Unit) abuts the state Honey Pot Wildlife Management Area (Honey Pot WMA) which is open to hunting under state regulations. A larger unit of the Honey Pot WMA is close by to the south and the Westfield Wildlife Management Area is across Honey Pot Road, west of the unit. This area has been a popular area with hunters for many years. Allowing hunting opportunities at this unit conforms to historic use on the nearby state wildlife management areas. Popular game species include white-tailed deer, turkey, and cottontail rabbits. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
Within 1 year of CCP approval:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal unit open hours (i.e., 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the unit and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the unit.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the unit with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Massachusetts Department of Fish and Game facilities, and in local businesses.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.
- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to encourage youth hunting at the unit as a means of introducing young people to this traditional recreation activity.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Sub-objective 3.1b. (Hunter Education and Outreach)
Not applicable

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

This objective is not applicable because there is no permanent surface water on this unit.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Honeypot Road Wetlands Unit.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in this part of the state. Currently, there is no infrastructure in place at this unit to support this use, and consequently, visitation for wildlife viewing and photography is limited. Allowing people to engage in wildlife observation and photography is in keeping with the nature of the area.

Management Strategies:
Continue to:
- Allow wildlife observation and photography at the Honeypot Road Wetlands Unit.
- Allow public access daily from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters.

Within 1 year of CCP approval:
- Add information on the Honeypot Road Wetlands Unit to the refuge Web site.

Within 5 years of CCP approval:
- Determine whether an informational kiosk adjacent to Honey Pot Road is warranted, to provide information about the unit and refuge to visitors.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the unit.

Rationale:
The entire unit will be available for wildlife observation and photography; however, since this is a small landholding adjacent to a large area of state-conserved land that is popular with recreationists, no viewing aids will be developed.

Management Strategies:
Within 1 year of CCP approval:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 10 years of CCP approval:
- Produce a wildlife and plant species guide for the Honeypot Road Wetlands Unit that will be available on the refuge website and at the refuge headquarters.

Sub objective 3.3c Watershed-based Partner Initiatives
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Honeypot Road Wetlands Unit that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate, and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the unit. Each of these must be found to be both appropriate and compatible to be an authorized use of the refuge.

Management Strategies:
Within 1 year of CCP approval:

- Allow dispersed hiking and snowshoeing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- If interest exists, work with partners to design and market a virtual geocache course at the unit. The course should integrate orienteering with refuge interpretive messages that include linking this unit to other refuge divisions and units.

Mount Toby Unit (Existing Refuge Unit)

Sunderland, Massachusetts

Total Unit Acres[1]	30

1 Actual surveyed acres

What are the priority habitat types within the unit? What percentage of the total unit acreage do they represent?

- Hardwood forest - 98%
- Pasture/Hay/Grassland – 2%

For more information on the unit's location and habitats, see map A.48, map A.49, and table A.30.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem. Migrants become more evenly distributed in habitats in the watershed beyond the Connecticut River main stem (Smith College 2006). The Mount Toby Unit's hardwood forest is situated within a larger conserved landscape and serves as important stopover habitat for landbirds.

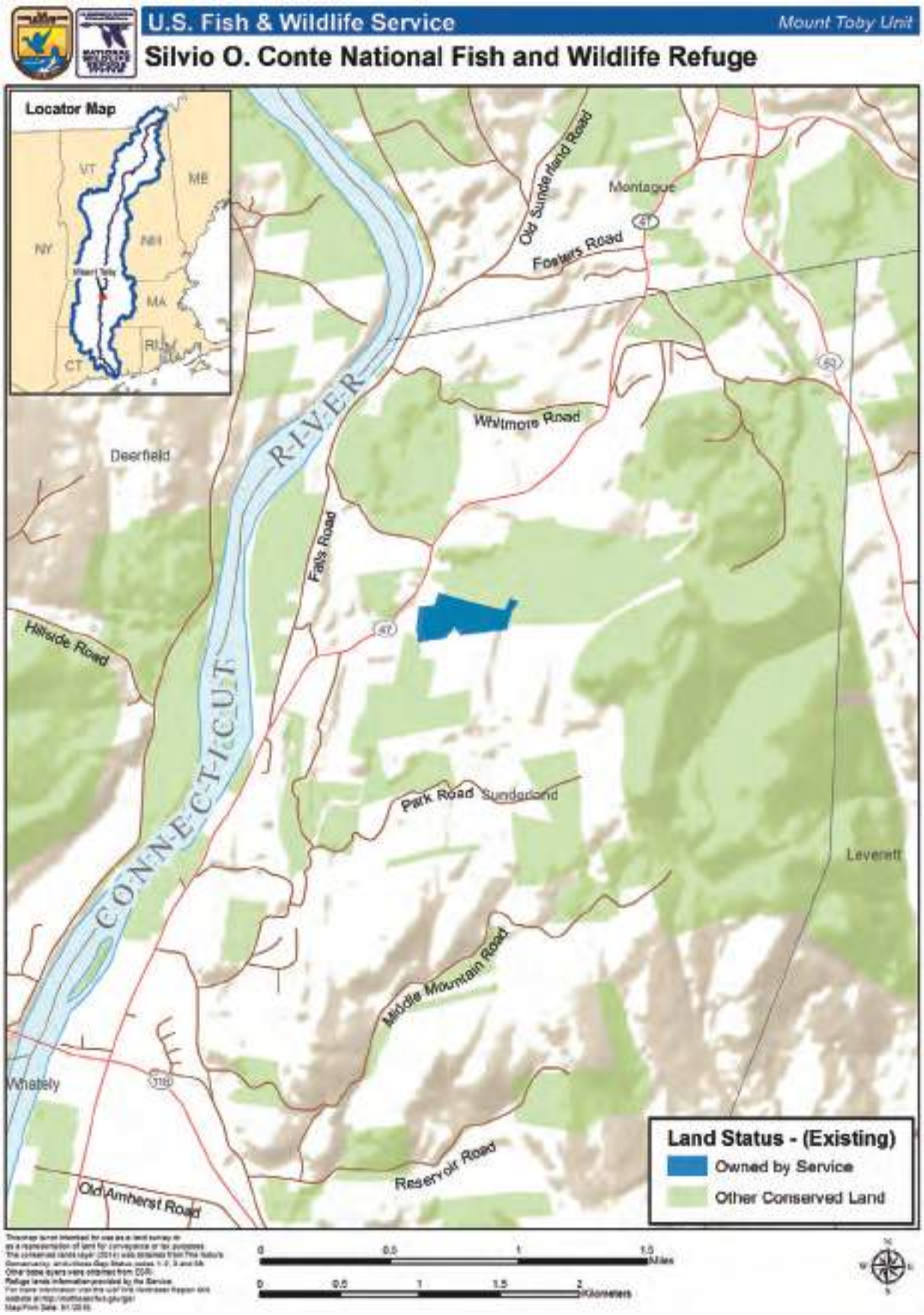
What habitat management activities will be a priority on refuge lands within the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on managing invasive plants to maintain native diversity.

What public use opportunities will be a priority on refuge lands within the unit?

We will focus on providing opportunities for hunting, interpretation, and wildlife observation and photography.

Map A.48. Mount Toby Unit – Location.



Map A.49. Mount Toby Unit – Habitat Types.

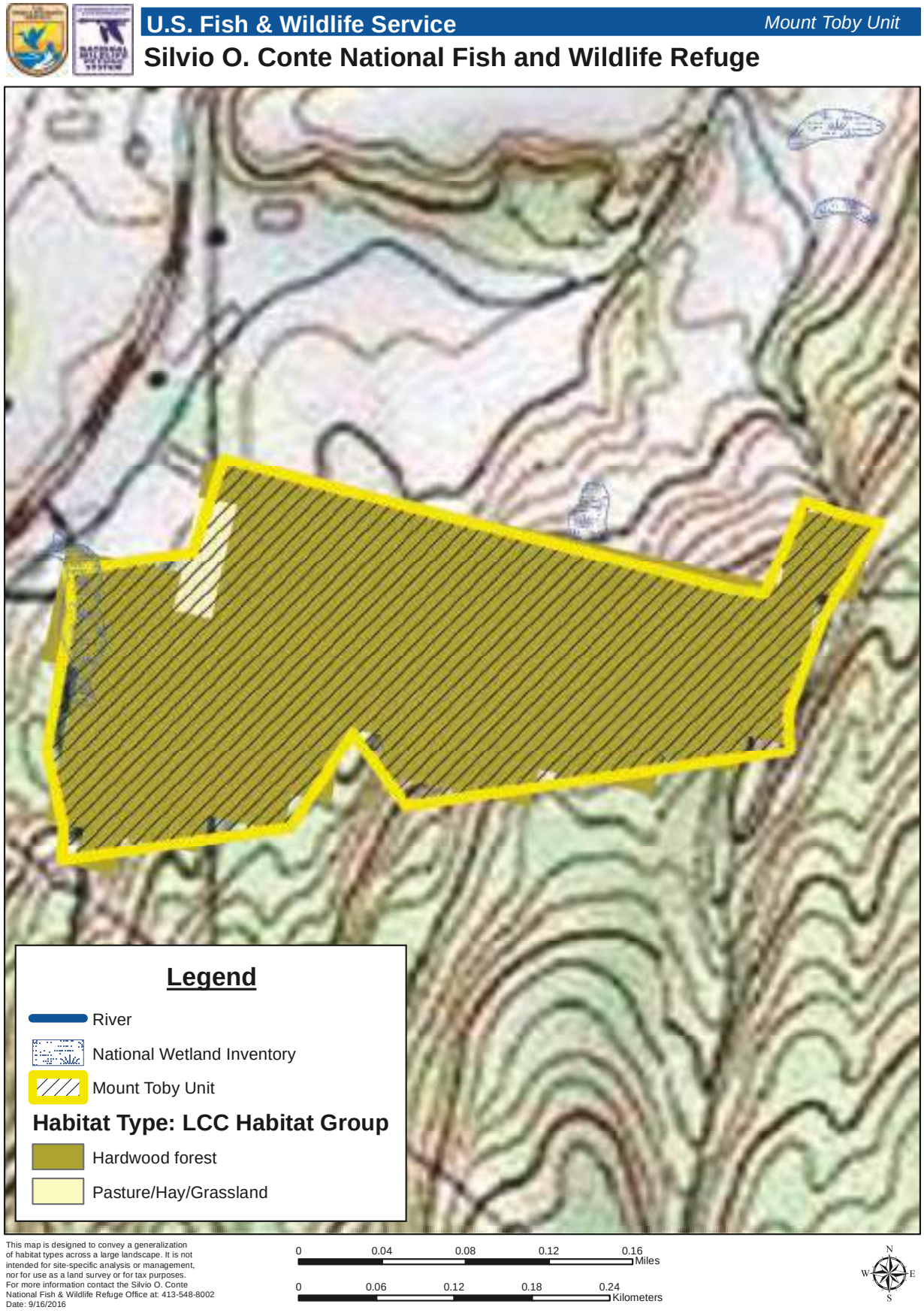


Table A.30. Mount Toby Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	29	97.8%
Forested uplands and wetlands subtotal	*29*	*97.8%*
Non-forested Uplands and Wetlands[2]		
Pasture/hay/grassland	1	2.2%
Non-forested uplands and wetlands subtotal	*1*	*2.2%*
TOTAL	**30**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies.

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Mount Toby Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Mount Toby Unit's small size and isolation from other refuge units, has led us to aggregate our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. While achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management, the Service also has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the Service has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Downed logs in a forest, streams and vernal pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a dead and downed logs, a vernal pool, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Mount Toby Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Fragmentation is of particular concern within the Mt Toby ecosystem—parcelization by land ownership is extensive. The large number and variety of landowners—each with their own objectives, resources, and constraints—means that the future of the Mount Toby landscape is far from certain. Our understanding of the current condition of all the habitats on refuge-owned lands and their contribution to the BIDEH of the unit and the broader landscape is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State of Massachusetts and the University of Massachusetts, in support of the State Wildlife Action Plan and the Mount Toby Demonstration Forest plan, to ensure management on Service lands complement adjacent land management objectives.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Monitor impacts to sensitive habitats from the introduction of trail users.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Mount Toby Unit as an outdoor classroom.

Rationale:
Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to "provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access."

Management Strategies:
Within 1 year of CCP approval:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Mount Toby Unit as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Mount Toby Unit as an outdoor classroom.

Rationale:
Because this unit will be unstaffed, the majority of environmental education opportunities on this unit will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of CCP approval:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Mount Toby Unit as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Mount Toby Unit. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Mount Toby Unit will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Mount Toby Unit's habitats and cultural resources.

Management Strategies:
Within 5 years of CCP approval:

- Inventory and evaluate each unit to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Mount Toby Unit.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Mount Toby Unit.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Mount Toby Unit will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Mount Toby Unit will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based state regulations.

Rationale:
The Mount Toby Unit is part of a partnership conservation effort with the University of Massachusetts, Massachusetts Department of Conservation and Recreation, The Nature Conservancy, and The Trustees of Reservations. Hunting is allowed on adjacent and nearby conservation lands and has been a popular area with hunters for many years. Popular game species include white-tailed deer, turkey, and cottontail rabbits. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Within 1 year of CCP approval:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal unit open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the unit and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the unit.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the unit with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Massachusetts Department of Fish and Game facilities, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to encourage youth hunting at the unit as a means of introducing young people to this traditional recreation activity.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

This objective is not applicable because there is no surface water on this unit.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Mount Toby Unit.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in this part of the state. Currently, there is no infrastructure in place at this unit to support this use, and consequently, visitation for wildlife viewing and photography is limited. Allowing people to engage in wildlife observation and photography is in keeping with the other conservation landowners at Mount Toby.

Management Strategies:
Within 1 year of CCP approval:

- Allow wildlife observation and photography at the Mount Toby Unit.

- Allow public access at the Mount Toby Unit daily from 30 minutes before sunrise to 30 minutes after sunset, with the exceptions listed for hunters.

- Add information on the Mount Toby Unit to the refuge website.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Not applicable

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Mount Toby Unit that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate, and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the unit. Each of these must be found to be both appropriate and compatible to be an authorized use of the refuge.

Management Strategies:
Within 1 year of CCP approval:

- Allow dispersed hiking and snowshoeing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- If interest exists, work with partners to design and market a virtual geocache course at the unit. The course should integrate orienteering with refuge interpretive messages that include linking this unit to other refuge divisions and units.

Mount Tom Unit (Existing Refuge Unit)

Holyoke, Massachusetts

Total Unit Acres[1]	141

1 Actual surveyed acres.

What are the priority habitat types within the unit? What percentage of the total unit acreage do they represent?

- Hardwood forest - 85%
- Woodlands (natural) - 0.2%
- Pasture/Hay/Grassland – 12%
- Open water –3%

For more information on the unit's location and habitats, see map A.50, map A.51, and table A.31.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The Mount Tom Unit's hardwood forests provide stopover habitat for landbirds.

2. **Wetlands**
   A portion of the wetlands were inventoried by a contractor working for an adjacent landowner. Most wetlands are associated with drainages or the abandoned drainage system from the former ski resort.

What habitat management activities will be a priority on the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on continuing to treat invasive plant populations to maintain native diversity.

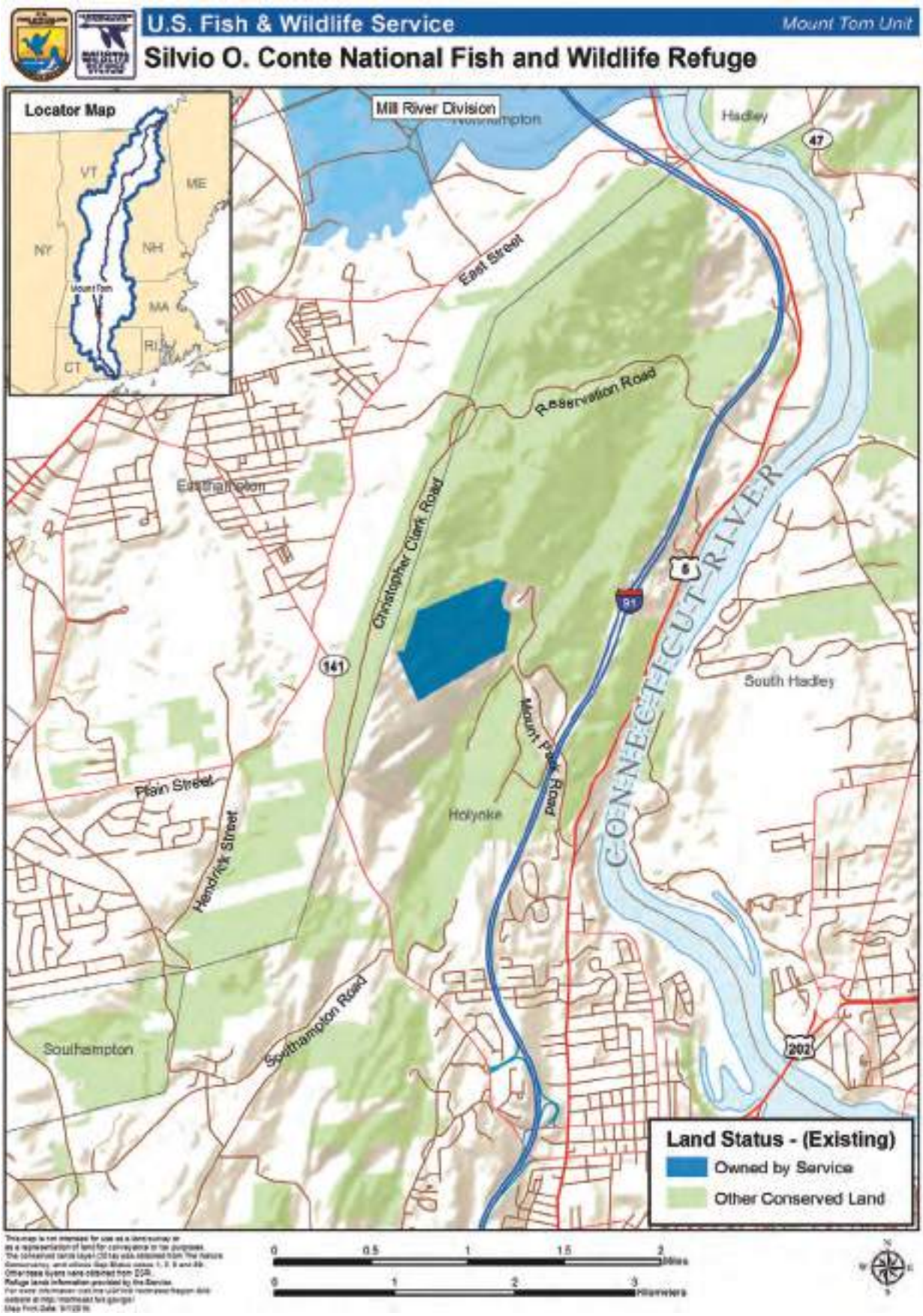
What public use opportunities will occur on the unit?

The unit is currently closed to the public due to vandalism and safety concerns. Once it is safe to do so, we intend to open the property for wildlife observation, photography, interpretation, and environmental education.

Does the unit have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

There are several State-listed plant and animal species on the unit. The Metacomet-Monandnock Trail passes just to the west of the unit.

Map A.50. Mount Tom Unit – Location.



Map A.51. Mount Tom Unit – Habitat Types.

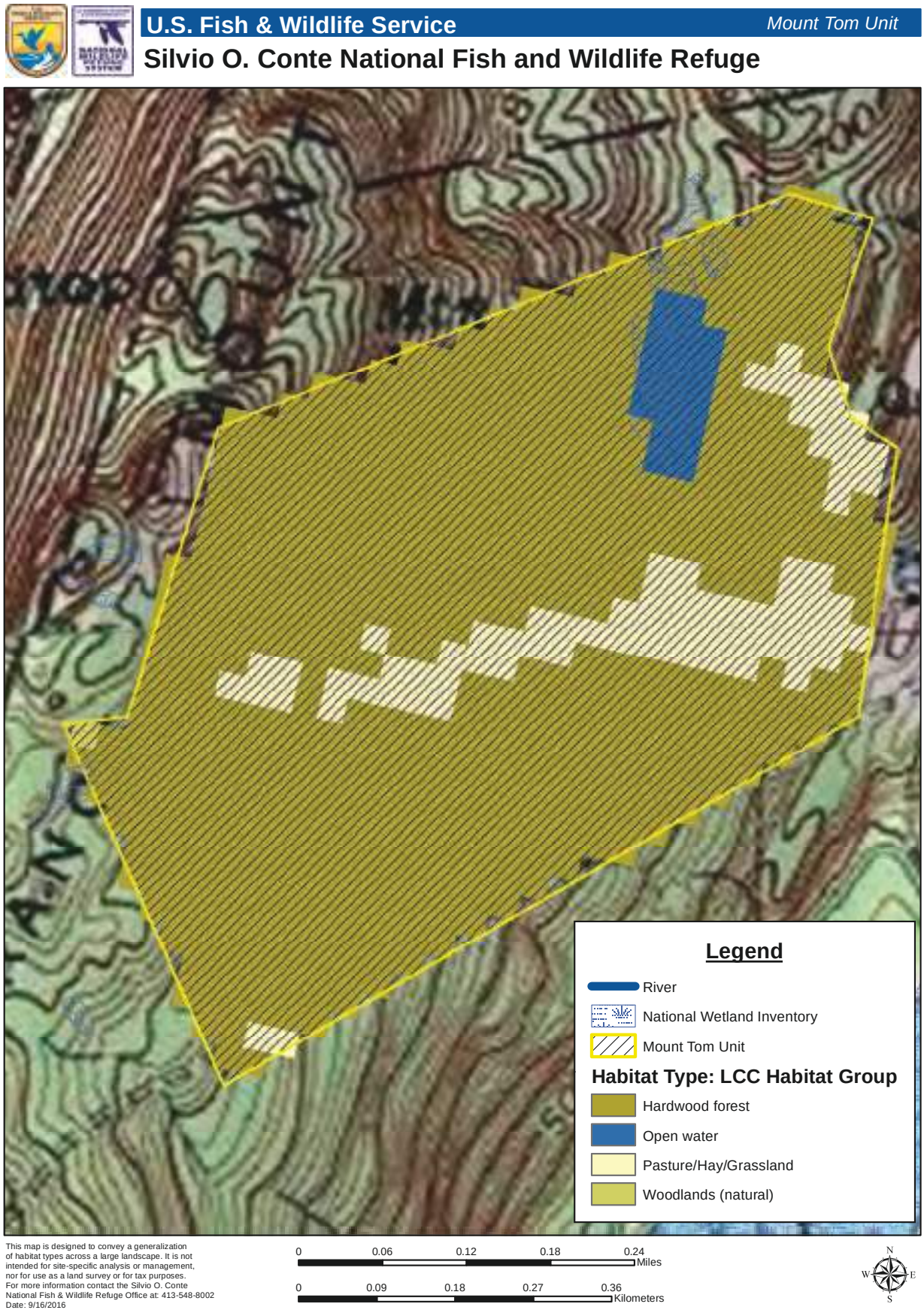


Table A.31. Mount Tom Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	120	85.4%
Woodlands (natural)	0.2	0.2%
Forested uplands and wetlands subtotal	*120*	*85.6%*
Non-forested Uplands and Wetlands[2]		
Pasture/hay/grassland	16	11.6%
Non-forested uplands and wetlands subtotal	*16*	*11.6%*
Inland Aquatic Habitats[2]		
Open water	4	2.9%
Inland aquatic habitats subtotal	*4*	*2.9%*
TOTAL	**140**	**100.0%**

Notes:

2 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

3 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Mount Tom Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Mount Tom Unit's small size and isolation from other refuge units, has led us to aggregate our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. While achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management, the Service also has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987; Hunter 1991; Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Downed logs in a forest, a vernal pool, and a volcanic basalt ridge in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a dead and downed logs, a vernal

pool, and a volcanic basalt ridge. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Mount Tom Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. The unit's exposed volcanic basalt layers for instance, are anomalies in an otherwise forested landscape. They often have unique microclimates and special flora and fauna—dry, hot upper ridges that support oak savannas — often dominated by chestnut oak—and a variety of rare plant species. One could make the case that these habitats are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually, and more targeted strategies for those rare, threatened, or endangered species that may be at the northern or southern limit of their range. Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the unit is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Continue to control invasive plant species on the refuge, particularly where they threatened State-listed plant species. Priority invasive plant management actions include:
  - ✓ Continuing to collaborate with Mt. Tom Partners and Massachusetts Natural Heritage Program to strategically prevent and manage invasive species.
  - ✓ Preventing the establishment of garlic mustard on the unit, which is prevalent nearby.
  - ✓ Training volunteers to detect and report sightings of regionally significant new invaders, such as Japanese stiltgrass, mile-a-minute vine, and narrow leaf bittercress.
- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Monitor impacts to sensitive habitats from the introduction of trail users.
- Map natural communities; protect rare or exemplary examples.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
In coordination with the Massachusetts Department of Conservation and Recreation, the Holyoke Boys and Girls Club, The Trustees of Reservations, and the city of Holyoke, act as a resource to communities, school systems, public and non-profit organizations, and private educational organizations in Massachusetts, who want to use the Mount Tom Unit as an outdoor environmental education classroom.

Rationale:
The Mount Tom/Mount Holyoke Range is well known for an abundance of rare plants and animals and for the unique habitats associated with the uncommon trap rock formations. During the establishment of the Conte Refuge in 1995 this area was designated as one of 48 Special Focus Areas in the watershed that warranted protection through either conservation easements or acquisition. Thus, it has been recognized for many years as important land for wildlife conservation. In 2002, the Service acquired 140 acres of the mid and upper slopes of the former Mount Tom Ski Area. Simultaneously, the Massachusetts Department of Conservation and Recreation, The Trustees of Reservations, and the Holyoke Boys and Girls Club acquired other parts of the former resort. Public access has been restricted by all partners since acquisition because of the active rock quarry at the base of the mountain and the threat of vandalism to the former ski lodge buildings. The quarry ceased operations in 2012 and the Holyoke Boys and Girls Club is in the process of developing a site plan for their property which includes the former ski lodge. The intention of the partners is to open the property for compatible public uses, with an emphasis on environmental education and interpretation, particularly for adjacent cities such as Holyoke, once it is safe to do so.

The Mount Tom Unit is located in Holyoke, Massachusetts and has great potential to reach urban audiences who would not normally visit a refuge on their own. The old ski area is a partnership between four partners, The Trustees of Reservation, the Department of Conservation and Recreation, the Holyoke Boys and Girls Club, and the Service. The goal is to support the development of the old ski lodge into an environmental education facility for the Holyoke Boys and Girls Club. If this scenario happens, the facility could be an important means for the refuge to spread the refuge message to under-represented audiences through programs, displays, etc.

Management Strategies:
Within 5 years of CCP approval and opening of the unit to public access:

- Support the Holyoke Boys and Girls Club in the creation of an environmental education facility at the site of the old Mount Tom ski area lodge.
- Provide support for the formation of a Mount Tom Friends group.
- Promote the Mount Tom Unit as a destination for field trips and increase the number of students by two percent per year for the next 5 years.
- Work with Mount Tom partners and Friends group to develop experiential learning programs focusing on the ecology of Mount Tom and migratory birds that contribute to MA curriculum standards.
- Make environmental education training conducted in other parts of the refuge available to volunteers and Friends group members.
- Work with partners to use the Mount Tom Unit as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Promote other government agencies, non-profit organizations, private educational organizations, staff, volunteers, and members of the Friends of Mount Tom to offer high quality environmental education programs at the Mount Tom Unit.

Rationale:
See rationale for sub-objective 2.1a.

Management Strategies:
Within 5 years of CCP approval and opening of the unit to public access:

- Develop a cadre of volunteers and partners that can lead educational visits by Holyoke Boys and Girls Club members, local schools, and other entities.
- Develop an educational partnership with the Holyoke Boys and Girls Club, Massachusetts Department of Conservation and Recreation, and The Trustees of Reservations to use the unit as an outdoor classroom emphasizing the unique ecological aspects of the unit.
- Encourage Mount Tom partners, volunteers, and members of Friends group to facilitate teachers and students at the Mount Tom Unit.
- Work with local environmental education providers to implement the refuge's Adopt-a-Habitat initiative to help individuals learn about and connect with their local environments;
- Work with Friends of Conte's Recreation and Education sub-committee to support and recruit partners that seek funding for watershed-based environmental education.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Encourage partners to develop an evaluation system to measure the effectiveness of environmental education programs.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
Encourage and support Mount Tom partners, and Friends group to work with communities, public and non-profit organizations, staff, and volunteers to offer quality interpretive programming at the Mount Tom Unit. Encourage development of highly trained interpreters by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. As mentioned above, the Mount Tom Unit is currently closed to the public. Once the Mount Tom Unit is opened to the public, we will develop an interpretive program. With various old roads, and trail connections to Trustees of Reservation and Department of Conservation and Recreation trails, the Mount Tom Unit is well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the habitats and cultural resources found on the Mount Tom property.

Management Strategies:
Within 5 years of CCP approval and opening of the unit to public access:

- Work with Mount Tom partners to employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, print and social media, signs, etc.) when creating programming for natural and cultural resource interpretation.
- Collaborate with Mount Tom partners, Friends group, and volunteers to create meaningful, consistent, thematic statements to be used in the delivery of programming at the Mount Tom Unit.
- Develop interpretive goals and objectives and identify appropriate strategies for refuge visitors.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval and opening of the unit to public access:

- Collaborate with Mount Tom partners, Friends group, and volunteers to develop self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Mount Tom partners, Friends group, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval and opening of the unit to public access:

- Through Mount Tom partners and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Mount Tom Unit.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.
- Work with partners to install an informational kiosk to disseminate information and interpretive resources.

Within 10 years of CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media e.g. pamphlets, signs, etc.

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because Mount Tom Unit is unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because Mount Tom Unit is unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

This objective is not applicable because the Mount Tom Unit is part of a partnership conservation effort with the Massachusetts Department of Conservation and Recreation, The Trustees of Reservations, and the Holyoke Boys and Girls Club. None of the adjacent landowners allow hunting on their property. Holyoke Boys and Girls Club is in the process of developing a site plan to construct new youth facilities to replace the old ski lodge and ancillary facilities. Once that is complete, children will be onsite, frequently engaged in outdoor activities. The Mount Tom Unit is upslope from the Holyoke Boys and Girls Club property and does not have separate access or Service-owned parking. Hunting on this unit will not be permitted because it was not previously allowed, adjacent landowners do not intend to allow hunting in the future, and children may be on the unit any time of the year.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

This objective is not applicable. The only water body suitable for fishing on the unit is Mountain Park Reservoir, a 1.5-acre, constructed pond that was used for snowmaking by the former ski area. It is located about mid-slope and is only accessible to the public by foot. Runoff and possibly springs feed the pond. Angling could only be sustained with a put-and-take fishery, but this is not economical, nor is it warranted because there are other places to fish in the area.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Mount Tom Unit.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in this part of the state. As mentioned above, the Mount Tom Unit is currently closed to the public. Also, there is currently no infrastructure in place at this unit to support this use, and consequently, visitation for wildlife viewing and photography is limited. Once the unit is opened to the public we will offer opportunities for wildlife observation and photography.

Management Strategies:
Within 1 year of CCP approval and opening of the unit to public access:

- Allow wildlife observation and photography at the Mount Tom Unit.
- Allow public access at the unit daily from 30 minutes before sunrise to 30 minutes after sunset.
- Add information on the unit to the refuge website.
- Work with partners to install an informational kiosk in a conspicuous location to post information and notices to visitors.

Within 5 years of CCP approval and opening of the unit to public access:

- Work within the Mount Tom Partnership (i.e., Massachusetts Department of Conservation and Recreation, The Trustees of Reservations, and Holyoke Boys and Girls Club to develop a public access strategy that responds to the demand for access across all ownerships, provides safe trailhead parking, informational kiosk(s), etc.

Within 10 years of CCP approval and opening of the unit to public access:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the unit.

Rationale:
Once the unit is opened to the public, the entire unit will be available for wildlife observation and photography. However, there are other steps the refuge can take to enhance visitor's experiences on the unit. Visitation increases are expected as this unit becomes better known because it is in close proximity to Holyoke and Easthampton, Massachusetts. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of CCP approval and opening of the unit to public access:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a Special Use Permit.

Within 5 years of CCP approval and opening of the unit to public access:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups and environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the unit for distribution at informational kiosks, the refuge website, and other popular media.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Mount Tom Unit that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking and wildlife observation. Examples include the New England Trail, located adjacent to the unit along the Mount Tom ridgeline which is owned and managed by the Massachusetts Department of Conservation and Recreation.

Within 5 years of CCP approval and opening of the unit to public access:
- Once the unit is open to the public, work with partners to determine how best to connect with users on the New England Trail.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Mount Tom Unit that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the unit without detrimentally impacting the wildlife resource. Once the unit is opened to the public, we will allow hiking, snowshoeing, pet walking, and recreational gathering of antler sheds, fruits, plant parts, and mushrooms for personal use.

Management Strategies:
Within 1 year of CCP approval and opening of the unit to public access:
- Allow dispersed hiking and snowshoeing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of the priority public uses by special use permit.

Within 5 years of CCP approval and opening of the unit to public access:
- Work with partners to determine whether a virtual geocache course at the unit is acceptable on the conserved property. The course should integrate orienteering with refuge interpretive messages that include linking this unit to other refuge divisions and units.

Third Island Unit (Existing Refuge Unit)

Deerfield, Massachusetts

Total Unit Acres[1]	4

1 Actual surveyed acres.

What are the priority habitat types within the unit? What percentage of the total unit acreage do they represent?

- Hardwood forest - 66%
- High-energy riverbank – 33%

For more information on the unit's location and habitats, see map A.52, map A.53, and table A.32.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). Third Island sits third in a line of four islands within the Connecticut River, and its 2 acres of hardwood forest provide stopover habitat for landbirds, and supracanopy trees for nesting bald eagles.

2. **Other**
   Third Island is part of series of four islands in the Connecticut River. These islands are biologically interesting because of their unique physical environments, habitats, and vegetation. The alluvial deposition of cobbles, sand and silt during high spring flood events created the islands, and annual flooding across the islands have created a gradient of substrate types and therefore unique habitats and vegetation.

   Each island, including Third Island, typically has two vegetation communities: a high-energy riverbank community on the upstream end and floodplain forest on the downstream end. The Massachusetts Natural Heritage and Endangered Species Program designate both community types as priority natural communities due to their rarity in the State. High-energy riverbank communities are rare because they can only form in steep-gradient, high flood areas, and several state-listed herbaceous species occur. Floodplain forests were at one time quite common in the state, particularly on the extensive alluvial silt deposits of the Connecticut River Valley, but they have been largely converted to agricultural land due to their high fertility (Paveglio and Taylor 2010; UMass 2012).

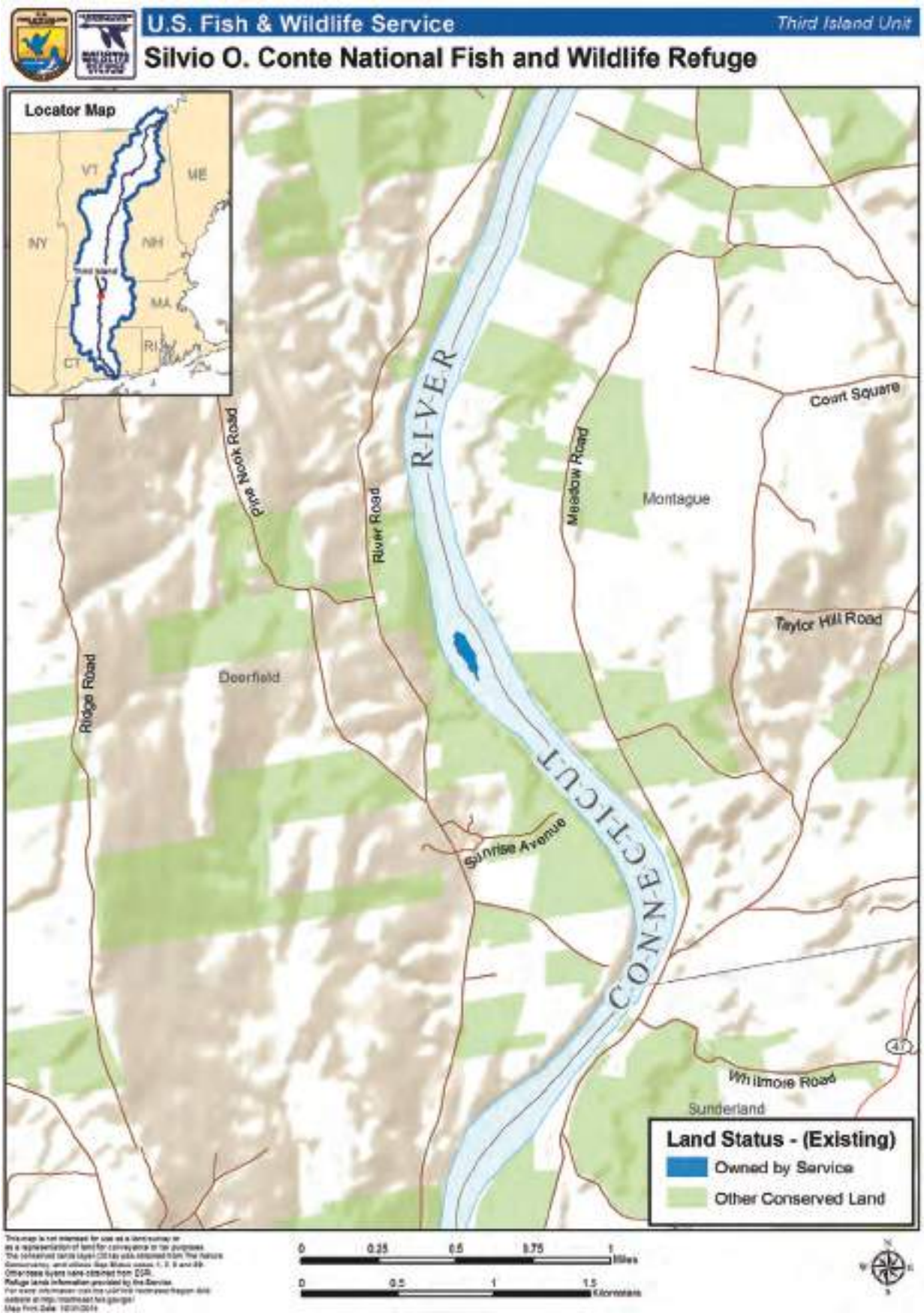
What habitat management activities will be a priority on the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on managing invasive plants to maintain native diversity.

What public use opportunities will be a priority on the unit?

We allow public access to Third Island from August 1 through December 31. The island is closed the remainder of the year to protect nesting bald eagles. Our priority will be to offer the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

Map A.52. Third Island Unit – Location.



Map A.53. Third Island Unit – Habitat Types.

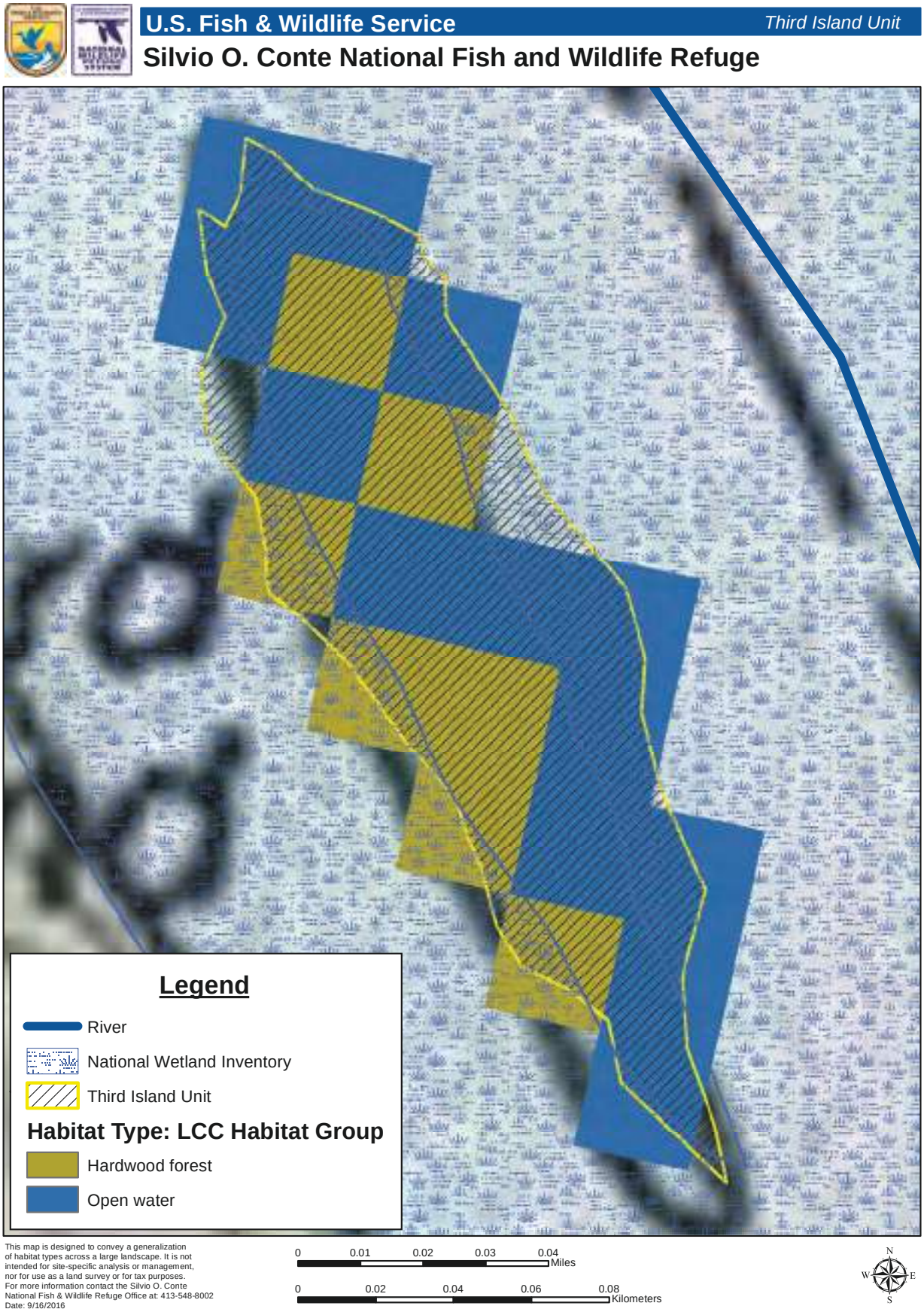


Table A.32. Third Island Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	2	35.0%
Forested uplands and wetlands subtotal	*2*	*35.0%*
Inland Aquatic Habitats[2]		
Open water	3	65.0%
Inland aquatic habitats subtotal	*3*	*65.0%*
TOTAL	**5**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies.

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Third Island Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Third Island Unit's small size and isolation from other refuge units, has led us to group our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. While achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management, the Service also has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Downed logs in a forest, a vernal pool, and a rocky outcrop in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a dead and downed logs, a vernal pool, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Third Island Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats, by virtue of the unit being an island, represent small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and provide additional structural and species diversity to the matrix. The island's high-energy cobble riverbank community or its downstream floodplain forests, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—rare grasses that thrive on frequently disturbed sites, or understory herbaceous plants restricted to nutrient rich sites. One could make the case that these habitats are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually, and more targeted strategies for those rare, threatened, or endangered species like the several State-listed dragonfly species that utilize the island's cobble shore and coarse woody debris. Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the unit is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible. Management priority should be given to invasive species, such as bittersweet, that threaten supra-canopy trees used by nesting bald eagles.

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Third Island Unit as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of CCP approval:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Third Island Unit as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
- Encourage schools, scout groups, and summer camps to use the Third Island Unit as an outdoor classroom.

Rationale:
Because this unit will be unstaffed, the majority of environmental education opportunities on this unit will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of CCP approval:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Third Island Unit as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Third Island Unit. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. During the period the island is open to the public Third Island Unit is well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Third Island Unit's habitats and cultural resources.

Management Strategies:
Within 5 years of CCP approval:
- Inventory and evaluate each unit to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Third Island Unit.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.

- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Through partners, and Friends group, annually provide quality interpretive programs,
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Third Island Unit will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Third Island Unit will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based state regulations.

Rationale:
The Third Island Unit is a 3.8-acre island in the Connecticut River in Deerfield, MA. The island is a popular stop for canoeists and kayakers and has been home to nesting bald eagles for several years. Other similar islands in the vicinity such as Second Island, administered by Massachusetts Department of Conservation and Recreation, are open to hunting. In reality, hunting at these small islands is primarily for waterfowl and often from boats as there is no other access. Hunting seasons can be designed so that bald eagle nesting is not affected.

As mentioned above, we allow public access to Third Island from August 1 through December 31. The island is closed the remainder of the year to protect nesting bald eagles.

Management Strategies:
Within 1 year of CCP approval:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.
- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with Massachusetts Department of Fish and Game to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Not applicable

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide the opportunity for a quality fishing experience generally following state regulations.

Rationale:
Fishing opportunities at Third Island are limited to bank fishing in the Connecticut River. This island is a popular resting area for canoeists and kayakers paddling down the river. By allowing fishing, visitors can enjoy this priority public use while visiting the island.

Management Strategies:
Within 5 years of CCP approval:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- The Third Island Unit will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations, except from January 1 to July 31 each year when the island will be closed to protect nesting bald eagles.

Inventory and Monitoring Strategies:
Within 10 years of CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the unit.

Rationale:
There are limited means of connecting with anglers on this unit because the island is remote and only accessible via boat, canoe, or kayak. The best way to inform visitors will be indirect methods such as the refuge website, social media, and by posting information on the island.

Management Strategies:
Within 5 years of CCP approval:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Third Island Unit.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity for people recreating in this reach of the Connecticut River. During the summer and fall water levels are relatively shallow, limiting access mainly to non-motorized watercraft. These people generally are out to experience the natural river attributes and enjoy viewing and photographing wildlife and their habitats. The Third Island Unit has been closed to all public uses during the bald eagle nest season which extends approximately from January 1 through June, although this may vary.

Management Strategies:
Within 1 year of CCP approval:

- Allow public access at the Third Island Unit daily from 30 minutes before sunrise to 30 minutes after sunset, except from January 1 to July 31 each year when the island will be closed.

Within 5 years of CCP approval:

- Construct a kiosk to post information on wildlife, fish, plants, and river dynamics.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the unit.

Rationale:
The entire unit will be available for wildlife observation and photography; however, since this is a small island with limited access no viewing aids will be developed.

Management Strategies:
Within 1 year of CCP approval:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of CCP approval:

- Produce a wildlife and plant species guide for the Third Island Unit that will be available on the refuge website and at the refuge headquarters.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Third Island Unit that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway trail. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Within 5 years of CCP approval:

- Work with public and private partners to determine whether and what roles this unit might contribute to a Connecticut River waterway trail.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)

Allow compatible outdoor recreational opportunities on the Third Island Unit that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:

In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the unit without detrimentally impacting the wildlife resource.

Within 1 year of CCP approval:

- Allow dispersed hiking.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Wissatinnewag Unit (Existing Refuge Unit)

Greenfield, Massachusetts

Total Unit Acres[1]	21

1 Actual surveyed acres.

What are the priority habitat types within the unit?

- Hardwood forest - 48%
- Woodlands (natural) – 34%

For more information on the unit's location and habitats, see map A.54, map A.55, and table A.33.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). Though, small in acreage, the Wissatinnewag Unit's hardwood forests provide stopover habitat for landbirds.

What habitat management activities will be a priority on refuge lands in the unit?

We will conduct an inventory to collect baseline information on the condition of habitats and wildlife to inform more detailed, habitat prescriptions within a required step-down HMP. Once inventory has been completed, then management will focus on managing invasive plants to maintain native diversity.

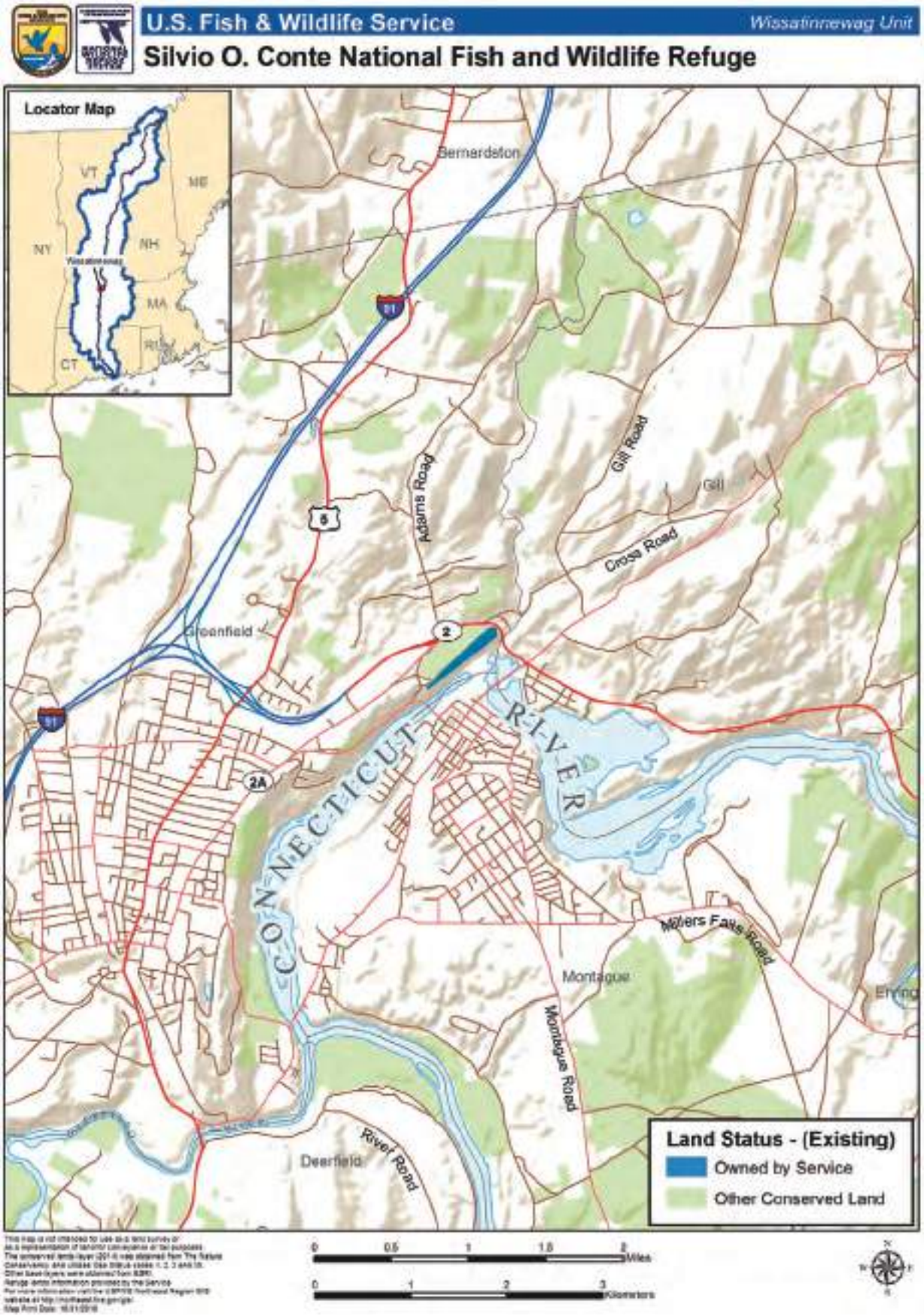
What public use opportunities will occur on the unit?

The unit is closed to the public to protect resources.

Does the unit have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

The Wissatinnewag Unit contains portions of the extensive, complex Mackin Sand Bank Site, which has produced burials and evidence of Native American settlement starting at least by the Middle Archaic period, more than 7,000 years ago.

Map A.54. Wissatinnewag Unit – Location.



Map A.55. Wissatinnewag Unit – Habitat Types.

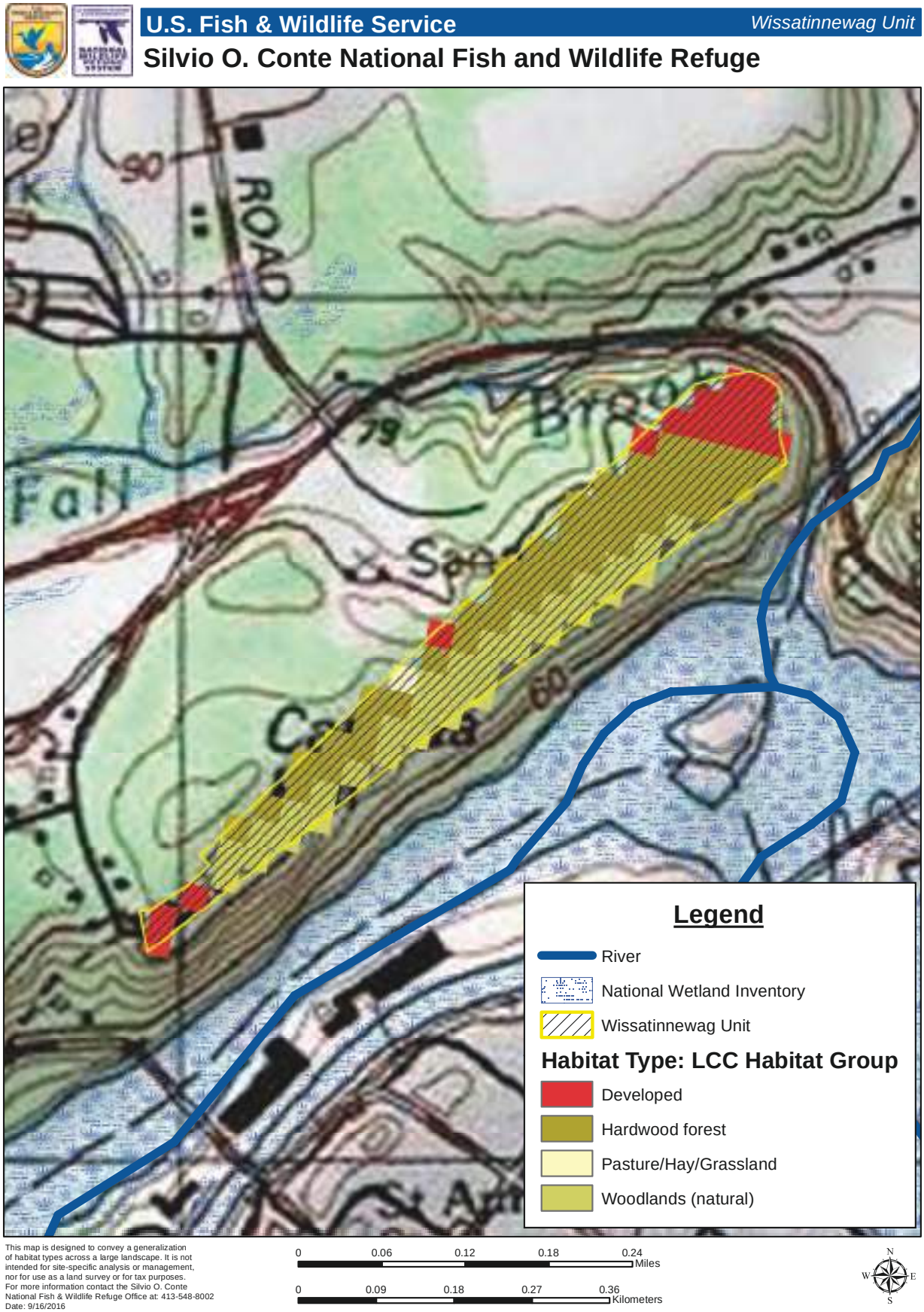


Table A.33. Wissatinnewag Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	10	48.4%
Woodlands (natural)	7	34.1%
Forested uplands and wetlands subtotal	*17*	*82.4%*
Non-forested Uplands and Wetlands[2]		
Pasture/hay/grassland	0.2	1.1%
Non-forested uplands and wetlands subtotal	*0.2*	*1.1%*
Other		
Developed	3	16.5%
Other subtotal	*3*	*16.5%*
TOTAL	20	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies.

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Wissatinnewag Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Wissatinnewag Unit's small size and isolation from other refuge units, has led us to group our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. While achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management, the Service also has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the Service has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad

hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Wissatinnewag Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats, by virtue of refuge ownership patterns, are small, isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the unit is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State of Massachusetts, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

This goal is not applicable to the Wissatinnewag Unit because the unit is closed to all public access, except by special use permit, to protect sensitive resources.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

This goal is not applicable to the Wissatinnewag Unit because the unit is closed to all public access, except by special use permit, to protect sensitive resources.

Dave Govatski

Cherry Pond from the Pondicherry Division, New Hampshire

State of New Hampshire

- **Ashuelot River Conservation Focus Area**
- **Blueberry Swamp Conservation Focus Area (Existing Refuge Division)**
- **Mascoma River Conservation Focus Area (Existing Refuge Division)**
- **Pondicherry Conservation Focus Area (Existing Refuge Division)**
- **Saddle Island Unit (Existing Refuge Unit)**
- **Sprague Brook Conservation Focus Area**

Ashuelot River Conservation Focus Area

Alstead, Marlow, Surry, and Gilsum, New Hampshire

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	17,860	85%
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*17,860*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	3,225	15%
Total Acres in CFA[2,4]	21,085	100%

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Ashuelot River CPA (map A.56) encompasses the Ashuelot River CFA (map A.57). The Ashuelot River CFA is part of a larger area identified as a high priority for conservation for the State of New Hampshire because it contains a large intact forested area with small, scattered, high-quality forested wetlands that are valuable, especially for black duck nesting. The CFA also encompasses a tremendous diversity of topography (e.g., elevation and aspects). Most of the Ashuelot River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Service land acquisition in this CFA could serve as a footing between other nearby conserved areas.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 85.7%
- Shrub swamp and Floodplain Forest – 2.3%
- Freshwater Marsh – 1.3%

For more information on habitats in the CFA, see map A.58 and table A.34.

What are the resources of conservation concern for the CFA?

As noted in table A.35 below, there are ten priority refuge resources of concern (PRRC) terrestrial and aquatic species, including a federal listed species that rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) including wetland dependent and forest interior species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   The Ashuelot River, below Surry Mountain Lake, supports the federally endangered dwarf wedgemussel. This species requires stable bank conditions and good water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000).The Ashuelot River is one of two rivers in the upper watershed where significant numbers of mussels have been found. Habitat loss, fragmentation and altered river processes are threats impeding the recovery of dwarf wedge mussel in the upper Connecticut River (Nedeau 2009).

   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA, especially those with active bat hibernacula, may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Ashuelot River CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat for a diversity bird species.

   The New Hampshire Chapter of The Nature Conservancy (TNC) identified the Surry Mountain area as one of 13 high priority habitat areas in the Ashuelot River watershed. These areas were identified due to their ecological diversity and unfragmented landscape (Zankel 2004). To better understand the biological diversity within the Surry Mountain area, TNC initiated the collection of baseline bird and habitat data. The intact forest and wetland ecosystems provide habitat for a diversity of bird species from aquatic and wetland-dependent birds to those that use large, unfragmented forests.

   A total of 68 documented bird species use the habitats identified in the Ashuelot River CFA. These include PRRC species such as blackburnian warbler, Canada warbler, chestnut-sided warbler, wood thrush, bald eagle, and American woodcock. Wood thrush and blackburnian warbler prefer older forests, while American woodcock and chestnut-sided warbler rely on young forests within the CFA. Canada warbler prefers the moist soils and structural diversity of forested wetlands and riparian areas. SGCN species were also observed during surveys including common loon, American bittern, great blue heron, Virginia rail, veery, and eastern towhee.

3. **Waterfowl**
   Wetlands within the CFA, especially those associated with Surry Mountain Lake, provide habitat for breeding and migrating species such as blue-winged teal, hooded merganser, common merganser, and wood duck. These wetlands may also provide provide quality breeding, foraging, and stopover habitat for American black duck, a species of high conservation concern and PRRC.

4. **Diadromous fish and other aquatic species**
   The Ashuelot River CFA supports numerous pond, wetland and river habitats. A portion of the Ashuelot River (from Village Pond to Surry Mountain Lake) meanders through the hilly terrain of the CFA. The main stem and tributaries provide habitat for American eel, and possibly Eastern brook trout. Both species are PRRC, though a species inventory will be necessary to confirm brook trout presence.

   Surry Mountain Lake is located in the southern portion of the CFA. This manmade lake is associated with the Surry Mountain Dam, which was built on the Ashuelot River in 1941 by the U.S. Army Corps of Engineers to prevent flooding along the Connecticut River. This 265-acre lake is managed by New Hampshire Fish and Game Department and the Army Corps of Engineers, and supports various species of bass, crappie, walleye, and lake trout.

5. **Wetlands**
   Over six percent of the Ashuelot River CFA is wetland habitat with a high percent of these acres forested wetlands. A large wetland complex occurs on the north end of Surry Mountain Lake. This complex contains a mix of shrub swamps and floodplain forest, hardwood swamp and freshwater marsh. According to The Nature Conservancy, the floodplain forest that occurs in this CFA is the only significant floodplain in NH that is dominated by white swamp oak. This species is rare in NH, making this habitat ecologically important (Marks et al 2011). Other wetland habitats in patches of variable size are scattered throughout the CFA.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse (different size classes) and native species will dominate. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- We will also conduct habitat management in wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (stream, rivers, ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

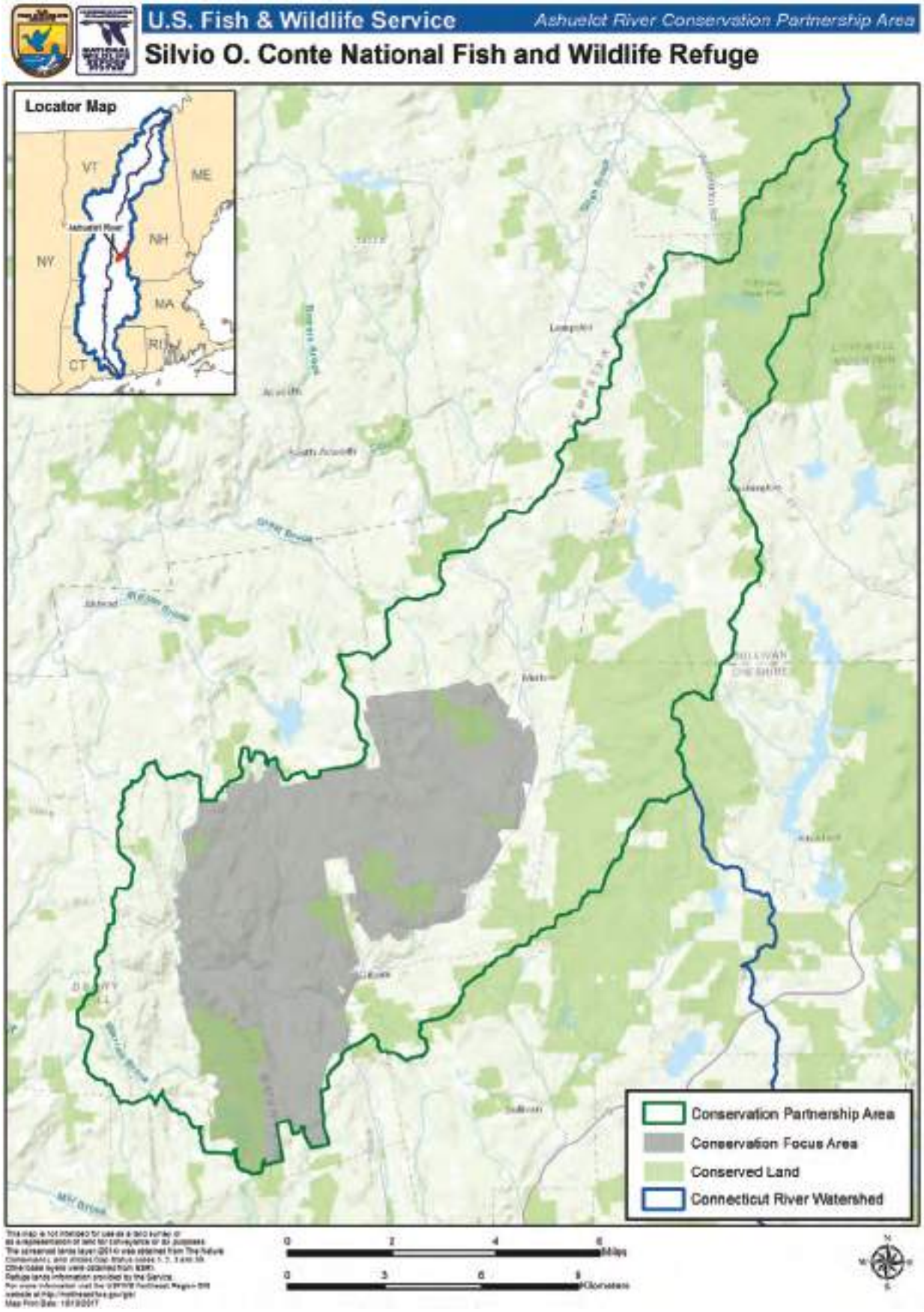
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

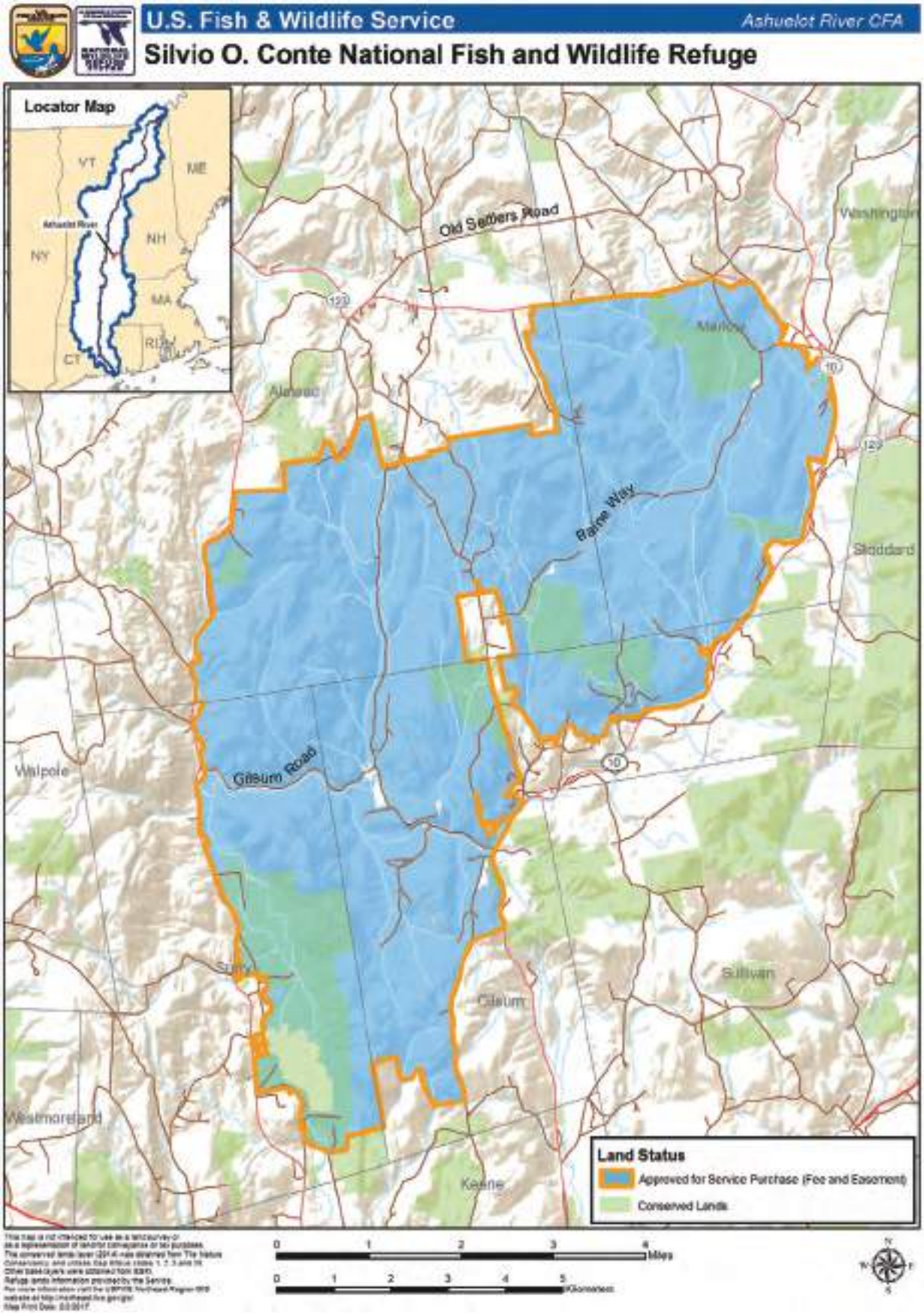
Does the CFA have special ecological, cultural, or recreational features or designations of regional, State, or local importance?

Surry Mountain Area was also identified by The New Hampshire Chapter of TNC as one of 13 high priority habitat areas in the Ashuelot watershed due to its ecological diversity and unfragmented landscape.

Map A.56. Ashuelot River CPA.



Map A.57. Ashuelot River CFA – Location.



Map A.58. Ashuelot River CPA/CFA – Habitat Types.

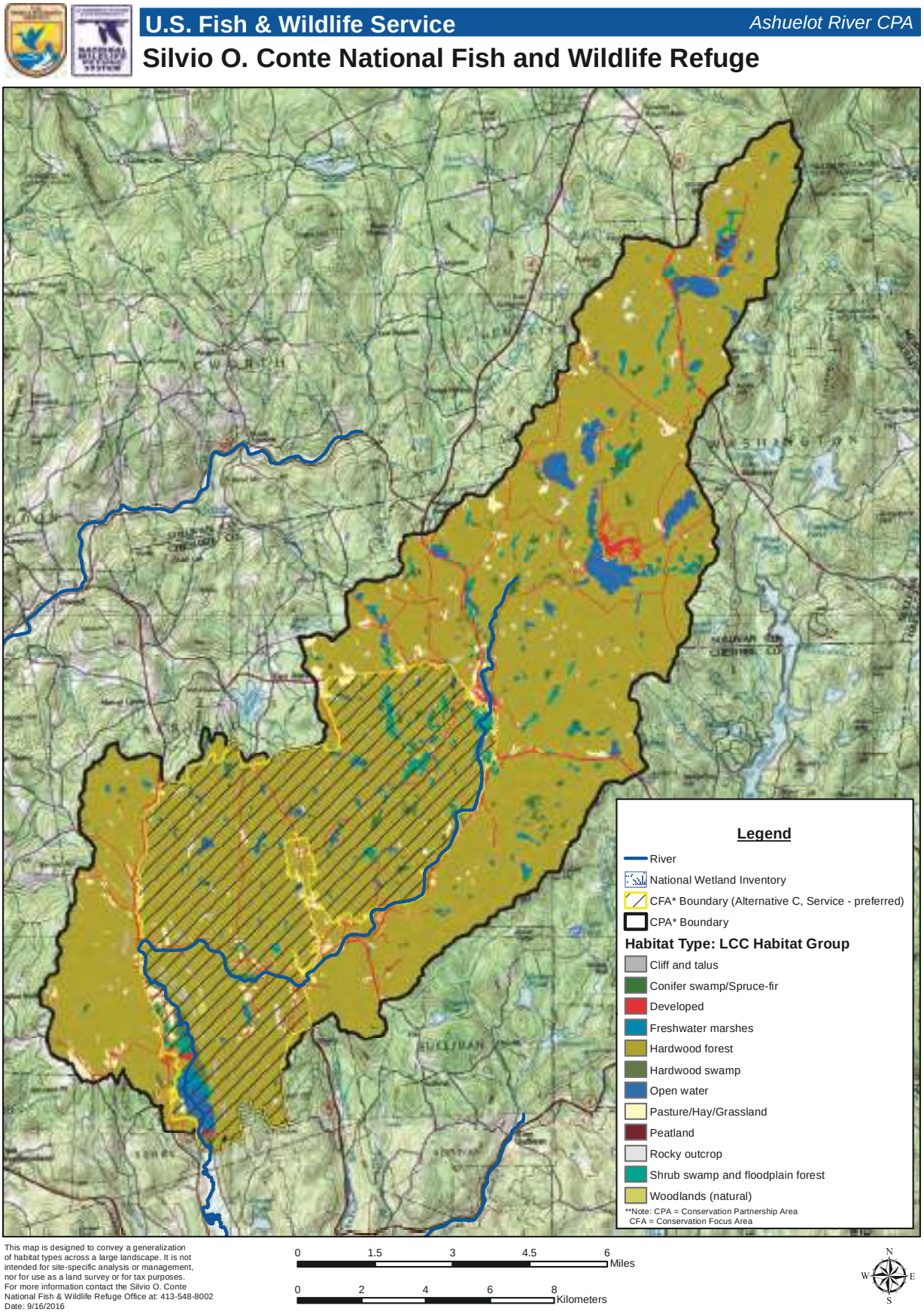


Table A.34. Ashuelot River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	915	1.4%	290	37	-	1.3%	31.7%
Hardwood forest	56,776	86.0%	18,399	2,173	-	85.7%	32.4%
Hardwood swamp	308	0.5%	265	200	-	1.2%	86.1%
Shrub swamp and floodplain forest	919	1.4%	498	130	-	2.3%	54.2%
Woodlands (natural)	193	0.3%	126	12	-	0.6%	65.1%
Forested uplands and wetlands subtotal	*59,111*	*89.6%*	*19,578*	*2,552*	-	*91.2%*	*33.1%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	257	0.4%	131	50	-	0.6%	51.1%
Freshwater marshes	637	1.0%	282	137	-	1.3%	44.3%
Pasture/hay/grassland	7316	1626	569	511	126	0.8%	2.4%
Peatland	60	0.1%	16	-	-	0.1%	27.0%
Rocky outcrop	439	0.7%	90	-	-	0.4%	20.5%
Non-forested uplands and wetlands subtotal	*3,019*	*4.6%*	*1,030*	*313*	-	*4.8%*	*34.1%*
Inland aquatic habitats[9]							
Open Water	1,818	2.8%	462	250	-	2.1%	25.4%
Inland aquatic habitats subtotal	*1,818*	*2.8%*	*462*	*250*	-	*2.1%*	*25.4%*

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Other							
Developed	2,045	3.1%	408	96	-	1.9%	20.0%
Other subtotal	*2,045*	*3.1%*	*408*	*96*	-	*1.9%*	*20.0%*
TOTAL[10]	**65,992**	**100.0%**	**21,478**	**3,212**	**-**	**100.0%**	**32.5%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.35. Ashuelot River CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 18,396 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Red-shouldered Hawk[J] **Ovenbird**[A] Eastern Wood Pewee[A,J] Northern Flicker[A,J] Yellow-bellied Sapsucker[A] Rose-breasted Grosbeak[A] **Eastern Red Bat**[I] **Louisiana Waterthrush** American Redstart[A,J] Little Brown Bat[I] Veery[A] Black-throated Green Warbler[A] Black-throated Blue Warbler[A] Black-and-white Warbler[J] Black-billed Cuckoo[A,J] Broad-winged hawk[J] Eastern Whip-poor-will[J] Great-crested Flycatcher[J] Northern Goshawk[A,I,J] Scarlet Tanager[J] Northern Parula[A] Ruffed Grouse[A] Black Racer[I]
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3 acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Chestnut-sided Warbler[A, B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
Bald Eagle[C, G]	Breeding and migrating habitat includes large bodies of open water with little human disturbance, and large canopy trees or other elevated sites for nesting, perching, and roosting (DeGraaf et al. 2001).	
Blackburnian Warbler[A, B]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Hardwood Swamp[5] - 266 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	**Northern Waterthrush** Red-shouldered Hawk[J] Rose-breasted Grosbeak[J] Purple Finch[A,I] Veery[A,J] White-eyed Vireo[J] Northern Parula[A] Wood Duck[J]
Conifer Swamp[5] - 290 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	Red-shouldered Hawk[J] Rose-breasted Grosbeak[J] Purple Finch[A,I] Veery[A,J] White-eyed Vireo[J] Northern Parula[A] Wood Duck[J]
Shrub Swamp and Floodplain Forest[5] - 498 acres		
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	**Warbling Vireo** **Willow Flycatcher** Veery[A] Ruffed Grouse[A] Chestnut-sided Warbler[A,B] American Redstart[A] Canada Goose[J] Mallard[J] Wood Duck[J] Eastern Kingbird[J] Gray Catbird[J] **Wood Turtle**[I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	
Woodlands (natural)[5] - 126 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Cliff and Talus[5] - 131 acres		
Laurentian-Acadian acidic cliff and talus[H] North-central Appalachian acidic cliff and talus[H] North-central Appalachian circumneutral cliff and talus[H] Laurentian-Acadian calcareous cliff and talus[H]	These cliff systems occur at low to mid elevations, well below treeline. The vegetation within the *Laurentian-Acadian acidic cliff and talus system* is patchy and often sparse, punctuated with patches of small trees such as birches and spruce species. Species that prefer calcium rich soils are absent. In north-facing or other sheltered settings where cold air accumulates at the bottom of slopes, a shrubland of heaths and reindeer lichens can develop. The *North Central Appalachian acidic cliff and talus system* comprises sparsely vegetated to partially wooded cliffs. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. Vegetation in seepage areas tends to be comparatively well-developed and different from the surrounding dry cliffs. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places. Eastern red cedar is a characteristic tree species, poison ivy a characteristic woody vine, and common polypody a characteristic fern. Substrates within the *circumneutral cliff and talus system* include limestone, dolomite and other rocks. The vegetation varies from sparse to patches of small trees, in places forming woodland or even forest vegetation. Ash, basswood, and American bladdernut are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., yellow jewelweed, purple cliffbrake, ebony spleenwort, or bluntlobe cliff fern. *The calcareous cliff and talus system* has more nutrient rich soils, and the the vegetation is often sparse, but may include patches of small trees including northern white cedar, which may be the dominate species. Ash species and basswood are woody indicators of the enriched setting (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Freshwater Marshes[5] - 282 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**American Bittern**[A] **Marsh Wren** **Virginia Rail**[I] Wood Duck[A,J] Canada Goose[J] Common Loon[A,I] Mallard[J] Wood Turtle[I]
Pasture/Hay/Grassland[5] – 511 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[J] Chestnut-sided Warbler[A,B] **Bobolink**[A] **Grasshopper Sparrow**[I] **Eastern Meadowlark**[I]
Peatland[5] – 16 acres		
Boreal-Laurentian-Acadian acidic basin fen[H]	These fens have developed in open or closed relatively shallow basins with nutrient-poor and acidic conditions. The substrate is sphagnum, and vegetation typically includes areas of dominance by grasses and dwarf-shrubs. Leatherleaf is usually present, and scattered stunted trees may occur. These fens often develop adjacent to open water (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Rocky Outcrop[5] – 90 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	The Northern Appalachian-Acadian rocky heath outcrop system occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including Sheep laurel, Low-bush blueberry, Black huckleberry, and Black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 462 acres		
American Eel[E, F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	Wood Turtle[I] **Slimy Sculpin**[I]
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	
Dwarf Wedgemussel[B, D, F]	Inhabits creeks and small rivers, prefers the stable bank conditions afforded by gravel or sandy substrates, and good water quality (Nedeau et al. 2000, USFWS 1993).	
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Canada Goose[A] Wood Duck[A] Hooded Merganser[J] Green-winged Teal[J] Mallard[J] Bald Eagle[A,I] **Common Merganser** Ring-necked Duck Common Loon[A,I]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 New Hampshire Wildlife Action Plan (Species of Greatest Concern)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Ashuelot River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, chestnut-sided warbler, American woodcock, Canada warbler, blackburnian warbler, bald eagle, and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
This large, contiguous block of matrix forest has been identified as a conservation priority by a host of partners including the State of New Hampshire's Wildlife Action Plan, the Nature Conservancy's Lower New England-Northern Piedmont Ecoregional Plan, and the Quabbin-to-Cardigan Collaborative Conservation Plan. We envision healthy forests within the Ashuelot River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of New Hampshire's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010).

Ashuelot River CFA's hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is most certainly available within the CFA. To date our review of Ashuelot's habitats and wildlife species — and their condition — has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Ashuelot comes exclusively from a reading of forest history in New England— a legacy of intensive past-use has altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of Ashuelot are remarkably more homogeneous than those of three centuries earlier, and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach combining passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Ashuelot River CFA will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al.

2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, bald eagles, and—if wetlands and riparian areas are present—Canada warbler (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009).

Ashuelot River CFA's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape: canopy, midstory, understory, and ground layer. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0 to 5 feet in height) are of particular importance. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who are thought to be strongly associated with the hemlock forests within Ashuelot—and have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Closed canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and—when along rocky bottomed streams—Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that, when near open bodies of water, are utilized by bald eagles. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Identify forest stands where soils and species composition will support woodcock management.

- Work with partners, including the State in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.
- Reserve supracanopy trees in proximity to important habitats during management activities.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood Swamps)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for priority refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the Ashuelot River Conservation Focus Area (CFA), hardwood swamps frequently have been altered and have potential for restoration. This habitat type in Ashuelot is found in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the watertable drives complexes of forest upland and wetland species including pin oak, red maple, sweetgum, and black gum. Within the Connecticut River watershed, including the CFA, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions and soil compaction remain as threats.

Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within Ashuelot will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats and riparian areas will create high-quality habitat for neotropical migratory birds. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites. Hardwood swamp stands with large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Many species of conservation concern use forested swamps, including northern parula, willow flycatcher, white-eyed vireo, and rose-breasted grosbeak. Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well-developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Hardwood swamps in the Ashuelot River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Hardwood swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the Ashuelot River CFA, and allow monitoring of population response to management actions (Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State of New Hampshire, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map vernal pools and seeps.
- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Conifer Swamps)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the Ashuelot River CFA, softwood swamps have undergone significant alteration and have potential for restoration. This habitat type is often found in small patches on mineral soils that are nutrient poor; there may be an organic layer, but generally deep peat soils are absent. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. The dynamic nature of the watertable drives complexes of forest upland and wetland species including red maple, balsam fir, red spruce, and ash species. Where soils tend more to alkaline conditions white cedar is a common tree species, and the shrub layer is generally more diverse. Within the Connecticut River watershed, agricultural practices and selective logging have largely removed this habitat from the

landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in softwood swamps are not well understood. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within Ashuelot will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Where needed, restoration of softwood swamp habitats will create high-quality habitat for neotropical migratory birds. Closed canopy softwood forests that include white cedar and other softwoods provide important mast, food, nesting, and cover. Softwood swamp stands with large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well-developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Conifer swamps in the Ashuelot River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Conifer swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the Ashuelot River CFA, and allow monitoring of population response to management actions (R. Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State of New Hampshire, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1d. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American woodcock and American black duck.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

American woodcock are dependant on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

Management of the shrub swamp communities may be required to maintain shrub dominance and stem densities. Tree species, such as red maple, tend to replace mature shrub species and established invasive plants compete for nutrients and space. These invading species require management in order to maintain the native shrub diversity of the community. A high shrub stem density is also important as it provides birds with cover from predators and more leaf surface area for gleaning. Cover for American woodcock, for example, is ideal in a 10-15 year old shrub swamp (USDA 2001). Shrub species, in particular alder, tend to die back as they reach maturity, and as a result stem density decreases. Periodic rejuvenation of shrubs is necessary to maintain required stem densities. Management priority will be given to shrub swamps that are part of a woodcock management area. Management of these shrub swamps will benefit other species that use these communities, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season, and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests in the vicinity of foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:
- Work with partners, including the State in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1e. (Biological Integrity, Biological Diversity, and Environmental Health)
Where a focal species has not been identified, protect and restore habitats that contribute to the biological integrity, diversity, and environmental health of refuge lands and the Connecticut River watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Ashuelot River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered

under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams (Gawler 2008). These marshes are also maintained over time by beaver activity, an important natural disturbance process within the Ashuelot watershed.

Our coarse-scale habitat analysis of this CFA identifies the majority of the wetlands are scattered throughout with the largest freshwater marsh acreage occurring within a large wetland complex on the north end of Surry Mountain Lake. This particular wetland complex, adjacent to open water habitat, will provide important breeding and foraging habitat for American black duck, and other waterfowl species. Located within the Connecticut River watershed, an important migration corridor, this area will also be important as staging areas for migrating waterfowl. An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for waterfowl species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate wetland hydrology for impacts to natural flow regimes.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Inventory wetland plant communities.
- Survey wildlife use of existing wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat for grassland birds and pollinators, if present and appropriate.

Rationale:
Over two percent of the Ashuelot River CFA is typed as pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow. American woodcock, a refuge priority resource of concern, will use both habitat conditions when managed in conjunction with their other habitat needs.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Shrubland and grassland habitats will also be used by American woodcock, which require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Small clearings with minimal vegetation is required for courtship areas, and shrublands with clumps of tall vegetation or sparse shrubs will provide roosting habitat.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, and grassland acres can provide quality habitat, for these species, and American woodcock, if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
See rationale for sub-objective 1.1e.

Habitats that occur within the Ashuelot River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout, American eel, and dwarf wedgemussel. Also provide undisturbed breeding and foraging habitat for American black duck, and staging areas for migrating waterfowl.

Rationale:
The Ashuelot River CFA supports numerous pond, wetland and river habitats. A portion of the Ashuelot River (from Village Pond to Surry Mountain Lake) meanders through the hilly terrain of the CFA. The main stem and tributaries provide habitat for American eel, and possibly eastern brook trout. A species inventory will be necessary to confirm brook trout presence. The Ashuelot River, below Surry Mountain Lake, also supports the federally endangered dwarf wedgemussel. This species requires stable bank conditions afforded by gravel or sandy substrates, and good water quality (U.S. Fish and Wildlife Service 1993, Nedeau et al. 2000).

Surry Mountain Lake is located in the southern portion of the CFA. This man-made lake is associated with the Surry Mountain Dam, which was built on the Ashuelot River in 1941 by the U.S. Army Corps of Engineers to prevent flooding along the Connecticut River. This 265-acre lake is managed by New Hampshire Fish and Game Department and the Army Corps of Engineers, and supports various species of bass, crappie, walleye, and lake trout. Backwater areas and wetlands surrounding Surry Mountain Lake may provide quality breeding, foraging and stopover habitat for American black duck, and other waterfowl species.

The aquatic habitats in the Ashuelot River CFA are diverse, and provide habitat for a variety of wildlife species. Development and human activities may have impacted water quality and infringed on aquatic species movements and life cycles. Clear aquatic species passage to spawning and wintering habitat and

structurally diverse in-stream habitat are important to the survival of aquatic species in this CFA. High water quality is essential to the survival of current and future dwarf wedgemussel populations. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Work with partners to implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to identify manmade physical barriers (e.g. impassable road crossings, culverts and dams) to the movement of fish and other aquatic organisms.
- Work with partners to conduct stream assessments to evaluate stream and fish community health.
- Work with partners to evaluate dwarf wedge mussel populations, and determine best management strategies for the maintenance of this species in the CFA.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Ashuelot River CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Ashuelot River CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Ashuelot River CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Ashuelot River CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Ashuelot River CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Ashuelot River CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Ashuelot River CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Ashuelot River CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, and printed media at the Ashuelot River CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures (e.g., general brochure and bird checklist) that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Ashuelot River CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Ashuelot River CFA will be unstaffed and is not anticipated to have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations and division-specific regulations, if necessary.

Rationale:
Hunting is a priority public use, allowed on national wildlife refuges, as long as it is found to be a compatible use. The Ashuelot River CFA is a popular area to hunt white-tailed deer, Eastern wild turkey, and small game. There is a moose season, but the number of tags is limited. Hunting, consistent with the final compatibility determination, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

  (a) The season for hunting snowshoe hare and coyotes with dogs is from October 1 to March 15.

  (b) Use of bait is prohibited.

  (c) Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

- Allow hunters access to the refuge outside of the normal refuge open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with New Hampshire Fish and Game Department to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with New Hampshire Fish and Game Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Ashuelot River CFA kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with New Hampshire Fish and Game Department to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Ashuelot River CFA after completing all administrative procedures to officially open refuge lands to fishing, based on New Hampshire Fish and Game Department regulations, and any division-specific conditions.

Rationale:
The Ashuelot River is the longest tributary of the Connecticut River in New Hampshire. Aquatic habitats include an Army Corps of Engineers Reservoir (Surry Mountain Lake), and both cold and warm water stream reaches. The reservoir supports perch, pickerel, bass, and crappie. The river has stocked trout and native Eastern brook trout in colder reaches and warm water species like large and small mouth bass near the confluence with the Connecticut River. Fishing is a popular activity throughout the river and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Ashuelot River CFA will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land with fishable waters:

- Work with the New Hampshire Fish and Game Department to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. To facilitate fishing, the refuge will make information readily available to interested anglers regarding opportunities on Service-owned land, location of fishable waters, and available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity in southern New Hampshire. Local organizations such as the Monadnock Chapter of New Hampshire Audubon, the Harris Center for Conservation Education, and others offer organized field trips to popular natural areas. A new division in this area will offer people the chance to see and photograph wildlife in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring sufficient land:

- Develop a public access strategy and complete the required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring sufficient land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will likely be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience, they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring sufficient land:

- Develop interpretive panels for kiosks and trails that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.

- Sponsor wildlife observation events such as International Migratory Bird Day, Big Sit, etc.

- Encourage local schools and groups such as the Monadnock Chapter of New Hampshire Audubon, the Harris Center for Conservation Education, and other environmental organizations to offer wildlife-centered trips to the CFA.

- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring sufficient land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring sufficient land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge visitor services plan.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Ashuelot River CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Examples include the Connecticut River waterway route. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- Work with public and private partners to determine whether and what roles this CFA might contribute to a Connecticut River waterway route.
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Ashuelot River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Ashuelot River CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Work with users to delineate winter cross-country skiing trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of acquiring sufficient land:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Blueberry Swamp Conservation Focus Area (Existing Refuge Division)

Columbia, New Hampshire

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	4,636	100 %
■ *Existing Refuge Ownership in CFA*[1]	*1,166*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*3,470*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	0	0 %
Total Acres in CFA[2,4]	4,636	100%

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Blueberry Swamp CPA (map A.59) encompasses the Blueberry Swamp CFA (map A.60). The existing Blueberry Swamp Division was established on December 18, 2007 and is now approximately 1,166 acres. Near the existing division is a large core of conserved lands: the 18,400-acre Bunnell Mountain Forestry Legacy tract and the 40,000 acre Nash Stream State Forest. These two conserved areas protect one of the largest contiguous blocks of high-elevation spruce forest in New England. Our existing division and planned expansion will connect to this block and conserve the large wetland area that drains these two areas and connects to the Connecticut River. The importance of this habitat was also identified through the *Connect the Connecticut* landscape conservation design, and much of the Blueberry Swamp CFA overlaps terrestrial Tier 1 Core and Connector lands from the design. Our expansion will increase the habitat diversity of the area by adding lower elevation wetlands to the larger conserved area. The wetlands complex includes Simms Stream, which empties directly into the Connecticut River as well as conifer swamps. Protection of this stream and other wetland areas will help conserve water quality and cold-water streams for eastern brook trout and other aquatic species.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Conifer Swamp/ Spruce-fir – 54.0%
- Shrub Swamps and Floodplain Forest - 4.6%
- Pasture/Hay/Grassland – 2.7%

For more information on habitats in the CFA, see map A.61 and table A.36.

What are the resources of conservation concern for the CFA?

As noted in table A.37 below, there are nine Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN), as well as species that require large contiguous forest tracts such as forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA, especially those with active bat hibernacula, may contain important maternity and summer roosting sites, as well as foraging areas for this species.

   Canada lynx have been confirmed breeding in northeastern Vermont within the Nulhegan Basin CFA, and has been consistently detected in northern NH near the Canada border since 2015. This species has not been documented within the Blueberry Swamp CFA. Conservation efforts for this species will be done at the regional scale. Additional information is necessary to evaluate the importance of New Hampshire and Vermont for Canada lynx conservation and to determine what measures are needed to ensure their persistence within the region. We will monitor Canada lynx populations on the division and work with partners to develop a regional lynx management plan. We will also work with the New England Field Office to ensure that none of our programs or activities could result in an incidental take of lynx.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Blueberry Swamp CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat as well.

   The Blueberry Swamp CFA provides over 4,600 acres of contiguous habitat for a diversity of migratory landbirds. Over half of the CFA is spruce-fir forest, which may provide habitat for uncommon boreal species including boreal chickadee, black-backed woodpecker, spruce grouse, gray jay, bay-breasted warbler, rusty blackbird, blackpoll warbler, and olive-sided flycatcher. The hardwood forests may provide habitat for other species of conservation concern, including PRRC species such as Canada warbler, blackburnian warbler, black-throated blue warbler, and American woodcock.

3. **Waterfowl**
   The large wetland complex known as “Blueberry Swamp” may provide breeding and foraging habitat for American black duck, a PRRC species, as well as wood duck, Canada geese, and other waterfowl species.

4. **Diadromous fish and other aquatic species**
   Simms Stream, the East Branch of Simms Stream, and various brooks within the Blueberry Swamp CFA support wild brook trout populations as well as slimy sculpin, a State species of greatest conservation need. Brook trout are a PRRC species, and are a species of conservation concern for the Service’s Northeast Region.

Although, not documented within this particular area, northern redbelly dace and/or finescale dace, both species of state conservation concern, are likely to occupy beaver ponds and other aquatic systems associated with slow moving streams. These species will benefit from efforts focusing on increasing and restoring stream riparian areas and connectivity (road crossing designs that incorporate aquatic species passage). Land protection efforts within this area will also benefit resident fish species that occupy the Connecticut River, about 5 miles downstream from the CFA. These species include round whitefish and tessellated darter (host species to the dwarf wedgemussel).

5. **Wetlands**
The Blueberry Swamp CFA contains a large wetland complex of approximately 430 acres known as "Blueberry Swamp." This wetland is mostly shrub swamp and cedar swamp, with a small portion of freshwater marsh. The slow moving waters of the East Branch of Simms Stream forms the eastern boundary. Additional wetlands occur along Simms Stream, and other areas in the CFA.

6. **Other**
Almost three percent of the Blueberry Swamp CFA is in agriculture, consisting mostly of large hayfields between 25 to 30 acres, and could be combined to provide a larger contiguous block. Many grassland birds are area sensitive, and require large grassland acres (greater than 25 acres or 10 hectares) including grasshopper sparrows, bobolinks, eastern meadowlarks, and upland sandpiper (Vickery et al. 1994), while other species, such as the American woodcock, do not require extensive open habitat acres. Grassland habitat is also important for declining pollinator species such as the yellow-banded bumble bee and monarch butterfly, both of which are petitioned for listing under the ESA.

Grasslands are a high priority habitat for the state of New Hampshire. These habitats provide breeding and nesting habitat for several state threatened and endangered species, including Northern harrier, upland sandpiper, eastern meadowlark, and grasshopper sparrow. Northern harriers breed in large grassland habitats in northern Coos County, including the Blueberry Swamp CFA, where the hayfields have declined 10 percent over the course of 10 years (Oehler et al. 2006).

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse (different size classes) and native species will dominate. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

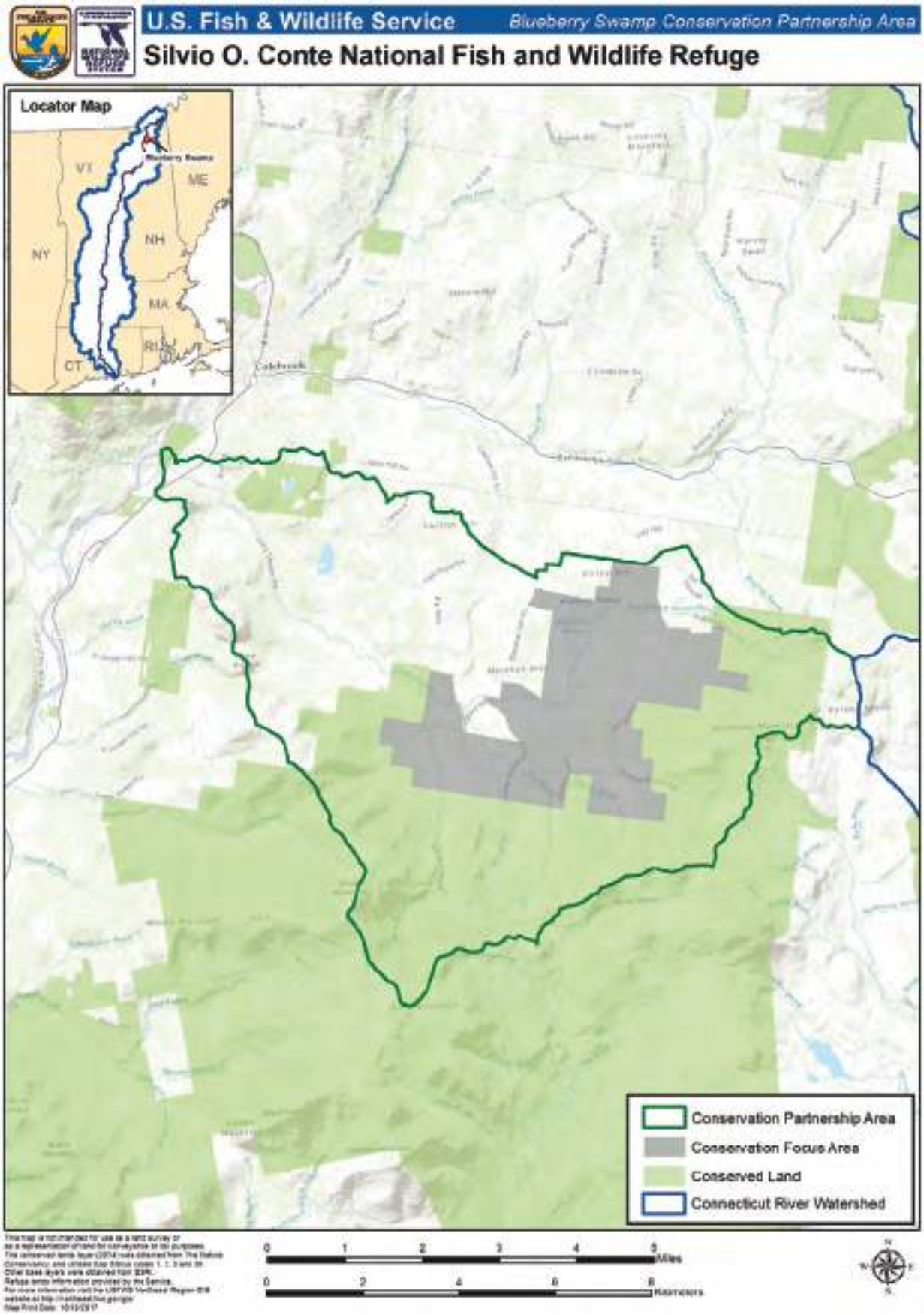
- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition, while management within pasture, hay, grassland habitats will provide grassland and shrub habitats. Invasive plant management will be a priority.

- In open water (stream, rivers, ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

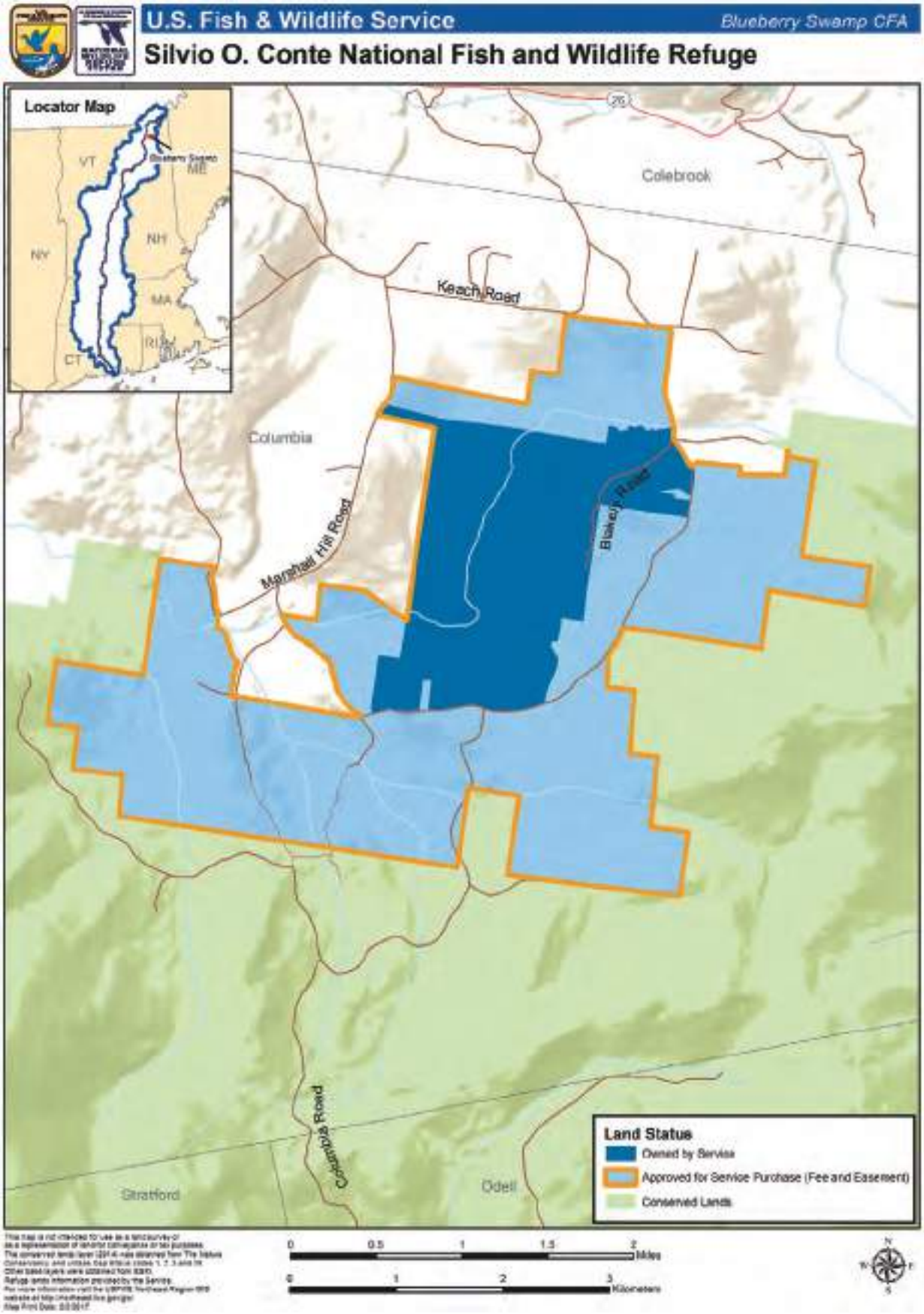
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational opportunities: hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

Map A.59. Blueberry Swamp CPA.



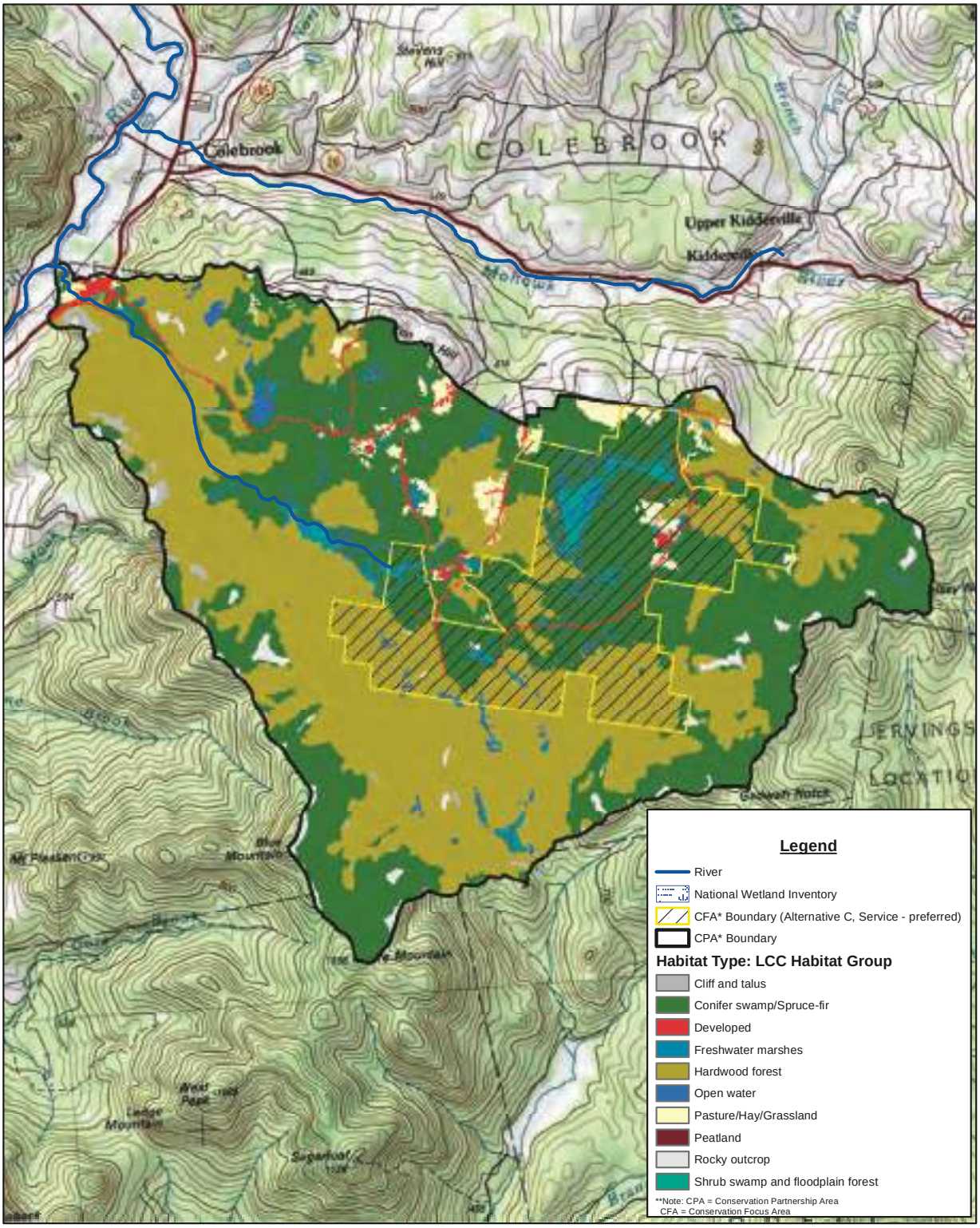
Map A.60. Blueberry Swamp CFA – Location.



Map A.61. Blueberry Swamp CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Blueberry Swamp CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes.
For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 0.9 1.8 2.7 3.6 Miles

0 1 2 3 4 Kilometers

N W E S

Table A.36. Blueberry Swamp CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	9,342	43.5%	2,499	34	795	54.0%	26.8%
Hardwood forest	10,230	47.6%	1,674	12	191	36.2%	16.4%
Shrub swamp and floodplain forest	369	1.7%	212	-	147	4.6%	57.3%
Forested uplands and wetlands subtotal	*19,942*	*92.8%*	*4,385*	*46*	*1,133*	*94.8%*	*22.0%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	123	0.6%	-	-	-	0.0%	0.0%
Freshwater marshes	69	0.3%	23	-	14	0.5%	33.0%
Pasture/hay/grassland	574	2.7%	127	-	19	2.7%	22.1%
Peatland	4	0.0%	-	-	-	0.0%	0.0%
Rocky outcrop	359	1.7%	9	9	-	0.2%	2.5%
Non-forested uplands and wetlands subtotal	*1,129*	*5.3%*	*158*	*9*	*34*	*3.4%*	*14.0%*
Inland aquatic habitats[9]							
Open Water	63	0.3%	-	-	-	0.0%	0.0%
Inland aquatic habitats subtotal	*63*	*0.3%*	-	-	-	*0.0%*	*0.0%*
Other							
Developed	351	1.6%	83	-	19	1.8%	23.6%
Other subtotal	*351*	*1.6%*	*83*	-	*19*	*1.8%*	*23.6%*
TOTAL[10]	**21,485**	**100.0%**	**4,626**	**55**	**1,186**	**100.0%**	**21.5%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.37. Blueberry Swamp CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Conifer Swamp/Spruce-fir Forest[5] - 2,496 acres		
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	Cape May Warbler[A, J] Boreal Chickadee[A, J] Purple Finch[A, J] Black-throated Green Warbler[A, J] **Spruce Grouse** [A, I] **American Marten**[I] Canada Lynx[I, J] Gray Jay[A, I, J] Black-backed Woodpecker [A, I, J] Bay-breasted Warbler[A, I, J] **White-throated Sparrow** **Blackpoll Warbler**[A, I] Brown Creeper[J] Northern Saw-whet Owl[J] Olive-sided Flycatcher[A, I, J] Palm Warbler[A,J] Pine Grosbeak[A, J] Northern Parula[A] Sharp-shinned Hawk[J] Yellow-bellied Flycatcher[J]
Rusty Blackbird[A, C]	Breeding habitat includes conifer dominated forested wetlands interspersed with shrub swamps and peatlands. Young spruce and fir may be required for nesting (Greenland et al, 2010, Powell et al., 2010, and Matsuoka et al, 2010).	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Hardwood Forest[5] - 1,676 acres		
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	**Ruffed Grouse**[A, I] Whip-poor-will[A, I, J] Canada Lynx[I] **Chestnut-sided Warbler**[A,B] **Ovenbird**[A] **Eastern Red Bat**[I] American Redstart[A, J] Veery[A] Little Brown Bat[I] Black-and-white Warbler[J] Broad-winged hawk[J] Eastern Wood-pewee[A, J] Northern Flicker[A, J] Northern Goshawk[A, I, J] Red-shouldered Hawk [J] Sharp-shinned Hawk[J] Northern Parula[A] Yellow-bellied Sapsucker[A, J]
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Black-throated Blue Warbler[A]	Breeding habitat includes mature deciduous and mixed deciduous/conifer forests with a shrubby understory (DeGraaf et al. 2001, Hodgman et al. 2000, Dobbs 2007, Dunn et al. 1997)	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Shrub Swamp and Floodplain Forest[5] - 211 acres		
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands, and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	Northern Harrier[A,I] Chestnut-sided Warbler[A] American Redstart[A,J] Eastern Kingbird[J] Gray Catbird[J] **Warbling Vireo** **Willow Flycatcher** Northern Leopard Frog[I] Ruffed Grouse[A,I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 23 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Pasture/Hay/Grassland[5] – 125 acres		
Maintain as contiguous block of pasture/hay/ grassland habitat	These habitat types include ruderal uplands and old-fields such as abandoned pastures; lands that are intensively managed for cool season grasses, such as Canada rye, redtop, and June grass or warm season grasses, such as switch grass, indian grass and blue stem; and hayfields/ pastures that are intensively managed for cool season grasses or are active pastures (Gawler 2008).	American Woodcock[A,I,J] Field Sparrow[J] Northern Harrier[A,I,J] Common Night Hawik[A,I] **Bobolink**[A] **Grasshopper Sparrow**[I] **Eastern Meadowlark**[I]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Rocky Outcrop[5] – 11 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	*The Northern Appalachian-Acadian rocky heath outcrop* system occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including sheep laurel, low-bush blueberry, black huckleberry, and black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Inland Aquatic Habitats[4]		
Water[5] – *(GIS data did not capture acreage due to dense forest cover along small stream and river corridors)*		
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	**Slimy Sculpin**[I] Northern Redbelly Dace[I] Wood Turtle[I]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 New Hampshire Wildlife Action Plan (Species of Greatest Concern)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Blueberry Swamp CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including black-throated blue warbler, American woodcock, and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
We envision healthy forests within the Blueberry Swamp CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of New Hampshire's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Blueberry Swamp CFA's hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is most certainly available within the CFA. However, to date our review of Blueberry Swamp's habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Blueberry Swamp comes exclusively from a reading of forest history in New England—a legacy of intensive past-use has altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of Blueberry Swamp are remarkably more homogeneous than those of three centuries earlier, and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory will test these assumptions, and aid in identifying stands where a forest management approach combining passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Blueberry Swamp will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, and—if wetlands and riparian areas are present—Canada warbler (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Blueberry Swamp's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance to species like black-throated blue warbler and Canada warbler. These habitat elements may have importance to declining mature forest-interior species like blackburnian warbler—identified as a representative species by the North Atlantic Landscape Conservation Collaboration. Black-throated blue warblers nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Bull 1974, Darveau et al. 1992, DeGraaf and Yamasaki 2001). Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who dwell in the upper canopies of conifers, and are thought to be strongly associated with the hemlock forests within Blueberry Swamp. Blackburnian warblers have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like black-throated blue warblers who often nest in the fork of coniferous or deciduous saplings. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, wood thrush, and—when found on wetter soils—Canada warbler.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like American marten, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are >3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. Trees with these characteristics are especially important within a 5 mile radius of hibernacula for swarming activities (USFWS 2014). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Identify forest stands where soils and species composition will support woodcock management.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species, such as glossy buckthorn, are excluded or managed to keep population levels as low as possible.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map vernal pools and seeps.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1b. (Shrub swamp and floodplain forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American woodcock and American black duck.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

American woodcock are dependent on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

Management of the shrub swamp communities may be required to maintain shrub dominance. Most shrub swamps maintain themselves, but tree species, such as red maple, can become established, and dominate the wetland community. Invasive plants, such as common reed, are a threat to these communities, and mechanical and chemical treatment of this invasive reed is necessary. Management of these shrub swamps will not only benefit American woodcock, but other shrub swamp specialists, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests in the vicinity of foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Ensure a diversity of native species is present and non-native species, such as glossy buckthorn, are excluded or managed to keep population levels as low as possible.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Inventory wetland plant communities.
- Evaluate wetland hydrology for impacts to natural flow regimes.
- Survey wildlife use of wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Conifer Swamp/Spruce-fir)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve landscape connectivity of spruce-fir habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including Blackburnian warbler, rusty blackbird, and Canada warbler.

***Rationale**:*
Of the forest types within the Blueberry CFA, spruce-fir forest and softwood swamps have undergone significant alteration and have the greatest potential for restoration. Pre-European settlement, most forest stands in this habitat type consisted primarily of long lived red spruce with varying components of balsam fir, white birch, and other overstory species. Within the Northern Forest region, including the CFA, utilitarian forest management practices converted tens of thousands of acres to homogeneous second or third growth stands more heavily dominated by balsam fir. By some estimates, less than 1 percent of the area formerly covered by the late successional stage of this habitat type still exists in the northeastern United States (Williams 1992, Whitney 1996, Hagan and Whitman 2004). Fortunately, emerging research (Franklin et al. 2002, Keeton 2006, North and Keeton 2008, Smith et al. 2008b, 2008a) has shown silvicultural systems designed to mimic the natural disturbance regimes endemic to this habitat type have restorative qualities. These and future studies will inform efforts to restore this habitat type. Future management should focus on promoting the ecological integrity of these stands and (where and when possible) restoring composition and structure to accepted historical conditions.

Blackburnian warbler, Canada warbler and rusty blackbird use different seral stages within the spruce-fir forest. Blackburnian warblers use mature conifer forests of spruce, fir, hemlock, and pines, and mixed wood habitats including deciduous stands with patches of conifer (Morse 1994, Dunn and Garrett 1997, DeGraaf and Yamasaki 2001). They are considered a forest interior species, making them susceptible to forest fragmentation and short rotation timber harvesting (Morse 1994, Hagan et al. 1996). The Blueberry Swamp CFA is in the core of its range, and management for this species will also provide habitat for bay-breasted warbler, boreal chickadee, black-backed woodpecker, and gray jay.

Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well-developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009).

Rusty blackbirds nest in shrub swamps and along riparian areas within spruce-fir forested wetlands. Disturbances such as beaver activity and wind throws create forest openings allowing softwood regeneration and potential rusty blackbird habitat (Avery 1995).

The management priorities for this habitat type, including structural diversity and landscape connectivity, and habitat requirements for priority resources of concern, will benefit other species of conservation concern such as spruce grouse, Canada lynx, and wintering deer.

Management Strategies:
Within 5 years of CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Identify forest stands where soils and species composition will support woodcock management.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Ensure this habitat type provides effective winter shelter for white-tailed deer, consistent with management of refuge resources of concern.
- Evaluate hydrologic regime to inform restoration efforts.

Within 10 years of CCP approval:

- Ensure a diversity of native species is present and non-native species, such as glossy buckthorn, are excluded or managed to keep population levels as low as possible.
- Implement identified active forest management opportunities by using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Where appropriate, emulate the natural disturbance regime inherent to the forest types within this broad habitat type and work within the confines of seral pathways dictated by soil, climate, and hydrology.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Pasture/Hay/Grassland)
Maintain a contiguous block of pasture, hay, and grassland habitat to provide breeding and foraging habitat for various grassland birds and pollinators. Management will also benefit refuge priority resources of concern including American woodcock.

Rationale:
Native grassland was once more widespread in North America. A deterioration of rangelands, the conversion of prairies to agriculture, and afforestation of the eastern United States are significant factors to the decline of grassland bird populations. During European settlement millions of hectares of forests were cleared for agriculture in the eastern U.S. creating habitat for grassland dependent birds. As agricultural activities declined, open areas dominated by herbaceous vegetation began to convert back to forests, causing a drastic decline in

grassland species in the region. Naturally occurring grassland ecosystems were not uncommon in the eastern U.S., but, were found closer to the coast rather than inland (Brennan and Kuvlesky Jr 2005). These grassland ecosystems have since been impacted by development and fragmentation.

Grasslands are a high priority habitat for the state of New Hampshire. These habitats provide breeding and nesting habitat for several state threatened and endangered species, including northern harrier, upland sandpiper, eastern meadowlark, and grasshopper sparrow. Northern harriers are breeding in large grassland habitats in northern Coos County, including the Blueberry Swamp CFA, where the amount of hayfields has declined 10 percent over the course of 10 years (Oehler et al. 2006). Habitat loss is also a factor for declining populations of pollinator species, including the yellow banded bumble bee and monarch butterfly. Both species are petitioned for listing under the Endangered Species Act.

Almost three percent of the Blueberry Swamp CFA is in agriculture, consisting mostly of large hayfields between 25 to 30 acres, and could be combined to provide a larger contiguous block. Many grassland birds are area sensitive, and require large grassland acres (greater than 25 acres or 10 hectares) including grasshopper sparrows, bobolinks, eastern meadowlarks, and upland sandpiper (Vickery et al. 1994), while other species, such as the American woodcock, do not require extensive open habitat acres.

Management in the Blueberry Swamp CFA will focus on maintaining contiguous grassland habitat with a variety of structure and native herbaceous species. A mixture of grasses, and broad-leaved forbs with scattered shrubs or clumps of herbaceous vegetation will provide roosting, and potential feeding areas, for American woodcock, and breeding and foraging habitat for bobolinks and northern harrier. While sparsely vegetated areas of approximately a half acre will provide courtship sites for woodcock. Grasslands that are outside the contiguous grassland acres may be managed as shrublands or converted back to forest depending on the location.

Due to our unfamiliarity with the habitat conditions in the CFA, a comprehensive, multi-scale habitat and wildlife inventory will be necessary to implement refuge strategies. This inventory will need to encompass all habitats within the CFA and associated landscape. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Ensure a diversity of native species is present and non-native species, such as glossy buckthorn autumn olive, reed canary grass, and Canada thistle, are excluded or managed to keep population levels as low as possible.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Assess the condition of pasture, hay and grassland habitats, as well as the overall size and location in the CFA, and proximity to other forest openings, to inform more detailed management strategies in an HMP.

Sub-objective 1.2b. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using

historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Blueberry Swamp CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout.

Rationale:
Simms Stream, the East Branch of Simms Stream, and various brooks within the Blueberry Swamp CFA support wild brook trout populations, as well as slimy sculpin, a state species of greatest conservation need. Although, not documented within this particular area, northern redbelly dace and/or finescale dace, both species of state conservation concern, are likely to occupy beaver ponds and other aquatic systems associated with slow moving streams. These species will benefit from efforts focusing on increasing and restoring stream riparian areas and connectivity (road crossing designs that incorporate aquatic species passage). Land protection efforts within this area will also benefit resident fish species that occupy the Connecticut River, about 5 miles downstream from the CFA. These species include round whitefish and tessellated darter (host species to the dwarf wedge mussel).

Management of water resources in the Blueberry Swamp CFA will provide clear aquatic species passage to spawning and wintering habitat, structurally diverse instream habitat, with boulders and downed woody debris providing riffles and pools, and shade trees along riparian edges. Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Aquatic species survival and breeding success is dependent on not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of the water resources in the CFA at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:
- Implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Conduct stream assessments to evaluate stream and fish community health.
- Identify man-made physical barriers (e.g. impassable road crossings, culverts and dams) to the movement of fish and other aquatic organisms.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Blueberry Swamp Division as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Blueberry Swamp Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Blueberry Swamp Division as an outdoor classroom.

Rationale:
Because this division will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Blueberry Swamp Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Blueberry Swamp Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Blueberry Swamp Division will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Blueberry Swamp Division's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Blueberry Swamp Division.
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See the rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Blueberry Swamp Division.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge Web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures (e.g., general brochure and bird checklist) that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:
- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Blueberry Swamp Division will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Blueberry Swamp Division will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations and division-specific regulations, if necessary.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. Blueberry Swamp has been a popular area with hunters for many years prior to acquisition by the Service. All of the division is currently open to hunting. Retaining hunting opportunities at this division conforms to historic use on this property and much of the surrounding land in the area. Popular game species include white-tailed deer, moose, ruffed grouse, American woodcock, black bear, and snowshoe hare. Allowing hunters to use public lands helps ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
Continue to:

- Allow hunter access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise to 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain hunting on the division, based on New Hampshire Fish and Game Department and the following division-specific regulations:

  (a) The season for hunting snowshoe hare and coyotes with dogs is from October 1 to March 15.

  (b) Use of bait is prohibited.

  (c) Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of CCP approval:

- Work with New Hampshire Fish and Game Department to determine whether opportunities exist for State-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with New Hampshire Fish and Game Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Blueberry Swamp Division kiosks, through a friends group, and in local businesses.

- Work with New Hampshire Fish and Game Department to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

Within 5 years of CCP approval:

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Blueberry Swamp Division. Complete all administrative procedures to officially open refuge lands to fishing, based on New Hampshire Fish and Game Department regulations, and division-specific conditions, if necessary.

Rationale:
Fishing is a priority public use on national wildlife refuges and a popular outdoor recreational activity. The division has been open to fishing, following acquisitions, through pre-acquisition compatibility determinations, but no formal opening package or fishing plan has been completed. Although fishing is not as popular as hunting at this division, there still are opportunities for visitors to fish the East Branch of Simms Stream.

Management Strategies:
Continue to:

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Install an informational kiosk in a conspicuous location to post information on fishing seasons and other notices to visitors.
- The Blueberry Swamp Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of CCP approval:

- Work with the New Hampshire Fish and Game Department to inventory and assess fish populations on the division.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Although most dedicated anglers will be drawn to the nearby White Mountain National Forest, the Connecticut River, or other areas better known for fishing, the East Branch of Simms Stream offers the opportunity to fish for Eastern brook and rainbow trout. To facilitate fishing, the refuge will make information readily available to interested anglers regarding opportunities on Service-owned land, location of fishable waters, and available game fish.

Management Strategies:
Within 5 years of CCP approval:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at the division kiosk, through friends groups, and in local businesses.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in northern New Hampshire. Currently, there is no infrastructure in place at the division to support these uses, and consequently, visitation for wildlife viewing and photography is limited and dispersed.

Management Strategies:
Continue to:

- Allow wildlife observation and photography at the Blueberry Swamp Division.
- Allow public access at the Blueberry Swamp Division daily from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 10 years of CCP approval:

- Evaluate the feasibility and demand for a native surface, primitive loop trail that through the fields and forests, and ultimately down to the East Branch of Simms Stream. Complete the required planning (i.e. NEPA, compatibility determination), if a trail is warranted.

Within 15 years of CCP approval:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners that host events designed to view wildlife on the division.

Rationale:
The entire division is available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. Visitation increases are expected as this division expands and becomes better known. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 1 year of CCP approval:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of CCP approval:

- Develop interpretive panels that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.

- Produce a list of wildlife species and associated habitats and other conservation information on the division for distribution at informational kiosks, the refuge website, and other popular media.

- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.

- Encourage local schools and groups to offer wildlife-related trips to the division.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Blueberry Swamp Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
This sub-objective is not applicable to the Blueberry Swamp Division because there are limited opportunities for canoeing or kayaking, and the East Branch of Simms Stream is not part of a larger water-based trail network.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Blueberry Swamp Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:
- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Blueberry Swamp Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division without detrimentally impacting the wildlife resource.

Management Strategies:
Continue to:
- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.

Within 1 year of CCP approval
- Work with users to delineate winter cross-country skiing trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:
- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Mascoma River Conservation Focus Area (Existing Refuge Division)

Lyme, Dorchester, Hanover, and Canaan, New Hampshire

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	20,593	91%
■ *Existing Refuge Ownership in CFA*[1]	*761*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	19,832	
Existing Acres in CFA Permanently Conserved by Others[2,3]	1,938	9%
Total Acres in CFA[2,4]	22,531	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Mascoma River CPA (map A.62) encompasses the Mascoma River CFA (map A.63). On February 23, 2015, the Service acquired a 761-acre easement which established the Mascoma River Division. This easement gives us the authority to manage habitat and public use in this area. The Mascoma River CFA was identified as high priority for conservation for the State of New Hampshire and contains a large, intact forested area which has diversity in elevation and aspect and includes numerous small, scattered, forested wetlands. The Mascoma River CFA is also located within an existing network of conserved lands, including the White Mountain National Forest, Mascoma River and Cumins Pond Wildlife Management Areas, and several privately owned tracts. In addition, most of the Mascoma River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional land protection by the Service in this area will help better connect these conserved lands. The Appalachian Trail Corridor, which crosses the CFA, provides outstanding recreational opportunities. The CFA will help form a better connection between the White Mountain National Forest and the Appalachian Trail.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 92.5%
- Shrub swamp and Floodplain Forest – 1.2%
- Conifer Swamp – 1.9%
- Freshwater Marsh – 0.4%

For more information on habitats in the CFA, see map A.64 and table A.38.

What are the resources of conservation concern for the CFA?

As noted in table A.39 below, there are eight Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to species that require large contiguous forest tracts such as forest interior dwelling bird species, and State Species of Greatest Conservation Need (SGCN). These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA, especially those with active bat hibernacula, may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Mascoma River CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat for a diversity of bird species.

   Habitats in the Mascoma River CFA have been identified as being of "Highest Quality in New Hampshire" in the New Hampshire Wildlife Action Plan (New Hamsphire Fish and Game Department 2005). The CFA contains a mosaic of unfragmented habitats that contribute to the larger core of undeveloped land within the landscape. These habitats provide breeding habitat for a diversity of landbirds including species of conservation concern and forest interior dwelling species. This CFA is in the core range of many of these species including PRRC species such as wood thrush, chestnut-sided warbler, American woodcock, Canada warbler and blackburnian warbler. Other species of conservation concern include black-throated blue warbler, purple finch, and black-throated green warbler. Peregrine falcon is another PRRC species, as well as a State Species of Greatest Conservation Need (SGCN). The cliff and talus systems in the CFA are used by nesting peregrine falcons, where the elevations can rise above 2,000 feet.

3. **Waterfowl**
   Potential breeding and foraging habitat for American black duck, a PRRC species, as well as wood duck, Canada geese, and other waterfowl species within wetlands adjacent to slow-moving streams and open water habitats. New Hampshire Audubon observed breeding and migrating Canada geese, wood duck, mallard, ring-necked duck, and hooded merganser in ponds adjacent to the CFA. As well as American black duck, green-winged teal, and common merganser during migration (Hunt personal communication 2008).

4. **Diadromous fish and other aquatic species**
   The Mascoma River watershed supports high water quality streams that are pristine with minimal impacts from human influences. The Mascoma River CFA supports numerous minimally developed ponds, perennial and intermittent streams, and river habitats, including the Mascoma River main stem. The brooks and streams in the Mascoma River CFA provide cold water habitat for Eastern brook trout, a PRRC species and conservation priority for the Service's Northeast Region.

5. **Wetlands**
   The Mascoma River CFA contains 2 acres of hardwood swamp, 429 acres of conifer swamp, 276 acres shrub-swamp and floodplain forest, 18 acres of peatland and 99 acres of freshwater marsh. Many of these wetlands occur along slow moving streams or small ponds. Habitat patches range from 2 acres to 124 acres in size.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse (different size classes) and native species will dominate. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- In open water (stream, rivers, and ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

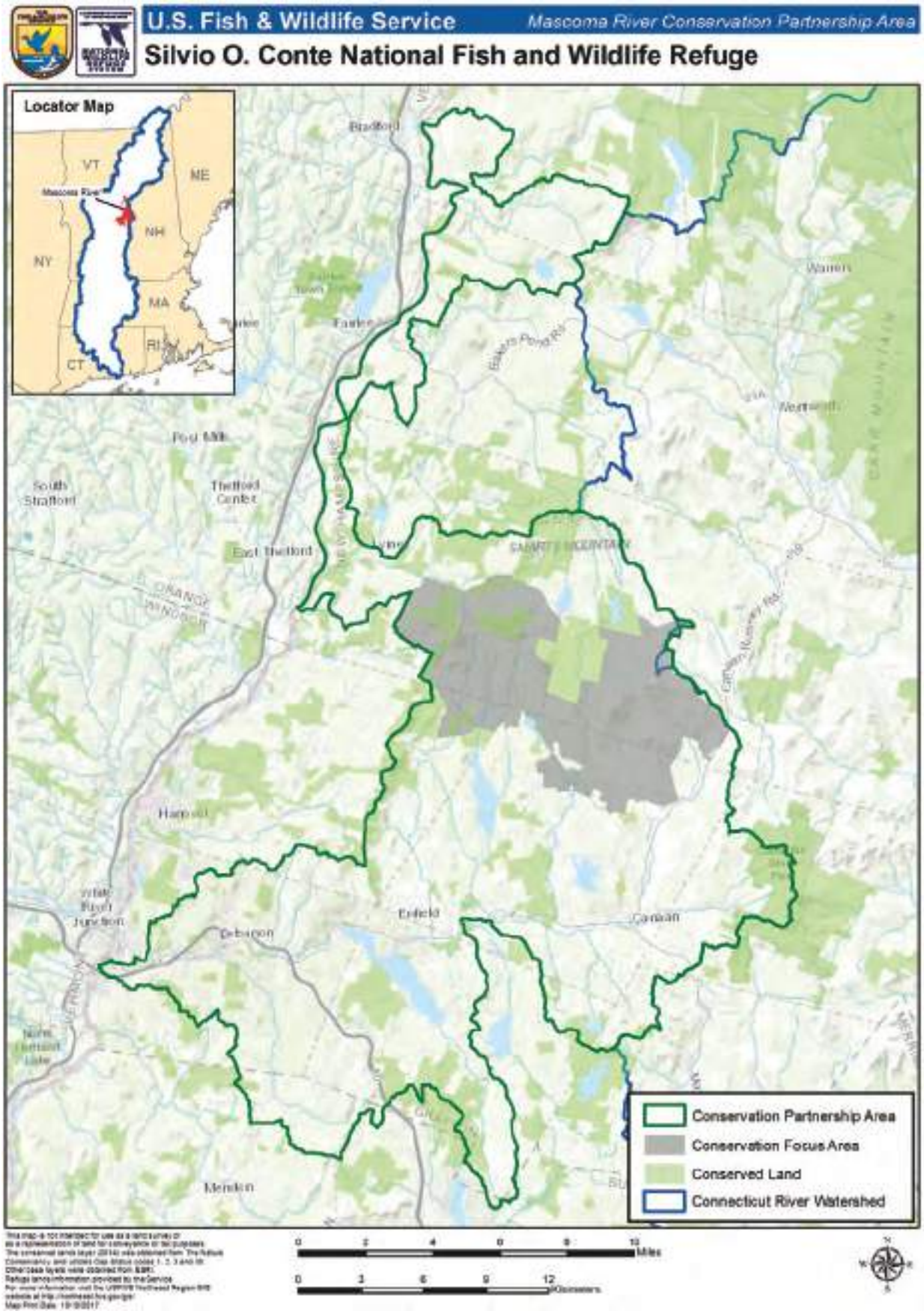
What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six, priority public uses: wildlife observation, wildlife photography, environmental education, interpretation, hunting, and fishing.

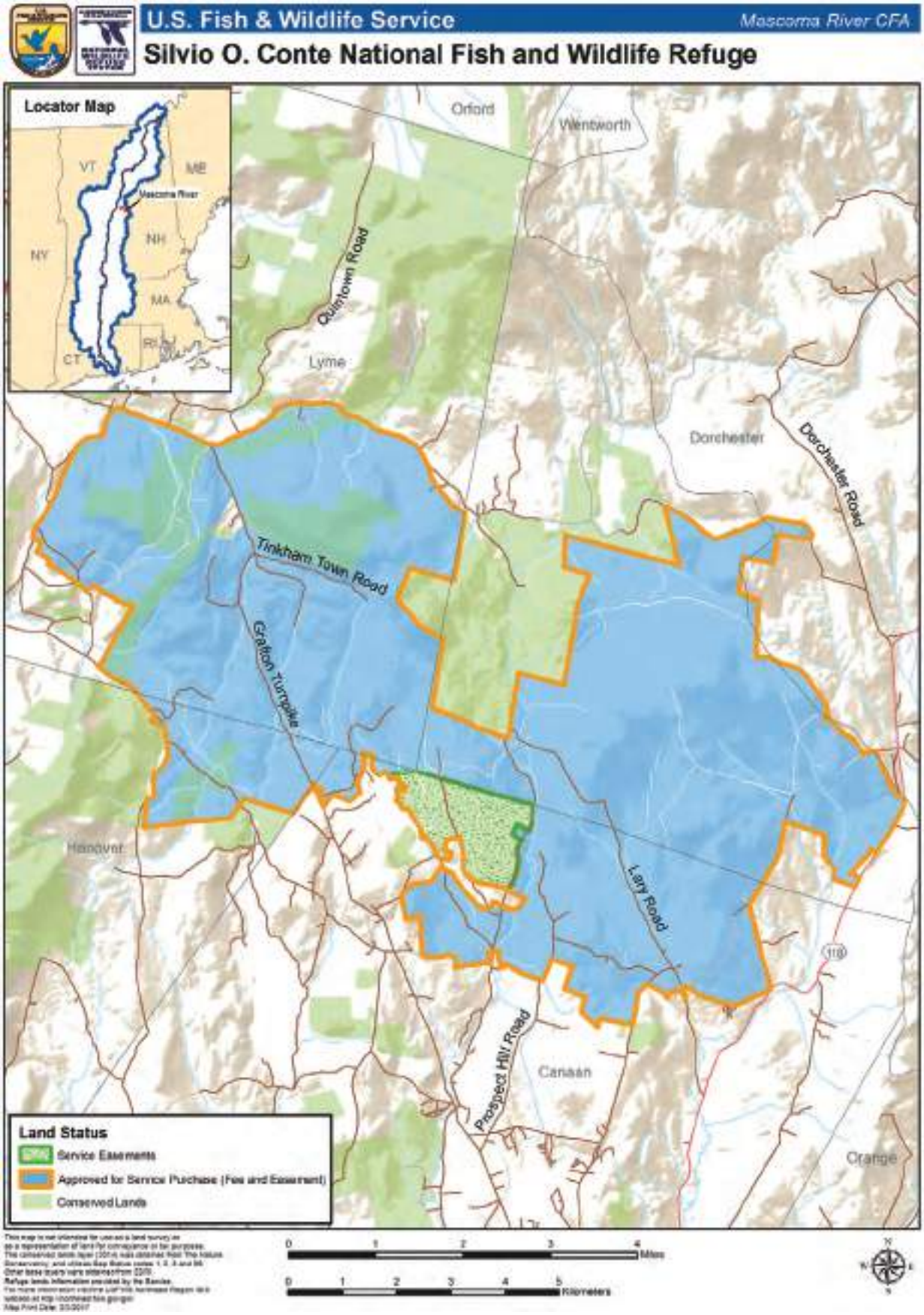
Were there other special considerations in delineating the CFA boundary?

- The CFA comprises a large portion of a priority matrix forest block identified in The Nature Conservancy's Lower New England-Northern Piedmont Ecoregional Plan.
- This area was identified as a conservation focus area priority in the Quabbin-to-Cardigan Collaborative Conservation Plan.

Map A.62. Mascoma River CPA.



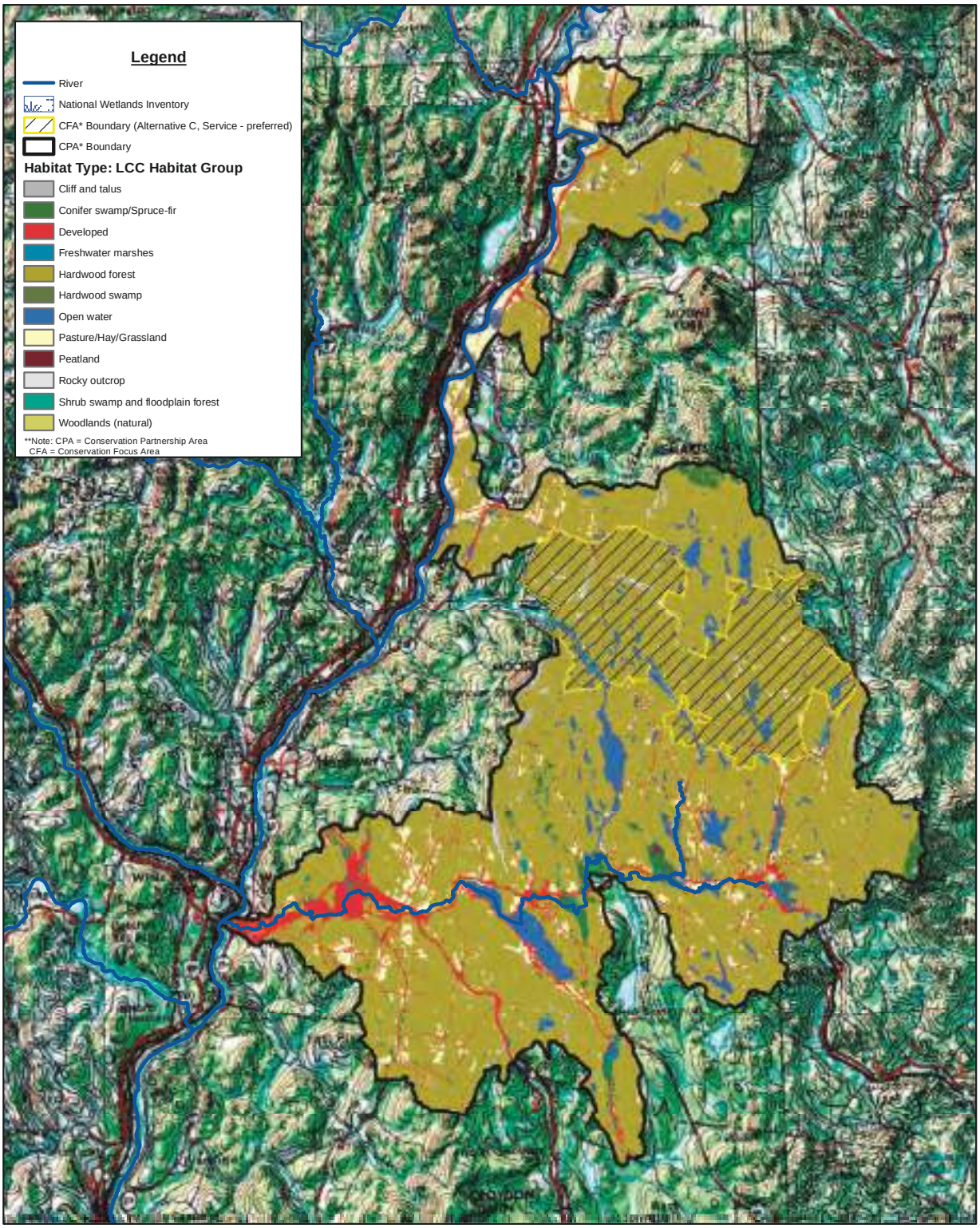
Map A.63. Mascoma River CFA – Location.



Map A.64. Mascoma River CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Mascoma River CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes.
For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 2.5 5 7.5 10 Miles

0 4 8 12 16 Kilometers

N W E S

Table A.38. Mascoma River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	4,061	2.8%	428	34	-	1.9%	10.5%
Hardwood forest	114,755	80.2%	20,865	1,761	735	92.5%	18.2%
Hardwood swamp	290	0.2%	2	-	-	0.0%	0.8%
Shrub swamp and floodplain forest	1,156	0.8%	277	41	-	1.2%	24.0%
Woodlands (natural)	238	0.2%	12	-	-	0.1%	5.0%
Forested uplands and wetlands subtotal	*120,500*	*84.2%*	*21,585*	*1,836*	*735*	*95.6%*	*17.9%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	1,171	0.8%	233	86	-	1.0%	19.9%
Freshwater marshes	668	0.5%	99	6	-	0.4%	14.8%
Pasture/hay/grassland	7,733	5.4%	102	7	8	0.5%	1.3%
Peatland	120	0.1%	18	-	-	0.1%	15.1%
Rocky outcrop	830	0.6%	279	87	-	1.2%	33.6%
Non-forested uplands and wetlands subtotal	*10,523*	*7.4%*	*731*	*187*	*8*	*3.2%*	*6.9%*
Inland aquatic habitats[9]							
Open Water	4,384	3.1%	98	3	12	0.4%	2.2%
Inland aquatic habitats subtotal	*4,384*	*3.1%*	*98*	*3*	*12*	*0.4%*	*2.2%*
Other							
Developed	7,629	5.3%	154	11	1	0.7%	2.0%
Other subtotal	*7,629*	*5.3%*	*154*	*11*	*1*	*0.7%*	*2.0%*
TOTAL[10]	**143,036**	**100.0%**	**22,567**	**2,037**	**757**	**100.0%**	**15.8%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.39. Mascoma River CFA – Priority Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 20,868 acres		
Wood Thrush[A,B,C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Red-shouldered Hawk[J] Ovenbird[A] Eastern Wood Pewee[A,J] Veery[A] Northern Flicker[A,J] Yellow-bellied Sapsucker[A] Rose-breasted Grosbeak[A] Eastern Red Bat[I] Louisiana Waterthrush American Redstart[A,J] Black-and-white Warbler[J] Black-billed Cuckoo[A,J] Black-throated Blue Warbler[A] Great-crested Flycatcher[J] Northern Goshawk[A,I,J] Scarlet Tanager[J] Little Brown Bat[I] Sharp-shinned Hawk[J] Purple Finch[A,I] Ruffed Grouse[A] Black Racer[I]
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Chestnut-sided Warbler[A, B]	Early successional deciduous forested upland and wetland habitat (Dunn et al., 1997, Richardson et al., 1995)	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Hardwood Swamp[5] – 2 acres		
North-Central Appalachian acidic swamp[H]	*North-Central Appalachian acidic swamps* are found in basins or on gently sloping seepage lowlands. Eastern hemlock is usually present and may be dominant. It is often mixed with deciduous wetland trees such as red maple or black tupelo. Species of the genus Sphagnum are an important component of the moss layer (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Conifer Swamp[5] – 429 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	Black-throated Green Warbler[A] Blackburnian Warbler[A] Northern Parula[A] Veery[A] Purple Finch[A, I]
Shrub Swamp and Floodplain Forest[5] - 276 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Warbling Vireo Willow Flycatcher Ruffed Grouse[A] Chestnut-sided Warbler[A,B] Veery[A] American Redstart[A] Canada Goose[J] Mallard[J] Wood Duck[J] Eastern Kingbird[J] Gray Catbird[J] Wood Turtle[I] Spotted Turtle[I]
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Woodlands (natural)[5] - 12 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Cliff and Talus[5] – 223 acres		
Peregrine Falcon[C, G]	Nests on cliffs, ledges, and talus slopes near open habitats including rivers, lakes, and marshes, and lack of human disturbance (DeGraaf et al. 2001).	Uncommon plant community within the landscape that contributes to BIDEH*
Freshwater Marshes[5] - 99 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	American Bittern[A] Marsh Wren Virginia Rail[I] Wood Duck[A,J] Canada Goose[J] Mallard[J] Wood Turtle[I] Common Loon[A,I] Spotted Turtle[I]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Pasture/Hay/Grassland[5] – 103 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[J] Northern Harrier[A,I,J] Bobolink[A] Grasshopper Sparrow[I] Eastern Meadowlark[I]
Peatland[5] – 18 acres		
Boreal-Laurentian-Acadian acidic basin fen[H] Laurentian-Acadian acidic alkaline fen[H]	*Boreal-Laurentian-Acadian acidic fens* have developed in open or closed relatively shallow basins with nutrient-poor and acidic conditions. The substrate is sphagnum, and vegetation typically includes areas of dominance by grasses and dwarf-shrubs. Leatherleaf is usually present, and scattered stunted trees may occur. These fens often develop adjacent to open water. *Laurentian-Acadian acidic alkaline fens* are most abundant in areas of limestone bedrock, and widely scattered in areas where calcareous substrates are scarce. Shore fens, which are peatlands that are occasionally flooded along stream and lakeshores, are also included here because flooding tends to create moderately alkaline conditions. The vegetation may be grass-dominated, shrub-dominated, or a patchwork of the two; shrubby cinquefoil is a common diagnostic shrub. The herbaceous flora is usually species-rich and includes calcium loving grasses and forbs. Sphagnum dominates the substrate; star campylium moss is an indicator bryophyte. The edge of the basin may be shallow to deep peat over a sloping substrate, where seepage waters provide nutrients (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Rocky Outcrop[5] – 280 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	The Northern Appalachian-Acadian rocky heath outcrop system occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including Sheep laurel, Low-bush blueberry, Black huckleberry, and Black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 96 acres		
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/ streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Slimy Sculpin[I] Wood Turtle[I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Canada Goose[A] Wood Duck[A] Hooded Merganser[J] Green-winged Teal[J] Mallard[J] Common Merganser Ring-necked Duck Common Loon[A,I]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 New Hampshire Wildlife Action Plan (Species of Greatest Concern)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD - These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Mascoma River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Conifer Swamp)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the Mascoma River CFA, softwood swamps frequently have been altered and have potential for restoration. This habitat type is often found in small patches on mineral soils that are nutrient poor; there may be an organic layer, but generally deep peat soils are absent. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. The dynamic nature of the watertable drives complexes of forest upland and wetland species including red maple, balsam fir, red spruce, and ash species. Where soils tend more to alkaline conditions white cedar is a common tree species, and the shrub layer is generally more diverse. Within the Connecticut River watershed, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in softwood swamps are not well understood. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within Mascoma will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Where needed, restoration of softwood swamp habitats will create high-quality habitat for neotropical migratory birds. Closed canopy softwood forests that include white cedar and other softwoods provide important mast, food, nesting, and cover. Softwood swamp stands with large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blowdowns create canopy gaps. This provides a well developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Conifer swamps in the Mascoma River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Conifer swamp patches of 10 acres or greater are thought to provide suitable breeding habitat for Canada warbler in the Mascoma River CFA, and allow monitoring of population response to management actions (R. Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of conifer swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State of New Hampshire, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, chestnut-sided warbler, American woodcock, Canada warbler, blackburnian warbler, and northern long-eared bat and tricolored bat. (if appropriate).

Rationale:
We envision healthy forests within the Mascoma River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of New Hampshire's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010). This large, contiguous block of matrix forest has been identified by a host of partners including the State of New Hampshire's Wildlife Action Plan, the Nature Conservancy's Lower New England-Northern Piedmont Ecoregional Plan, and the Quabbin-to-Cardigan Collaborative Conservation Plan.

Within the Mascoma River CFA and the watershed there are several large areas of unfragmented forest. These areas serve as refugia for wildlife, which has led the establishment of multiple wildlife management areas in the watershed. To date our review of Mascoma River's habitats and wildlife species —and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of

conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Mascoma River comes exclusively from a reading of forest history in New England—a legacy of intensive past-use has altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of Mascoma River are remarkably more homogeneous than those of three centuries earlier, and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach combining passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Mascoma River will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, and—if wetlands and riparian areas are present—Canada warbler (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009).

Mascoma River's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape: canopy, midstory, understory, and ground layer. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils, and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who are thought to be strongly associated with the hemlock forests within Mascoma River—and have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and—when along rocky bottomed streams—Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Identify forest stands where soils and species composition will support woodcock management.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without

jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003) The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complimented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Mascoma River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American woodcock and American black duck.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

American woodcock are dependent on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA may provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

Management of the shrub swamp communities may be required to maintain shrub dominance and stem densities. Tree species, such as red maple, tend to replace mature shrub species and established invasive plants compete for nutrients and space. These invading species require management in order to maintain the native shrub diversity of the community. A high shrub stem density is also important as it provides birds with cover from predators and more leaf surface area for gleaning. Cover for American woodcock, for example, is ideal in a 10-15 year old shrub swamp (USDA 2001). Shrub species, in particular alder, tend to die back as they reach maturity, and as a result stem density decreases. Periodic rejuvenation of shrubs is necessary to maintain required stem densities. Management priority will be given to shrub swamps that are part of a woodcock management area. Management of these shrub swamps will benefit other species that use these communities, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation, and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests near foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams (Gawler 2008). These marshes are also maintained over time by beaver activity, an important natural disturbance process within the Mascoma River watershed.

Our coarse-scale habitat analysis of this CFA identifies these wetlands as scattered throughout the CFA, with a large percent occurring along Pressey Brook. This particular wetland complex, adjacent to a slow moving stream, may provide important breeding and foraging habitat for American black duck, and other waterfowl species. This area may also be important as staging areas for migrating waterfowl. An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for waterfowl species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Encourage local landowners to use New Hampshire Best Management Practices within active agricultural fields that are located along the perimeter of marsh habitats.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map natural communities; protect rare or exemplary examples.
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Survey wildlife use of existing wetlands.

Sub-objective 1.2b. (Cliff and Talus)
Protect cliffs, ledges and talus slopes to maintain the biological integrity, health and diversity of associated natural and rare ecological communities. Emphasis will be on sites occupied by nesting peregrine falcons.

Rationale:
Cliff and talus systems in this CFA generally occur below treeline at low to mid elevations. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places (Gawler 2008). The type of rock, microclimate, and soil availability from higher elevation sources directly and indirectly

influence vegetation within these systems (Thompson and Sorenson 2000). Rock types may include limestone, dolmite, granite, schist, slate, or shale which breakdown differently in the environment providing varying levels of nutrients, moisture, ground stabilization, and soil availability. Sun exposure, aspect, elevation, and moisture provide different microclimate conditions impacting vegetation type and growth. These systems provide unique niches for rare and uncommon plants, and habitat for snakes, including the rare eastern timber rattlesnake, black rat snake, and eastern garter snake. Exposed cliffs provide nesting habitat for turkey vultures, ravens, porcupines, and peregrine falcons, a state species of greatest conservation need. Peregrine falcons are also a refuge purpose species. New Hampshire's breeding population has increased steadily since they were extirpated from the Eastern US in the mid to late 1960's due to indiscriminate use of DDT following World War II. Peregrines nest on Holts Ledge in the Mascoma River CFA. Winslow Ledge, located across the valley from Holts Ledge, may provide an alternate nest site for peregrines. Monitoring and management of these sites is coordinated by New Hampshire Audubon.

Management of cliff and talus systems in the Mascoma River CFA will begin with a comprehensive, multi-scale wildlife and habitat inventory. Wildlife species survival and breeding success is dependent on habitat at a fine scale and the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of cliff and talus systems at the time of acquisition, and communication and coordination with our partners, will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with New Hampshire Audubon and other partners to evaluate and manage human (e.g. recreational) influences, and conduct outreach and education as necessary.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Identify historical, active, and potential peregrine falcon nesting sites.
- Coordinate with New Hampshire Audubon and other conservation organizations to conduct spring surveys of identified sites to determine occupancy.
- Work with New Hampshire Audubon and other partners to annually monitor active sites to determine occupancy status and reproductive outcome.

Sub-objective 1.2c. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat for grassland birds and pollinators, if present and appropriate.

Rationale:
Less than one percent of the Mascoma River CFA is typed as pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow, as well as pollinators, including the yellow banded bumble bee and monarch butterfly. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow. American woodcock, a refuge priority resource of concern, will use both habitat conditions when managed in conjunction with their other habitat needs.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Shrubland and grassland habitats will also be used by American woodcock, which require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Small clearings with minimal vegetation is required for courtship areas, and shrublands with clumps of tall vegetation or sparse shrubs will provide roosting habitat.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, and grassland acres can provide quality habitat, for these species, and American woodcock, if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct an inventory of pasture, hay and grassland habitats to determine their condition, size and location, and incorporate them into the management strategies for American woodcock in the HMP.

Sub-objective 1.2d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987; Hunter 1991; Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Mascoma River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including

Eastern brook. Also provide undisturbed breeding, foraging and stopover habitat for American black duck and other waterfowl species.

Rationale:
The Mascoma River watershed supports high water quality streams that are pristine with minimal impacts from human influences. The Mascoma River CFA supports numerous minimally developed ponds, perennial and intermittent streams, and river habitats, including the Mascoma River. The brooks and streams in the Mascoma River CFA provides cold water habitat for eastern brook trout, a species of conservation concern for the State and the Service's Northeast Region.

Mudgetts Pond, Larry Pond, and Little Clark Pond are secluded and surrounded by wetlands, and may provide undisturbed breeding, foraging and stopover habitat for a variety of waterfowl species including wood duck, American black duck, Canada goose, mallard, green-winged teal, ring-necked ducks and mergansers. Common loons, a state species of greatest conservation need are known to nest in the Mascoma River CFA.

Management of water resources in the Mascoma River CFA will provide clear aquatic species passage to spawning and wintering habitat, structurally diverse instream habitat, with boulders and downed woody debris providing riffles and pools, and shade trees along riparian edges. Open water habitats will remain pristine and undeveloped.

Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Aquatic species survival and breeding success is dependent on not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of the water resources in the CFA at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:
- Work with partners to implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with partners to conduct stream assessments to evaluate stream and fish community health.
- Work with partners to identify man-made physical barriers (e.g. impassable road crossings, culverts and dams) to the movement of fish and other aquatic organisms.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Mascoma River Division as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Mascoma River Division as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Mascoma River Division as an outdoor classroom.

Rationale:
Because this division will be unstaffed, the majority of environmental education opportunities on this division will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Mascoma River Division as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Mascoma River Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Mascoma River Division will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Mascoma River Division's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Mascoma River Division.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:

See the rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Mascoma River Division.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:
- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Mascoma River Division will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Mascoma River Division will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience based on state regulations.

Rationale:
The Mascoma River CFA is a popular area to hunt white-tailed deer, moose, Eastern wild turkey, black bear, and small game. Hunting will be allowed on a newly created division as long as it is found to be a compatible use. Hunting, consistent with the final compatibility determination, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

  (a) The season for hunting snowshoe hare and coyotes with dogs is from October 1 to March 15.

  (b) Use of bait is prohibited.

(c) Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.
- Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with New Hampshire Fish and Game Department to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with New Hampshire Fish and Game Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the division and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the division.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:
- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Mascoma River Division kiosks, through a friends group, and in local businesses.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.
- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.
- Work with New Hampshire Fish and Game Department to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with New Hampshire Fish and Game Department to encourage youth hunting at the division as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Mascoma River Division after completing all administrative procedures to officially open refuge lands to fishing, based on New Hampshire Fish and Game Department regulations, and any division-specific conditions.

Rationale:
There are several streams in the CFA including the Mascoma River, Tinkhamtown Brook, Indian River, and Call Brook. The Mascoma River supports a cold water fishery with brook trout, brown trout, and rainbow trout. A variety of game fish are found in the other streams of the CFA. Fishing is a popular activity throughout this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk to post information on fishing seasons and other notices to visitors.
- The Mascoma River Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land with fishable waters:
- Work with the New Hampshire Fish and Game Department to inventory and assess fish populations on the division.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. Local organizations such as the Mascoma Chapter of New Hampshire Audubon and others offer organized field trips to popular natural areas. A new division in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring sufficient land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring sufficient land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the division.

Rationale:
The entire division will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring sufficient land:

- Develop interpretive panels for kiosks and trails that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups such as the Mascoma Chapter of New Hampshire Audubon and other environmental organizations to offer wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the division for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring sufficient land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Mascoma River Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Mascoma River Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division without detrimentally impacting the wildlife resource. Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Within 5 years of acquiring land containing a section of the Appalachian Trail:

- Work with the State of New Hampshire, the Appalachian Trail Conservancy, adjacent landowners, and other local interests to explore partnership opportunities related to the trail and the surrounding network of conserved lands in the CPA.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Mascoma River Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Work with users to delineate winter cross-country skiing trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of acquiring sufficient land:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units

Pondicherry Conservation Focus Area (Existing Refuge Division)

Whitefield, Jefferson, and Carroll, New Hampshire

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	10,249	100 %
■ *Existing Refuge Ownership in CFA*[1]	*6,443*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*3,769*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	0	
Total Acres in CFA[2, 4]	10,249	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Pondicherry CPA (map A.65) encompasses the Pondicherry CFA (map A.66). The existing Pondicherry Division was established in 2000 and is now over 10 square miles in area. The CFA includes the State of New Hampshire's first designated IBA, a National Natural Landmark, and two National Recreation Trails. Much of the Pondicherry CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. The expansion to the existing division will help better protect the headwaters of Johns River and provide connectivity between White Mountains National Forest and the Pondicherry wetlands complex by connecting the lower elevation wetlands in the CFA to the upland slopes that feed into it.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Conifer Swamp/Spruce-fir – 57.7%
- Peatlands – 6.4%
- Shrub Swamps and Floodplain Forest - 5.1%

For more information about habitats in the CFA, see map A.67 and table A.40.

What are the resources of conservation concern for the CFA?

As noted in table A.41 below, there are eight Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species that rely upon the diverse habitats in this CFA. There are also PRRC habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the potential value of this area to Canada lynx, a federally listed species recently confirmed breeding in northern New Hampshire, and to State Species of Greatest Conservation Need (SGCN).

1. **Federal Threatened and Endangered Species**

Canada lynx have been confirmed breeding in northeastern New Hampshire by New Hampshire Fish and Game Department, and lynx tracks have been detected near the Pondicherry CFA. Conservation efforts for this species should be done at the landscape scale, and additional information is necessary to evaluate the importance of New Hampshire for Canada lynx and those measures needed to ensure their persistence within the State. Monitoring lynx presence and use of habitats in the Pondicherry CFA, therefore, is a priority, and coordination with New Hampshire Fish and Game Department will allow for a standardized approach.

This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas A bat acoustic survey in 2013, conducted by the USFWS, did not detect northern long-eared bats, but did detected the presence of little brown bats, hoary bat, silver-haired bat, big brown bat and eastern red bat.

2. **Migratory Birds**

The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Pondicherry CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat for a diversity of bird species.

The importance of Pondicherry to birds has been officially recognized several times. In 1963, New Hampshire Audubon and the New Hampshire Fish and Game Department collaborated to establish the Pondicherry Wildlife Sanctuary, comprised of Cherry and Little Cherry ponds and 166 acres of shoreline. The National Park Service recognized Pondicherry in 1972 for its "…relatively stable bog-forest supporting an unusual variety of birdlife" by naming it a National Natural Landmark. In 2003 the Division and the adjacent Mount Washington Regional Airport were designated the first Important Bird Area in New Hampshire.

The complex ecosystem of bogs, ponds, streams and wetlands surrounded by spruce and fir boreal forests supports approximately 238 species of birds, of which 129 species have been confirmed as breeding. Five years of breeding landbird survey data, and countless observations made by expert birders have detected numerous species of high conservation concern. Many of these species are resident and migratory boreal species including boreal chickadee, black-backed woodpecker, spruce grouse, gray jay, bay-breasted warbler, rusty blackbird, blackpoll warbler, and olive-sided flycatcher. The contiguous forests also provide habitat for forest interior species such as Canada warbler, ovenbird, blackburnian warbler, black-throated blue warbler, and black-throated green warbler. Blackburnian warbler, Canada warbler and black-throated blue warbler are PRRC species that require different species composition and structure within a mature forest. While American woodcock and rusty blackbird, also PRRC species, rely on early successional forests in the CFA.

The secluded ponds and associated wetlands in the CFA provide habitat for various waterbirds including Virginia rail, great blue heron, and American bittern. Cherry Pond is also one of the State's key common loon territories, fledging an average of one chick per year per pair.

3. **Waterfowl**
   Cherry and Little Cherry Pond, and associated wetlands provide important breeding and foraging habitat for American black duck, a PRRC species, and other waterfowl species such as ring-necked duck, wood duck, hooded mergansers, and green-winged teal. Cherry Pond and Little Cherry Pond are also staging areas for migrating waterfowl, including scaup, bufflehead, gadwall, scoters, and goldeneye.

4. **Diadromous fish and other aquatic species**
   Open water habitats in the Pondicherry CFA are limited to Cherry Pond, Little Cherry Pond, Mud Pond, the John's River and its tributaries, and Stanley Brook. These habitats support several fish species one of which, the Eastern brook trout, is a PRRC and has been identified as a conservation priority for the Service's Northeast Region. Brook trout are found in cold headwater rivers and streams. Wild brook trout have been documented within the CFA, and many streams, including Carroll Stream, are suitable to be managed as a self-sustaining wild brook trout population. Other species documented from Pondicherry include chain pickerel and several perch species from Cherry Pond, and state species of concern including burbot (cusk), northern redbelly dace, slimy sculpin, and tessellated darter from riverine habitats.

5. **Wetlands**
   The Pondicherry CFA lies about 1,110 feet above sea-level in a three-sided basin, surrounded to the north, east, and south-by peaks rising from 5,000 feet (Pliny Range) to 5,580 feet (Presidential Range) above the basin. It is not surprising that more than seven percent of the CFA consists of wetland habitats. About 537 acres of shrub swamp and floodplain forest, and 667 acres of peatlands make up the majority of the wetland habitat. These wetlands are concentrated along the perimeter of Cherry and Little Cherry Ponds, and the John's River.

What habitat management activities will be a priority on refuge lands within the CFA?

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse (different size classes) and management actions will aim to maintain forest types and structures appropriate for to site conditions and location (i.e. soils and aspect). Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- We will also manage wetland habitats, and pasture, hay, grassland habitats (map A.68). Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (stream, rivers, and ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse in-stream habitat, and unimpeded aquatic species passage to spawning and wintering habitat.

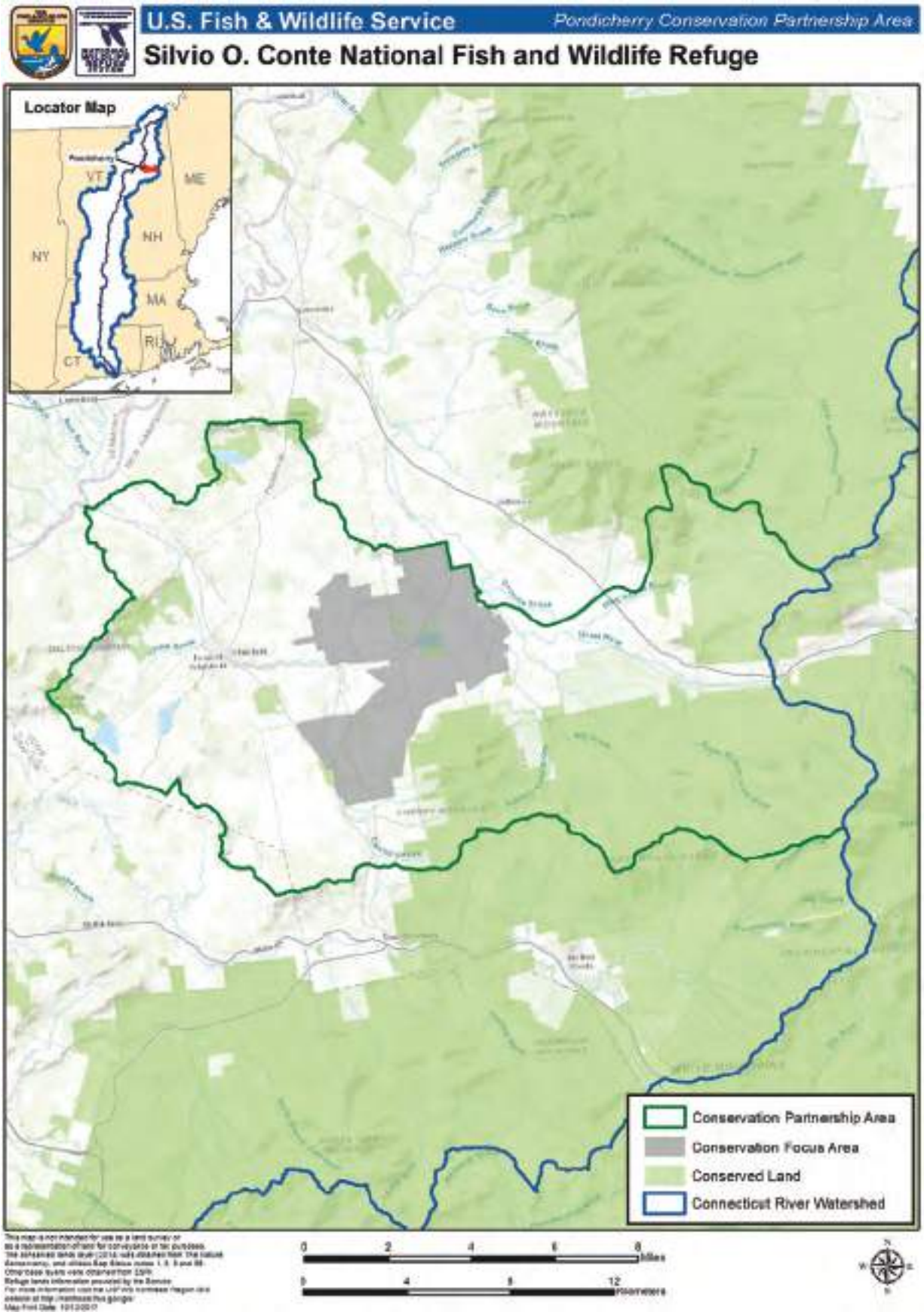
What public use opportunities will be a priority on refuge lands within the CFA?

Our priority will be providing opportunities for the six priority, wildlife-dependent recreational uses: hunting (see map A.69), fishing (map A.70), wildlife observation and photography, environmental education, and interpretation. See map A.71 and map A.72 for more information on additional public use infrastructure.

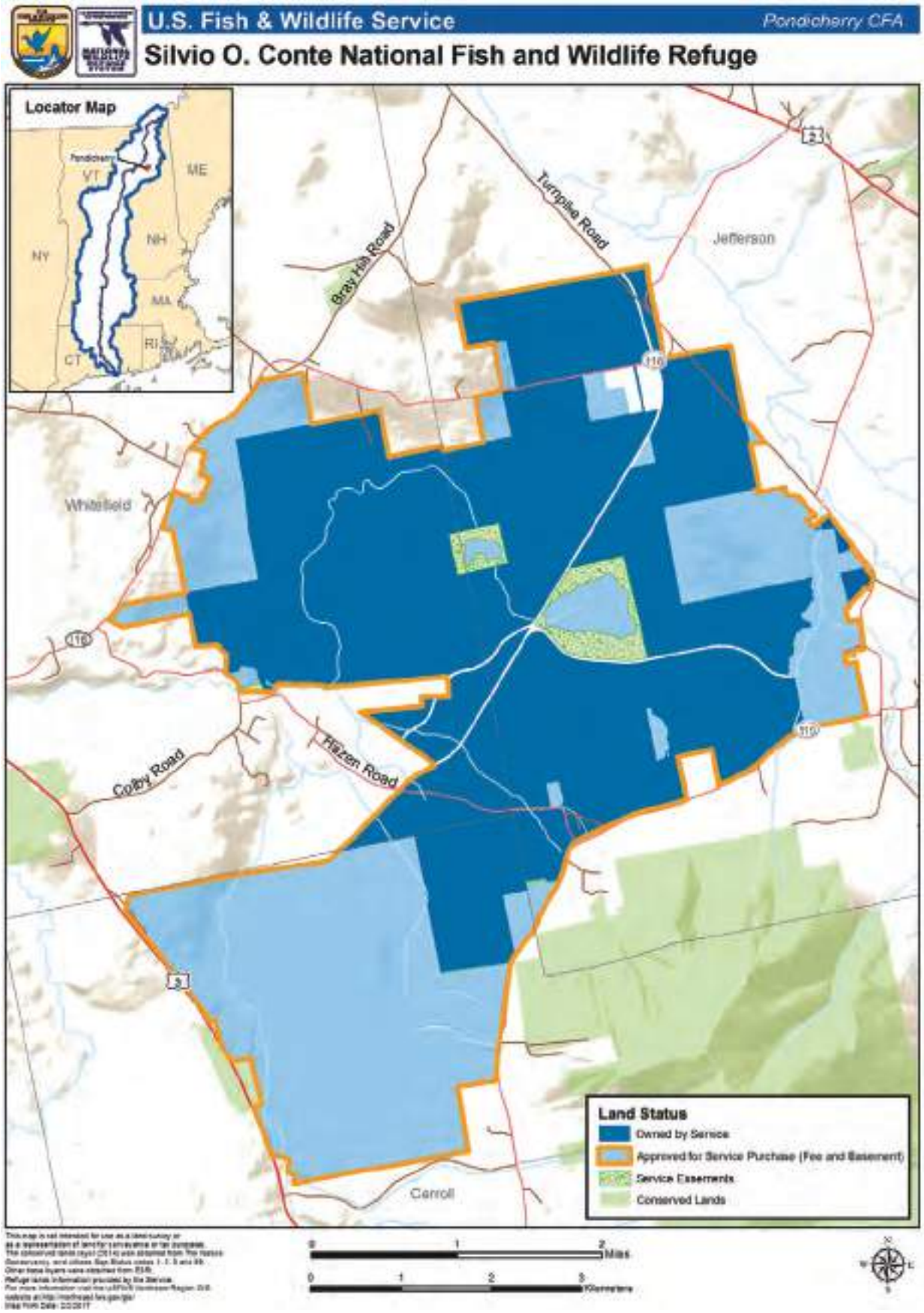
Were there other special considerations in delineating the CFA boundary?

In 1974, land within the basin also was recognized as a National Natural Landmark (map A.73) by the National Park Service. In 2003, the Pondicherry Division was designated as the State's first Important Bird Area—an international program which uses scientific criteria to identify habitat important to birds.

Map A.65. Pondicherry CPA.



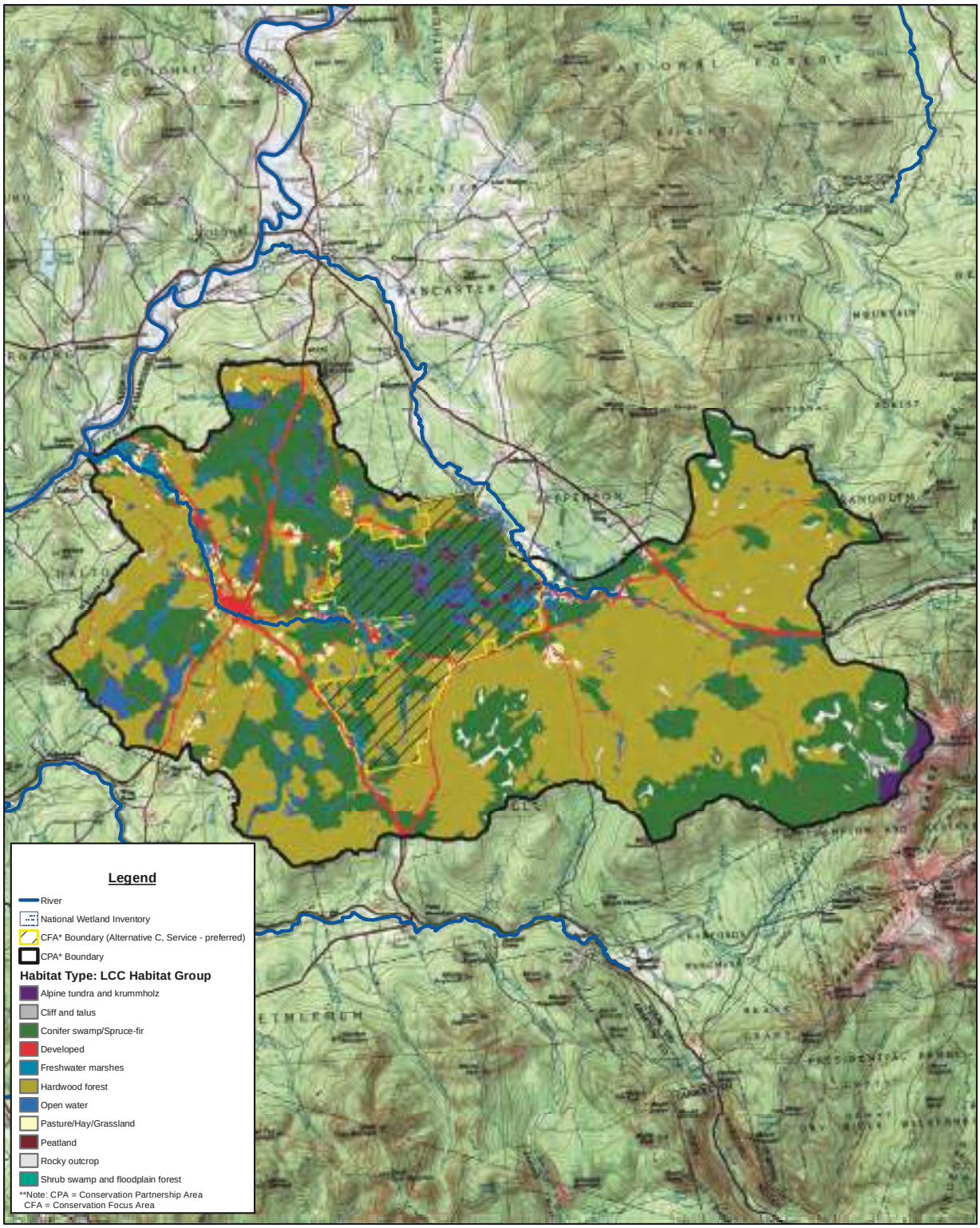
Map A.66. Pondicherry CFA – Location.



Map A.67. Pondicherry CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Pondicherry CPA*

Silvio O. Conte National Fish and Wildlife Refuge



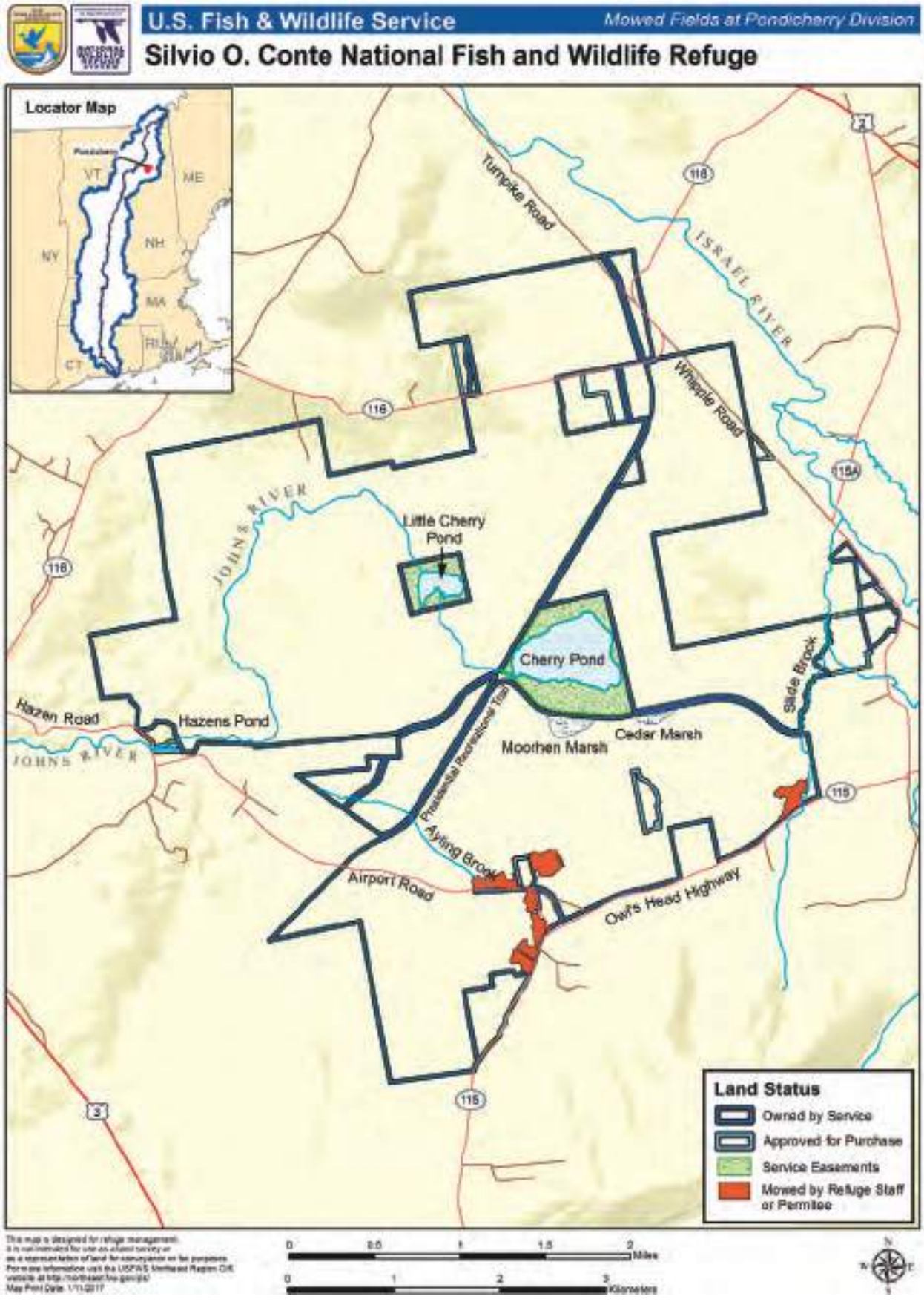
This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes. For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 2 4 6 8 Miles

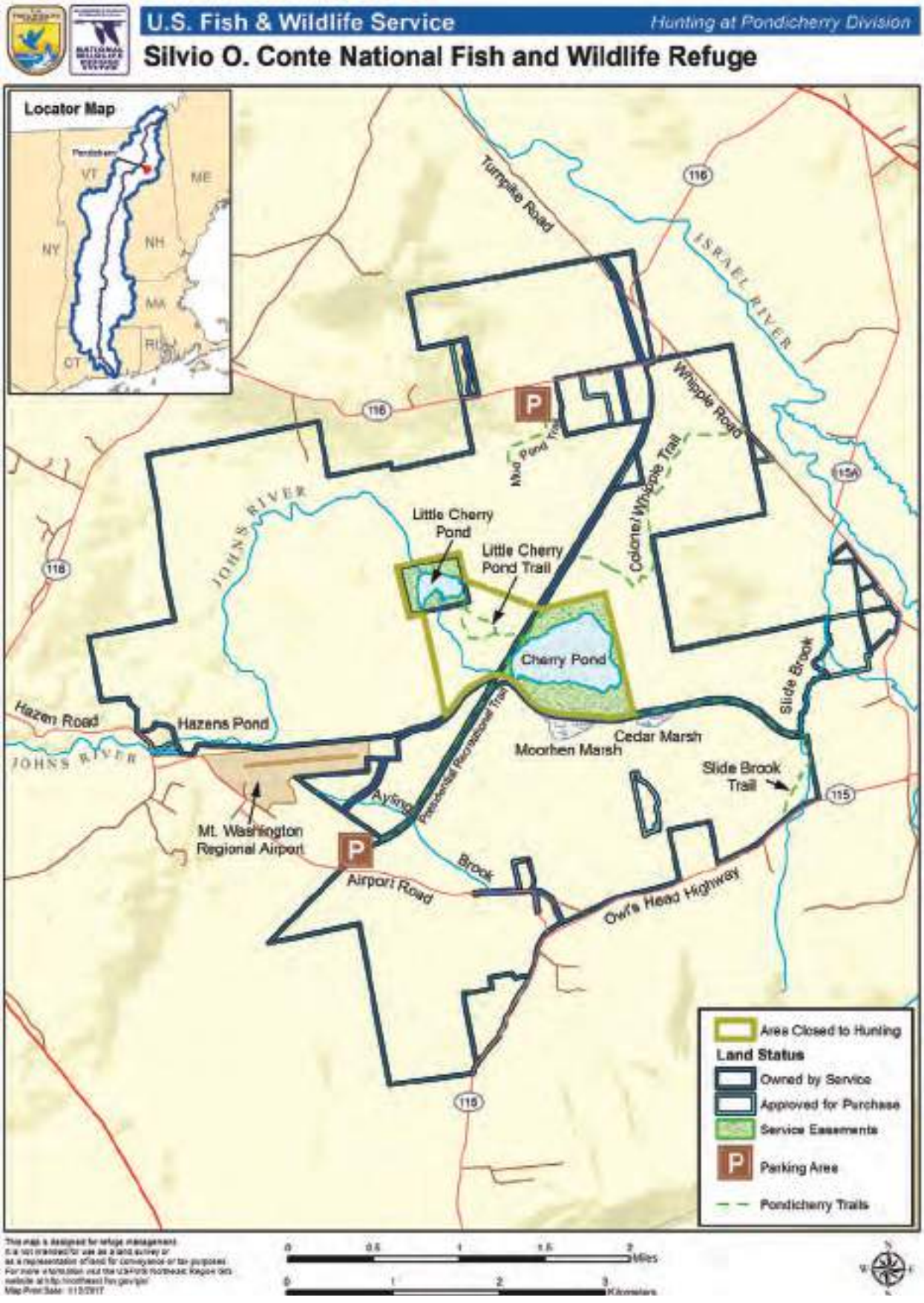
0 3 6 9 12 Kilometers

N W E S

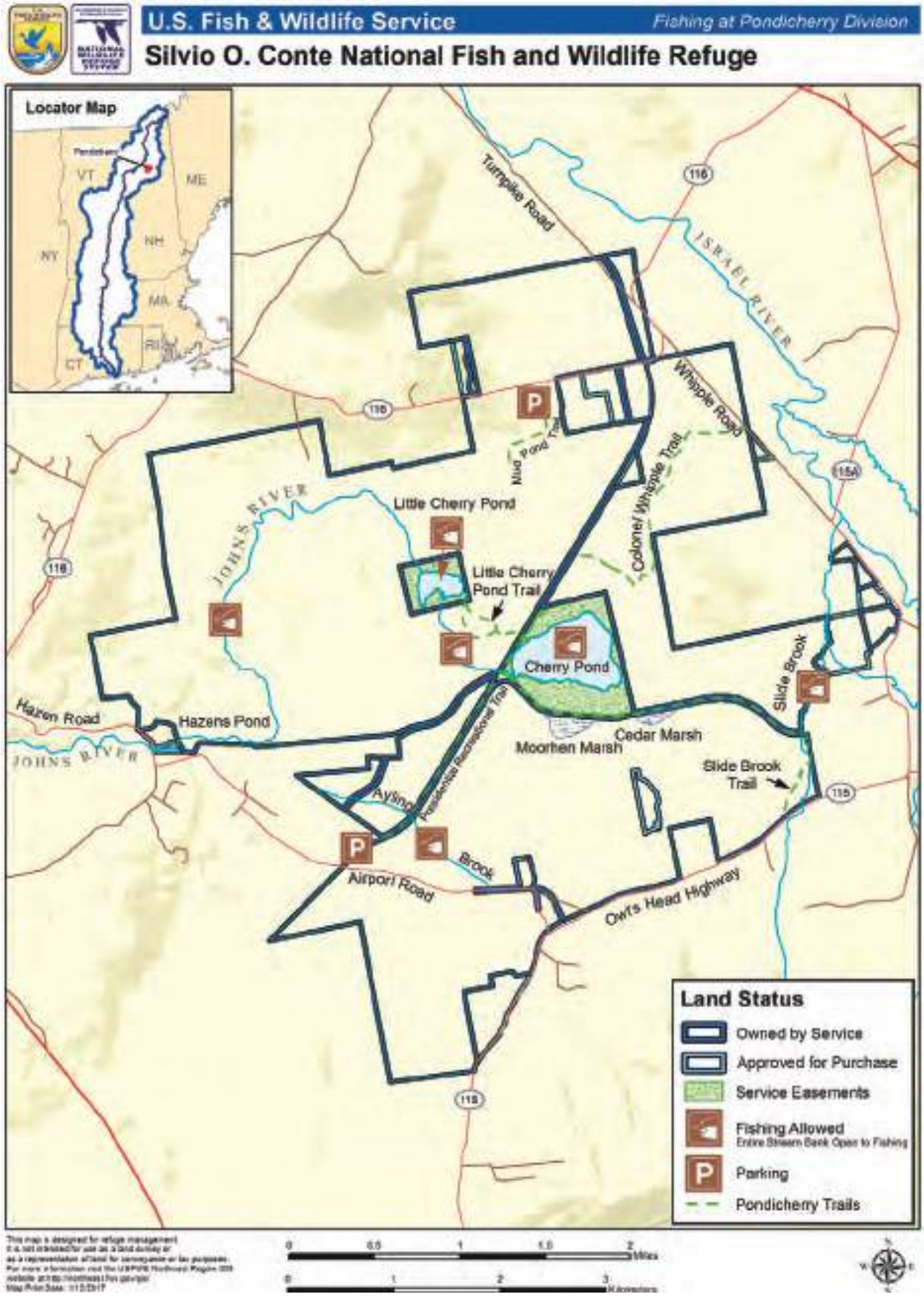
Map A.68. Pondicherry CFA – Mowed Fields.



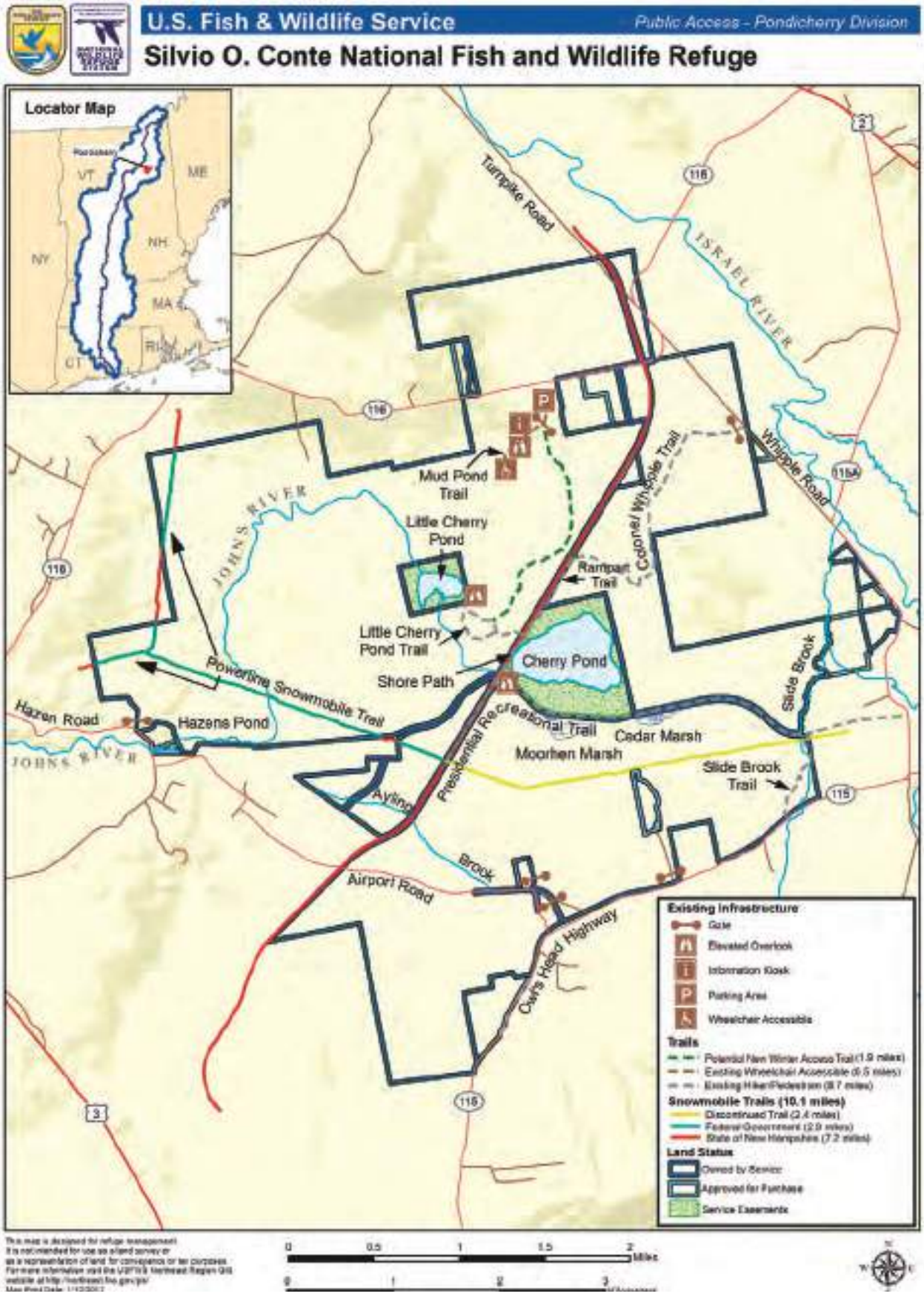
Map A.69. Pondicherry CFA – Hunting.



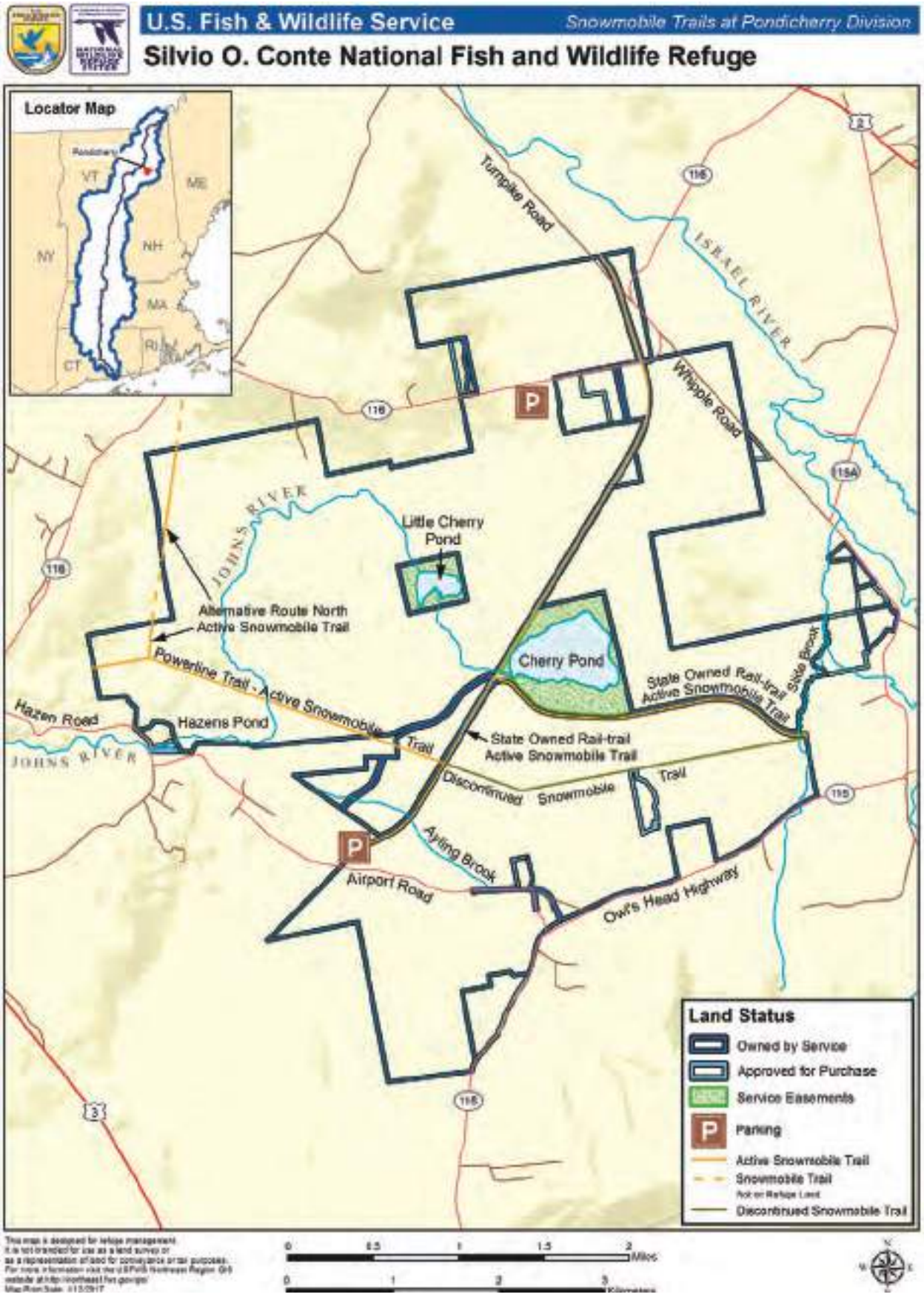
Map A.70. Pondicherry CFA – Fishing.



Map A.71. Pondicherry CFA – Public Access.



Map A.72. Pondicherry CFA – Snowmobile Trails.



Map A.73. Pondicherry CFA – Pondicherry National Natural Landmark.

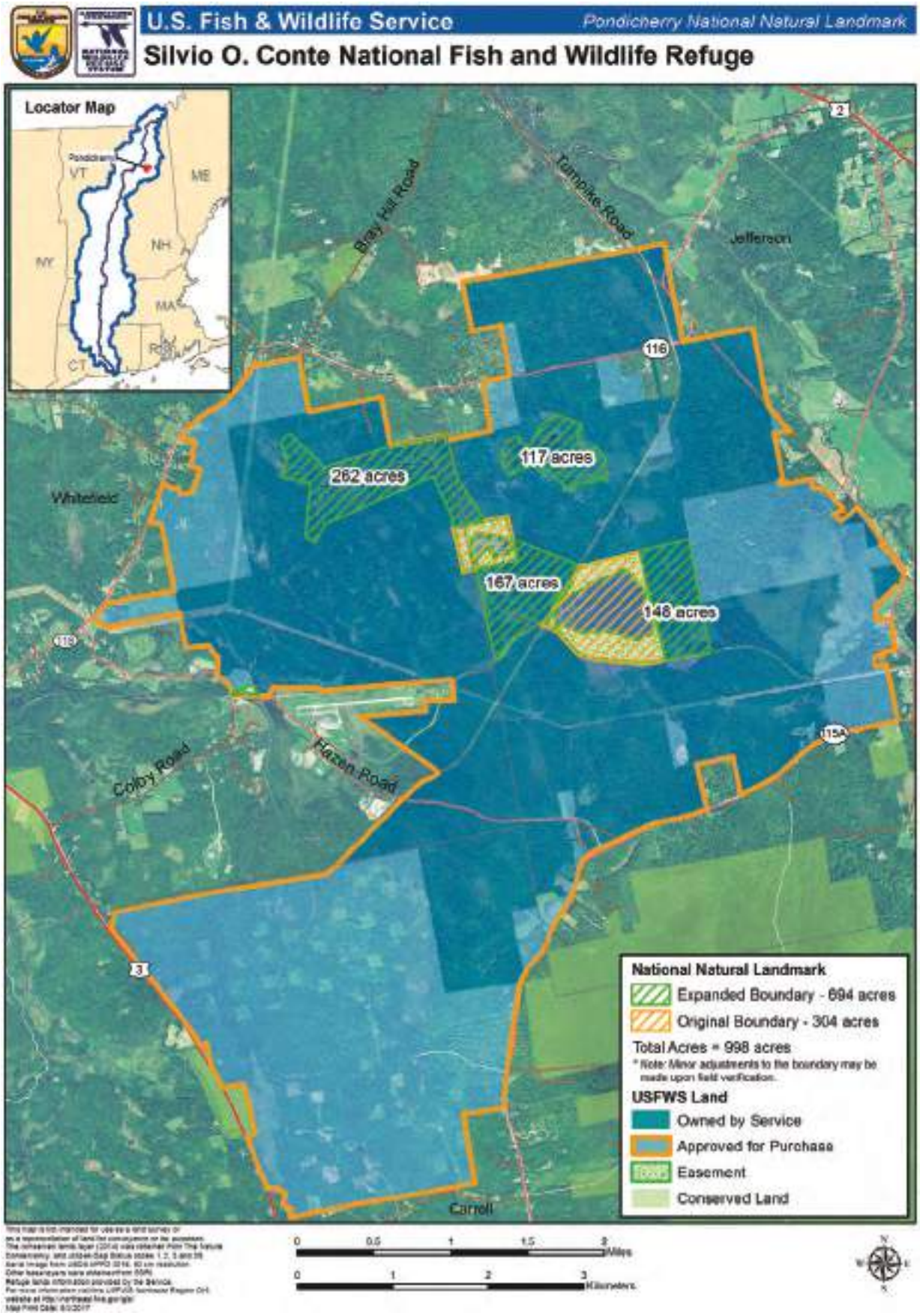


Table A.40. Pondicherry CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	31,676	37.4%	6,066	18	4,318	57.7%	19.1%
Hardwood forest	41,943	49.6%	2,834	8	1,011	27.0%	6.8%
Shrub swamp and floodplain forest	1,802	2.1%	536	7	353	5.1%	29.8%
Forested uplands and wetlands subtotal	*75,421*	*89.1%*	*9,436*	*33*	*5,683*	*89.8%*	*12.5%*
Non-forested Uplands and Wetlands[9]							
Alpine tundra and krummholz	393	0.5%	-	-	-	0.0%	0.0%
Cliff and talus	312	0.4%	-	-	-	0.0%	0.0%
Freshwater marshes	387	0.5%	65	-	40	0.6%	16.8%
Pasture/hay/grassland	1,754	2.1%	50	1	29	0.5%	2.9%
Peatland	1,027	1.2%	666	1	593	6.3%	64.9%
Rocky outcrop	1,148	1.4%	-	-	-	0.0%	0.0%
Non-forested uplands and wetlands subtotal	*5,020*	*5.9%*	*781*	*2*	*662*	*7.4%*	*15.6%*
Inland aquatic habitats[9]							
Open Water	787	0.9%	135	-	10	1.3%	17.2%
Inland aquatic habitats subtotal	*787*	*0.9%*	*135*	-	*10*	*1.3%*	*17.2%*

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Other							
Developed	3,375	4.0%	154	2	81	1.5%	4.6%
Other subtotal	*3,375*	*4.0%*	*154*	*2*	*81*	*1.5%*	*4.6%*
TOTAL[10]	**84,602**	**100.0%**	**10,507**	**38**	**6,436**	**100.0%**	**12.4%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.41. Pondicherry CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Conifer Swamp/Spruce-fir Forest[5] - 6,056 acres		
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (Degraaf et al. 2001, Dunn et al. 1997, Morse 2004).	Cape May Warbler[A, J] Boreal Chickadee[A, J] Northern Parula[A] Purple Finch[A, J] Black-throated Green Warbler[A, J] **Spruce Grouse**[A, I] **American Marten**[I] Canada Lynx[I, J] Gray Jay[A, I, J] Black-backed Woodpecker [A, I, J] Bay-breasted Warbler[A, I, J] **White-throated Sparrow** **Blackpoll Warbler**[A, I] Brown Creeper[J] Northern Saw-whet Owl[J] Olive-sided Flycatcher[A, I, J] Palm Warbler[A,J] Pine Grosbeak[A, J] Sharp-shinned Hawk[J] Yellow-bellied Flycatcher[J]
Rusty Blackbird[A, C]	Breeding habitat includes conifer dominated forested wetlands interspersed with shrub swamps and peatlands. Young spruce and fir may be required for nesting (Greenland et al., 2010, Powell et al., 2010, and Matsuoka et al., 2010).	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft. within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Hardwood Forest[5] - 2,827 acres		
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	**Ruffed Grouse**[A, I] Whip-poor-will[A, I, J] Smooth Green Snake[I] Canada Lynx [I] **Chestnut-sided Warbler**[A,B] **Ovenbird**[A] **Eastern Red Bat**[I] Northern Parula[A] American Redstart[A, J] Black-and-white Warbler[J] Black-throated Green Warbler[A] Eastern Wood-pewee[A, J] Northern Flicker[A, J] Northern Goshawk[A, I, J] Little Brown Bat[I] Red-shouldered Hawk [J] Sharp-shinned Hawk[J] Yellow-bellied Sapsucker[A, J] Purple Finch[A,I] Veery[A]
Black-throated Blue Warbler[A]	Breeding habitat includes mature deciduous and mixed deciduous/conifer forests with a shrubby understory (DeGraaf et al. 2001, Hodgman et al. 2000, Dobbs 2007, Dunn et al. 1997)	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Shrub Swamp and Floodplain Forest[5] - 537 acres		
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands, and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	Chestnut-sided Warbler[A,B] American Redstart[A,J] Eastern Kingbird[J] Gray Catbird[J] Wood Duck[A,J] **Warbling Vireo** **Willow Flycatcher** Canada Goose[A] Northern Leopard Frog[I] Smooth Green Snake[I] Veery[A] Ruffed Grouse[A,I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 66 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**American Bittern**[A] **Marsh Wren** Virginia Rail Northern Harrier[A,I,J] Common Moorhen[I] Canada Goose[A] Wood Duck[A] Hooded Merganser[J] Green-winged Teal[J] Mallard[J] Common Loon[A,I]
Pasture/Hay/Grassland[5] – 49 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[J] Northern Harrier[A,I,J] Chestnut-sided Warbler[A,B] **Bobolink**[A] **Grasshopper Sparrow**[I] **Eastern Meadowlark**[I]
Peatland[5] – 667 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Olive-sided Flycatcher[A, I, J] **Mink Frog**[I] **Palm Warbler**[A] Black-backed Woodpecker[A, I, J] Northern Harrier[A, I, J] Eastern Kingbird[J]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 136 acres		
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Northern Redbelly Dace[I] **Slimy Sculpin**[I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Canada Goose[A] Wood Duck[A] Hooded Merganser[J] Green-winged Teal[J] Mallard[J] **Common Merganser** **Ring-necked Duck** **Common Loon**[A,I]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 New Hampshire Wildlife Action Plan (Species of Greatest Concern)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Pondicherry CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including black-throated blue warbler, American woodcock, blackburnian warbler and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
This large, contiguous block of matrix forest has been identified as a conservation priority by a host of partners including the State of New Hampshire's Wildlife Action Plan, the Nature Conservancy's Lower New England-Northern Piedmont Ecoregional Plan, and Audubon has designated Pondicherry as an Important Bird Area.

In 1972, land within the basin was recognized as a National Natural Landmark (NNL) by the U.S. National Park Service. Its significance is that it is an exemplary example of an undisturbed boreal forest community that supports an unusually high diversity of birdlife and wetland communities. With additional acquisition of exemplary wetlands in the Pondicherry Division, we are proposing an expansion to this NNL designation. In chapter 4 under "General Refuge Management Direction," we describe our proposal and include a map of the existing NNL and its expansion.

In 2003, the Pondicherry Division was designated as the state's first Important Bird Area--an international program which uses scientific criteria to identify habitat important to birds. Its complex ecosystem of bogs, ponds, streams, and wetlands surrounded by spruce and fir boreal forests supports approximately 238 species of birds, of which 129 species have been confirmed as breeding. Following its designation as an important bird area, the Division was expanded by 3,010 acres purchased from Hancock Timber Resource Group.

We envision healthy forests within the Pondicherry CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of New Hampshire's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011). Pondicherry CFA's hardwood forests have long been recognized as being among the most diverse and productive for wildlife, and abundant, high-quality habitat is most certainly available within the CFA. To date, our review of Pondicherry's habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, a coarse-scale habitat inventory, and an understanding of forest disturbance and land-use history within the CFA. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Pondicherry comes from a forest-based habitat inventory conducted in 2007 (USFWS, unpublished), and a reading of the recent forest history within the Pondicherry basin—a legacy of intensive past-use has altered the vegetation structure and composition, landscape patterns, and potentially ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective addresses the current hardwood forest condition of Pondicherry which are remarkably more homogeneous than those of three centuries earlier, and species compositions include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (USFWS, unpublished). Completing a finer-scale comprehensive forest and habitat inventory will aid in identifying stands where a forest management approach combining passive management and the application of

silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. Much of the hardwood forest within the Pondicherry CFA was harvested prior to refuge ownership using techniques that produced a structurally homogenous, young forest landscape. While our management goals may create a relatively old forest, hardwood forests within Pondicherry will contain a variety of patches in different age classes and developmental stages; it will not be uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, bald eagles, and—if wetlands and riparian areas are present—Canada warbler (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009).

The structural homogeneity of hardwood forests in Pondicherry has limited important habitat features for refuge priority resources of concern. Pondicherry's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape: canopy, midstory, understory, and ground layer. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0 to 5 feet in height) are of particular importance. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like black-throated blue warbler and blackburnian warbler. Black-throated blue warbler nest and feed within the shrub layer level; a sub-canopy layer of shrubs, moist soils, and leaf litter are important habitat features (Rosenberg et al. 1999). And blackburnian warbler has significance as a NALCC representative species for hardwood forests in the NALCC northern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who are thought to be strongly associated with the mixed-wood forests within Pondicherry.

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Closed canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and northern goshawk.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are largely absent or are very few in the younger forests that characterize Pondicherry, and that has implications for wildlife habitats and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that, when near open bodies of water, are utilized by bald eagles. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that use large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Cavity trees may also be used by little brown bats and northern long-eared bats as roosting sites. Female little brown bats raise pups in large maternity colonies within buildings or cavity trees often near wetlands or open water. Northern long-eared bats will also use cavity trees for maternity roosting sites, as well as live, dead or dying trees with crevices, cavities, cracks or exfoliating bark, while tricolored bats tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Continue to manage invasive plant species.
- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Identify forest stands where soils and species composition will support woodcock management
- Work with partners, including the State of New Hampshire, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Retain cavity trees within the vicinity of open water and wetlands to provide maternity sites for little brown bats. Protect bat maternity roosts, if present.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Map natural communities; protect rare or exemplary examples.
- Conduct forest inventories.
- Continue to survey wildlife use including breeding landbirds and bat inventories.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Conifer Swamp/Spruce-fir)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve landscape connectivity of spruce-fir habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including blackburnian warbler, rusty blackbird, and Canada warbler.

Rationale:
The spruce-fir forests of Pondicherry have long been recognized for their diverse mix of habitats centered on lowland spruce-fir forests and associated wetlands. Conservation plans including the State of New Hampshire's Wildlife Action Plan and the Nature Conservancy's Lower New England-Northern Piedmont Ecoregional Plan have targeted Pondicherry. In 2003, the Pondicherry Division was designated as the state's first Important Bird Area—an international program which uses scientific criteria to identify habitat important to birds. The CFA supports a complex ecosystem of bogs, ponds, streams and wetlands surrounded by spruce and fir boreal forests supports approximately 238 species of birds, of which 129 species have been confirmed as breeding. We envision healthy spruce-fir forests within the Pondicherry CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of New Hampshire's wildlife.

Our long-term vision for the CFA includes spruce-fir mosaic forests characterized by complex horizontal and vertical structure, a generally closed canopy, larger-diameter trees, dead woody material, snags and cavity trees, native species diversity, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011). Historically, this habitat type was a mosaic of lowland spruce-fir forest and red spruce swamp communities that occur on mineral soils. In the Pondicherry CFA, these communities intergrade in complex ways on the ground, with various expressions ranging from red spruce swamps with either an abrupt transition to a narrow spruce—fir forest border or direct transition to hardwood forest. Lowland spruce—fir forests generally have a well-developed conifer canopy, a sparse tall shrub understory, sparse to moderate cover of ferns and dwarf shrubs, and moderate to high cover of bryophytes.

To date, our review of Pondicherry's habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, a coarse-scale habitat inventory, and an understanding of forest disturbance and land-use history within the CFA. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Pondicherry comes from a forest-based habitat inventory conducted in 2007 (USFWS, unpublished), and a reading of the recent forest history within the Pondicherry basin—a legacy of intensive past-use has altered the vegetation structure and composition, landscape patterns, and potentially ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, 2002, Bellemare et al. 2002). In this habitat, heavy disturbance prior to refuge ownership resulted in hardwood-softwood mixtures with a predominance of balsam fir and a paucity of red spruce. Our sub-objective addresses the current spruce-fir forest condition of Pondicherry: remarkably more structurally homogeneous than those of three centuries earlier, with a preponderance of young forest with low species diversity (USFWS, unpublished). Completing a finer-scale comprehensive forest and habitat inventory will aid in identifying stands where a forest management approach combining passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. Much of the spruce-fir forest within the Pondicherry CFA was harvested prior to refuge ownership using techniques that produced a structurally homogenous, young forest landscape. While our management goals may create a relatively old forest, spruce-fir forests within Pondicherry will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like rusty blackbird, are declining as remaining patches of young forest mature (Matsuoka et al. 2010, Powell et al. 2010) (R. Cliche personal communication). Across the CFA, enhanced horizontal structure should support other species of conservation concern like bobcat, spruce grouse, and—if wetlands and riparian areas are present—Canada warbler (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009).

The structural homogeneity of spruce-fir forests in Pondicherry has limited important habitat features for refuge priority resources of concern. Pondicherry's spruce-fir forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape: canopy, midstory, understory, and ground layer. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance. These habitat elements may have importance to declining forest species identified in regional conservation plans like rusty blackbird and blackburnian warbler. Rusty blackbirds are thought to use younger softwood along riparian areas and open wetlands within spruce-fir forested wetlands in the CFA. Disturbances such as beaver activity and windthrow create forest openings allowing softwood regeneration and potential rusty blackbird habitat (Avery 1995). Blackburnian warbler has significance as a NALCC representative species for hardwood forests in the NALCC northern sub-region. Blackburnian warblers use mature conifer forests of spruce, fir, hemlock, and pines, and mixed wood habitats including deciduous stands with patches of conifer (Morse 1994, Dunn and Garrett 1997, DeGraaf and Yamasaki 2001). Improving vertical diversity of spruce-fir forests during management may provide an important habitat component for blackburnian warblers, who are canopy foragers who preferentially breed in forests with substantial cover taller than 60 feet (Morse 1976).

Canada warbler, a priority refuge resource of concern, occupies this habitat with high densities occurring in mixed forested swamps (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009).

Canada lynx, a federal listed species, will also benefit from our forest management. Canada lynx have been confirmed breeding in northeastern New Hampshire by NH Fish and Game Department, and lynx tracks have been detected near the Pondicherry CFA. Canada lynx require boreal forests that contain a mosaic of early successional and mature forests. Snowshoe hare is their primary food source, and hare density is considered the most important factor in explaining lynx distribution. It is generally believed that at least 0.2 hares per acre are required to support breeding populations of Canada lynx (Ruggiero et al. 1999). A mature forest with abundant coarse woody debris, such as downed trees and root wads are used by lynx for denning habitat. Snow conditions that are deep and fluffy for extended periods of time are thought to favor lynx, providing a competitive edge over bobcats, their principal competitor. Large contiguous tracts of boreal forests with these habitat conditions will facilitate movement between areas of high snowshoe hare abundance within established home ranges.

Monitoring lynx use of habitats in the Pondicherry CFA is a priority, and coordination with New Hampshire Fish and Game Department will allow for a standardized approach. To ensure that Canada lynx persist in the state, it is important that efforts to conserve the species be developed at a landscape scale, since no single landowner is likely to support enough habitat for this species. Collaboration with key partners will be necessary, including adjacent landowners, New England Field Office, the New Hampshire Fish and Game Department and Vermont Fish and Wildlife Department, to develop a lynx conservation plan for northern New Hampshire and neighboring Vermont.

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like black-throated green warblers. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Closed canopy conditions favor a suite of wildlife species that include: spruce grouse, white-throated sparrow, American marten, denning Canada lynx, and white-tailed deer.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (20 inches or greater dbh) trees where appropriate. Such larger trees are largely absent or are very few in the younger forests that characterize Pondicherry, and that has implications for wildlife habitats and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the sharp-shinned hawk. Emergent white pines—tall, large-diameter trees that extend above the canopy—provide special habitats that, when near open bodies of water, are utilized by bald eagles. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that use large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Cavity trees may also be used by little brown bats as roosting sites. Female little brown bats raise pups in large maternity colonies within buildings or cavity trees often near wetlands or open water. Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, northern saw-whet owls, and black-backed woodpecker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Continue to manage invasive plant species.

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Identify forest stands where soils and species composition will support woodcock management.
- Ensure this habitat type provides effective winter shelter for white-tailed deer, consistent with management of refuge resources of concern.
- Evaluate hydrologic regime to inform restoration efforts.
- Work with partners, including the State of New Hampshire, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.
- Work with partners and the USFWS New England Field Office to develop a lynx management plan for northern Vermont and New Hampshire, and evaluate the importance and role of habitats in the Pondicherry CFA to lynx populations in the southern boreal forest.

Within 10 years of CCP approval:

- Implement identified active forest management opportunities by using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Where appropriate, emulate the natural disturbance regime inherent to the forest types within this broad habitat type and work within the confines of seral pathways dictated by soil, climate, and hydrology.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Promote stands dominated by early seral stages where appropriate to support nesting Canada warbler and rusty blackbirds.
- Promote stands dominated by late seral stages in the CFA interior to support blackburnian warbler.
- Retain cavity trees within the vicinity of open water and wetlands to provide maternity sites for little brown bats. Protect current bat maternity roosts, if present.

Inventory and Monitoring Strategies:

Within 5 years of CCP approval:

- Conduct forest inventories.
- Continue to survey wildlife use including breeding landbirds and bat inventories
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.
- Monitor Canada lynx populations.

Sub-objective 1.1d. (Shrub Swamps and Floodplain Forest)

Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide breeding and foraging habitat for priority refuge resources of concern including American woodcock, American black duck and various species of bats.

Rationale:

Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008).

These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock, little brown bat and American black duck, priority refuge resources of concern.

American woodcock are dependent on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

Management of the shrub swamp communities may be required to maintain shrub dominance and stem densities. Tree species, such as red maple, tend to replace mature shrub species and established invasive plants compete for nutrients and space. These invading species require management in order to maintain the native shrub diversity of the community. A high shrub stem density is also important as it provides birds with cover from predators and more leaf surface area for gleaning. Cover for American woodcock, for example, is ideal in a 10-15 year old shrub swamp (USDA 2001). Shrub species, in particular alder, tend to die back as they reach maturity, and as a result stem density decreases. Periodic rejuvenation of shrubs is necessary to maintain required stem densities. Management priority will be given to shrub swamps that are part of a woodcock management area. Management of these shrub swamps will benefit other species that use these communities, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation, and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests near foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14.

Various bat species including little brown bats and big brown bat forage for insects over CFA wetland and open water habitat where insect populations are abundant. Bats use echolocation for navigation and to locate prey. Rivers and streams in the CFA are used as travel corridors between suitable habitats. Little brown bats use buildings or tree cavities for summer roost sites, often near open water. Females will roost in large maternity colonies to raise young. Pondicherry CFA is an important feeding area for these bats, which have experienced drastic population declines due to the effects of the fungal disease known as white-nose syndrome.

Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of refuge priority resources, and other species that use CFA wetlands.

Management Strategies:
Within 5 years of CCP approval:

- Create and maintain alder in suitable density and age class to provide quality foraging habitat for American woodcock.
- Manage non-native plant species.
- Map natural communities and protect rare or exemplary examples.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Assess hydrology of wetland communities, evaluate impacts, and prioritize restoration opportunities.
- Monitor American black duck productivity, and use of shrub wetlands.

- Continue to inventory bat populations throughout the CFA to better understand species presence and locate areas with concentrated detections. Investigate areas with high bat activity to determine if maternity roosts are present. Manage and protect maternity roosts if present.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh and Peatlands)
Manage freshwater marsh and peatland communities to support natural and rare ecological communities, and provide breeding and foraging habitat for priority refuge resources of concern including American black duck, and undisturbed staging areas for migrating waterfowl.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams. The substrate in peatland communities is dominated by sphagnum moss, and the vegetation can be semi-treed or dominated by low shrubs, such as sheep laurel and Labrador tea. Sedges and grasses are common in the understory (Gawler 2008).

Freshwater marshes and peatlands are scattered throughout the CFA, but are concentrated along the perimeter of Cherry and Little Cherry ponds. This wetland complex, adjacent to open water habitat, provides important breeding and foraging habitat for American black duck, and other waterfowl species such as ring-necked duck, wood duck, hooded mergansers, and green-winged teal. Cherry Pond is also a key common loon territory in the state, fledging an average of one chick per year per pair. Cherry Pond and Little Cherry Pond are also staging areas for migrating waterfowl, including scaup, bufflehead, gadwall, scoters, and goldeneye.

These marsh habitats are also important for other species including American bittern, northern harrier, marsh wren, swamp sparrow, and Virginia rail. Moorhen Marsh and Hazens Pond marsh has had one of the highest densities of marsh wrens found in northern New Hampshire. Conservation efforts will focus on maintaining native herbaceous vegetation, natural hydrological regimes, and minimizing disturbances to waterfowl during the breeding and migration periods.

Management Strategies:
Within 5 years of CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Investigate the need for beaver baffles in areas where high water levels are impacting marsh vegetation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Map natural communities; protect rare or exemplary examples.
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Continue to survey wildlife use of wetlands.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat for grassland birds and pollinators, if present and appropriate.

Rationale:
Less than one percent of the Pondicherry CFA is typed as pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and

grasshopper sparrow. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow. American woodcock, a refuge priority resource of concern, will use both habitat conditions when managed in conjunction with their other habitat needs.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Shrubland and grassland habitats will also be used by American woodcock, which require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Small clearings with minimal vegetation is required for courtship areas, and shrublands with clumps of tall vegetation or sparse shrubs will provide roosting habitat.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, and grassland acres can provide quality habitat, for these species, and American woodcock, if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct an inventory of pasture, hay, and grassland habitats to determine their condition, size and location, and incorporate them into the management strategies for American woodcock in the HMP.

- Conduct further investigation on the pasture, hay and grassland habitats that will not be managed for woodcock to determine their importance to other wildlife and contribution to habitat diversity in the landscape.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and uninterrupted aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout. Also provide undisturbed areas for breeding and migrating waterfowl.

Rationale:
Open water habitats in the Pondicherry CFA are limited to Cherry Pond, Little Cherry Pond, Mud Pond, Moorhen Marsh, Cedar Marsh, the John's River and its tributaries, and Stanley Brook. These habitats support several fish species one of which, the Eastern brook trout, has been identified as a conservation priority for the Service's Northeast Region. Brook trout are found in cold headwater rivers and streams. They are sensitive to extreme temperature fluctuations, and require water temperatures between 40 to 70 degrees Fahrenheit for

spawning, growth, and survival. Wild brook trout have been documented within the CFA, and many streams, including Carroll Stream, are suitable to be managed as a self-sustaining wild brook trout population. Other species documented from Pondicherry include chain pickerel and several perch species from Cherry Pond, and state species of concern including burbot (cusk), northern redbelly dace, slimy sculpin, and tessellated darter from riverine habitats.

Cherry and Little Cherry ponds, and associated wetlands provide important breeding and foraging habitat for American black duck, and other waterfowl species such as ring-necked duck, wood duck, hooded mergansers, and green-winged teal. Cherry Pond is also one of the State's key common loon territories, fledging an average of one chick per year per pair. Cherry Pond and Little Cherry Pond are also staging areas for migrating waterfowl, including scaup, bufflehead, gadwall, scoters, and goldeneye. Conservation efforts will focus on minimizing disturbances during the breeding and migration periods.

Management of water resources in the Pondicherry CFA will provide unimpeded aquatic species passage to spawning and wintering habitat, structurally diverse in-stream habitat, with boulders and downed woody debris providing riffles and pools, and shade trees along riparian edges. Due to our lack of knowledge regarding aquatic habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Baseline information on the condition of the water resources in the CFA at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct stream assessments to evaluate the physical, chemical, and biological condition of the Pondicherry Division's fish community structure, productivity, and health.
- Conduct stream assessments to identify man-made physical barriers (e.g., impassable road crossings, culverts, and dams) to the movement of fish and other aquatic organisms.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
In coordination with our Friends group, act as a resource to communities, school systems, public and non-profit organizations, and private educational organizations in northeastern Vermont and northern New Hampshire, who want to use the Pondicherry Division as an outdoor environmental education classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed. Because the Pondicherry Division does not have a facility or full time staff, environmental education efforts will generally be conducted through volunteers, Friends members, and partners.

Management Strategies:
Continue to:
- Make the division available as an outdoor environmental classroom to schools and organizations.

Within 5 years of CCP approval:
- Promote the Pondicherry Division as a destination for field trips and increase the number of students by two percent per year for the next 5 years.
- Encourage and support Friends group to work with local schools to develop experiential learning programs focusing on Northern hardwood and spruce-fir forests, wetlands, and migratory birds that contribute to NH curriculum standards.
- Encourage and support the Friends group to develop an educational partnership with the White Mountain Regional School District, the White Mountain School, and other local schools to use the division as an outdoor classroom emphasizing the ecology of Northern hardwood and spruce-fir forests, wetlands, and migratory birds.
- Make environmental education training conducted in other parts of the refuge available to volunteers and Friends group members.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Develop an evaluation system to assess the effectiveness of all environmental education programs.

Sub-objective 2.1b. (Environmental Education Delivery)
Promote other government agencies, non-profit organizations, private educational organizations, staff, volunteers, and members of the Friends of Pondicherry to offer high quality environmental education programs at the Pondicherry Division.

Rationale:
See the rationale for sub-objective 2.1a.

Management Strategies:
Within 5 years of CCP approval:
- Use volunteers and members of Friends group to facilitate teachers and students at the Pondicherry Division.
- Work with local environmental education providers to implement the refuge's Adopt-a-Habitat initiative to help schools and individuals learn about and connect with natural features their local environments.
- Work with Friends of Conte Recreation and Education sub-committee to support and recruit partners that seek funding for watershed-based environmental education.
- Work with Friends to develop and provide educational programs on how to detect and report invasive species, such as invasive plants, pathogens, insect pests, fish, and other animals.

- Encourage partners to develop an evaluation system to measure the effectiveness of environmental education programs.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
Encourage and support Friends group to work with communities, public and non-profit organizations, staff, and volunteers to offer quality interpretive programming at the Pondicherry Division. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail on site, the Pondicherry Division is well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the habitats and cultural resources found on the Pondicherry property.

Management Strategies:
Within 5 years of CCP approval:

- Work with Friends group to employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.
- Collaborate with Friends group and volunteers to create meaningful, consistent, thematic statements to be used in the delivery of programming at the Pondicherry Division.
- Develop more detailed interpretive objectives and strategies as part of a Visitor Services Plan.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval:

- Develop self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members and the general public, with priority given to refuge affiliates.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Through Friends group, annually provide quality interpretive programs, exhibits, printed media at the Pondicherry Division.

- Initiate a "refuge host" program, or utilize SCA interns and volunteers to provide personal contacts at the refuge to initiate discussion and answer questions, at least between Memorial Day and Labor Day.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of CCP approval

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Pondicherry Division is unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Pondicherry Division is unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation. Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following state regulations, except as noted under Strategies below. The area around Cherry Pond, Little Cherry Pond and the corridor between the two ponds on which the Service holds a management easement will remain closed to hunting complying with the wishes of the landowner and avoiding conflicts in an area popular with hikers, bird watchers, photographers, etc.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. Pondicherry has been a popular area with hunters, particularly for ruffed grouse, snowshoe hare, and white-tailed deer for many years prior to acquisition by the Service. The division is currently open to hunting except for Cherry and Little Cherry ponds, lands connecting the ponds, and the lands immediately adjacent to the ponds. This area has been closed to hunting since the early 1960s when the original preserve was established by the State of New Hampshire and New Hampshire Audubon. The State has jurisdiction over both large ponds because they are Great Ponds (i.e., water bodies at least 10 acres in size that are held by the State in trust for the people of New Hampshire), and New Hampshire Audubon owns the original preserve land in fee title, although the Service holds an easement on that land. Maintaining the hunting closure of this area retains a long-held tradition that is respected by both hunters and other refuge visitors.

Management Strategies:
Continue to:
- Allow hunting based on regulations which correspond to the State of New Hampshire regulations with the following exceptions:

  (a) The season for hunting snowshoe hare and coyotes with dogs is from October 1 to March 15.

  (b) Use of bait is prohibited.

  (c) Temporary blinds are permitted, but must have the name and address visible on the stand and the stand must be removed at the end of the hunting season.

- Ensure the area closed to hunting around Cherry and Little Cherry ponds and the corridor between them is evident via signage and delineation on hunt maps and in the hunt brochure.

Within 1 year of CCP approval:
- Complete all administrative requirements to maintain hunting consistent with State hunting regulations and the division-specific regulations mentioned above.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Allow hunters access to the refuge outside of the open hours (i.e., 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

Within 5 years of CCP approval
- Work with New Hampshire Fish and Game Department to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Work with New Hampshire Fish and Game Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide state-sponsored hunter education classes access to the division. Conduct direct outreach to ensure hunters are informed about refuge-specific regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, web pages, media releases, etc.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
Continue to:

- Work with New Hampshire Fish and Game Department to inform hunters of the field identification differences between ruffed grouse (i.e., partridge) and the protected spruce grouse via flyers at division kiosks, the refuge website, etc.

- The refuge is open to visitors from 30 minutes before sunrise to 30 minutes after sunset with the exception of hunters, snowmobilers, and those issued a Special Use Permit for a specific activity outside of normal open hours. Hunters may be on the refuge prior to and after these hours as long as they are engaged in lawful hunting activities.

Within 1 year of CCP approval:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Pondicherry Division kiosks, through the Friends of Pondicherry, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with New Hampshire Fish and Game Department to encourage youth hunting at the division as a means of introducing young people to hunting.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge Web site, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program; involve hunters and other users in collecting feedback; determine whether Refuge management objectives are being met; and allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Pondicherry Division. Complete all administrative procedures to officially open refuge lands to fishing, based on New Hampshire Fish and Game Department regulations, and any division-specific conditions.

Rationale:
Fishing is a priority public use on national wildlife refuges and a popular outdoor recreational activity. The Division has been open to fishing since establishment and we propose to continue to offer this use. Although fishing is not as popular as hunting or wildlife observation at Pondicherry, there still are opportunities for visitors to fish the John's River, Ayling Brook, Cherry and Little Cherry ponds.

Management Strategies:
Continue to:

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- The Pondicherry Division will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Maintain the Shoreline Trail along the western shore of Cherry Pond for bank fishing opportunities.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale: Although fishing opportunities are limited at Pondicherry, there are places to fish including Cherry Pond, John's River, and Ayling Brook. Other nearby areas, including the White Mountain National Forest or the Connecticut River, provide higher quality fishing opportunities.

Management Strategies:
Within 1 year of CCP approval:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Pondicherry Division for people of all physical abilities.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and the most popular recreational activity at Pondicherry. The division is well known for an abundance and variety of wildlife, particularly migratory birds during the nesting season and was recognized as the state's first Important Bird Area where 238 species have been recorded, and 129 of those are confirmed nesters. It also was named a National Natural Landmark by the National Park Service.

Management Strategies:
Continue to:

- Maintain the current visitor infrastructure including the Little Cherry Pond Trail, the Shoreline Trail along the western shore of Cherry Pond, the Colonel Whipple Trail (a segment of the Cohos Trail), the Mud Pond Trail, the Ramparts Trail (connects the Shoreline Trail to the Colonel Whipple Trail), the Slide Brook Trail, kiosks including the parking lot trailhead and kiosk, the kiosk at the Presidential Recreational Trail parking lot on Airport Road, and the observation decks at Cherry Pond, Little Cherry Pond, and Mud Pond.

- Allow wildlife observation and photography at the Pondicherry Division.

- Partner with the New Hampshire Bureau of Trails under the existing Memorandum of Understanding on maintenance of the Presidential Recreational Trail from Airport Road in Whitefield to Route 115A in Jefferson. This is the primary access used by visitors to enter the division.

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters, anglers, and snowmobilers. The refuge manager may issue a special use permit for public uses during the closed hours.

Within 5 years of CCP approval:
- Construct kiosks at the Colonel Whipple Trail entrance from the East off Whipple Road and at the junction of the Powerline Snowmobile Trail and the Presidential Recreational Trail, south of Waumbek Junction.

- Install wildlife interpretive signs on the Mud Pond and Little Cherry Pond trails.

- Determine whether there is sufficient demand for permanent wildlife viewing blinds strategically located off the trail network.

Within 10 years of CCP approval:
- Work with New Hampshire Department of Transportation to explore opportunities to increase parking, construct an observation platform, and install interpretive signs at the State Route 115 pull off that overlooks Cherry Pond.

- Construct a native surface, primitive trail that connects the Mud Pond Trail to the Little Cherry Pond Trail if sufficient demand exists and an environmentally acceptable route can be established. The NEPA compliance and compatibility determination were previously completed for a tentative location (see map A.72).

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people that visit the division. Work closely with the Friends of Pondicherry and other partners who host events designed to view wildlife on the division.

Rationale:
The entire division is available for wildlife observation and photography; however, there are steps the refuge can take to enhance their time on the division. With such a large number of breeding birds, many of which can only be detected by their song, birding can be intimidating. Providing a variety of methods to help people recognize and appreciate Pondicherry wildlife will contribute to this objective.

Management Strategies:
Continue to:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a Special Use Permit.

- Support wildlife observation events led by the Friends of Pondicherry and other partners, including International Migratory Bird Day, Big Sit, etc.

Within 5 years of CCP approval:
- Work with the Friends of Pondicherry to produce a wildlife and plant species guide for Pondicherry that will be available on the refuge website and at division kiosks.

- Work with the Friends of Pondicherry to design a self-guided brochure based on the trail network that helps visitors view and learn about the variety of species inhabiting the division.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Pondicherry Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking and wildlife observation. One examples include the regional Cohos Trail. Where appropriate, we will work with these partners to promote, and distribute information about, this opportunity.

Management Strategies:
Continue to:

- Work with partners to maintain the Colonel Whipple Trail as a link in the regional Cohos Trail.

Within 5 years of acquiring new lands:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Pondicherry Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate, and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division. Each of these will be managed consistent with the final finding of appropriateness and compatibility determination. Bicycling and horseback riding are allowed on the State-owned Presidential Recreational Trail that intersects the division, however these uses are not being considered for the division because the current and proposed trail network is not designed for these uses.

Management Strategies:
Continue to:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Work with the New Hampshire Bureau of Trails and the local snowmobile club to provide a groomed snowmobile trail in both of the power line corridors that cross the Division.
- Meet at least annually with the local snowmobile club responsible for grooming and maintaining the snowmobile trails to review special use permit stipulations and conditions so long as this use continues to be compatible and consistent with applicable Services laws, policies, and guidelines.

- There are no closed hours for snowmobilers on the designated trails during the snowmobiling season.

- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.

Within 1 year of CCP approval:

- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.

- Allow commercial guiding and outfitting for appropriate and compatible uses under a special use permit for guides that charge a fee to customers.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking Pondicherry with other refuge divisions.

Within 10 years of CCP approval:

- Work with the Friends of Pondicherry and New Hampshire Fish and Game Department to determine whether there is sufficient demand for canoe and kayak access to Cherry Pond and the John's River. There is limited demand for this use at present, but if it increases beyond capacity (e.g., impacts pond or stream banks), consider hardening options to eliminate impacts.

Saddle Island Unit (Existing Refuge Unit)

Bath, New Hampshire

Total Unit Acres[1]	2

1 Actual acres

What are the priority habitat types within the unit? What percentage of the total unit acreage do they represent?

- Hardwood forest with open bedrock- 66%
- High-energy riverbank – 33%

For more information on the unit's location and habitats, see map A.74, map A.75, and table A.42.

What are the Federal trust and other natural resource values in the unit?

1. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) receives higher use by migrants, with use concentrated in habitats along the Connecticut River main stem (Smith College 2006). The hardwood forest on Saddle Island likely provides stopover habitat for landbirds.

2. **Other**
   The two acre Saddle Island is located in the Connecticut River, bordering the town of Bath, NH. This island has a unique physical environment due in part to its location in the Connecticut River, geological features, and size. The upper portion of the island contains a wooded bluff which transitions to steep banks of sparsely vegetated bedrock ledges. Ice scour regularly clears woody vegetation and soils from the ledges which has a significant impact on the terrain and vegetation. The soils that settle into fractures and pockets in the bedrock provide conditions for unique plant species and communities.

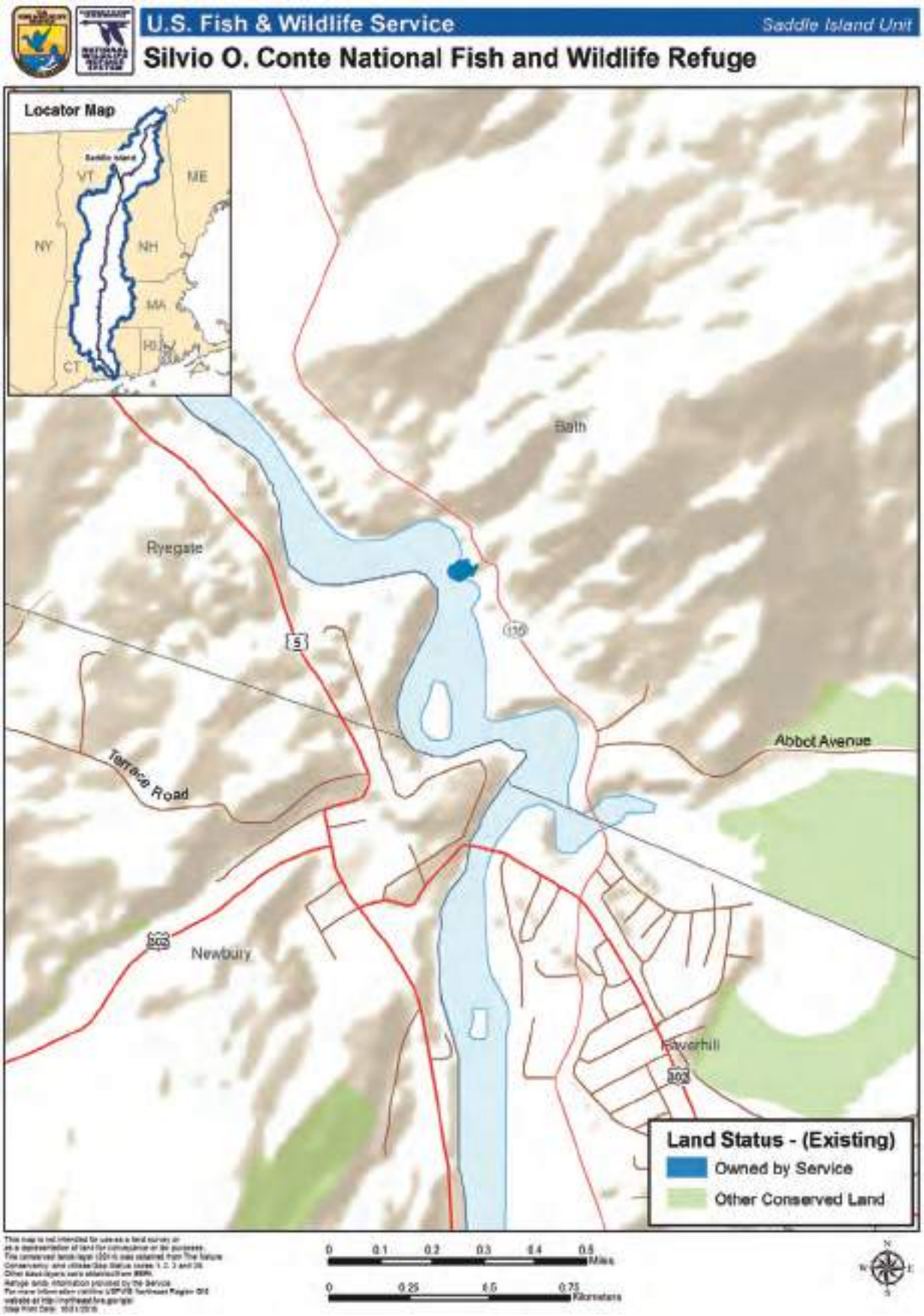
What habitat management activities will be a priority on the unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on managing invasive plants to maintain native diversity.

What public use opportunities will occur on the unit?

The unit is closed to the public to protect resources.

Map A.74. Saddle Island Unit – Location.



Map A.75. Saddle Island Unit – Habitat Types.

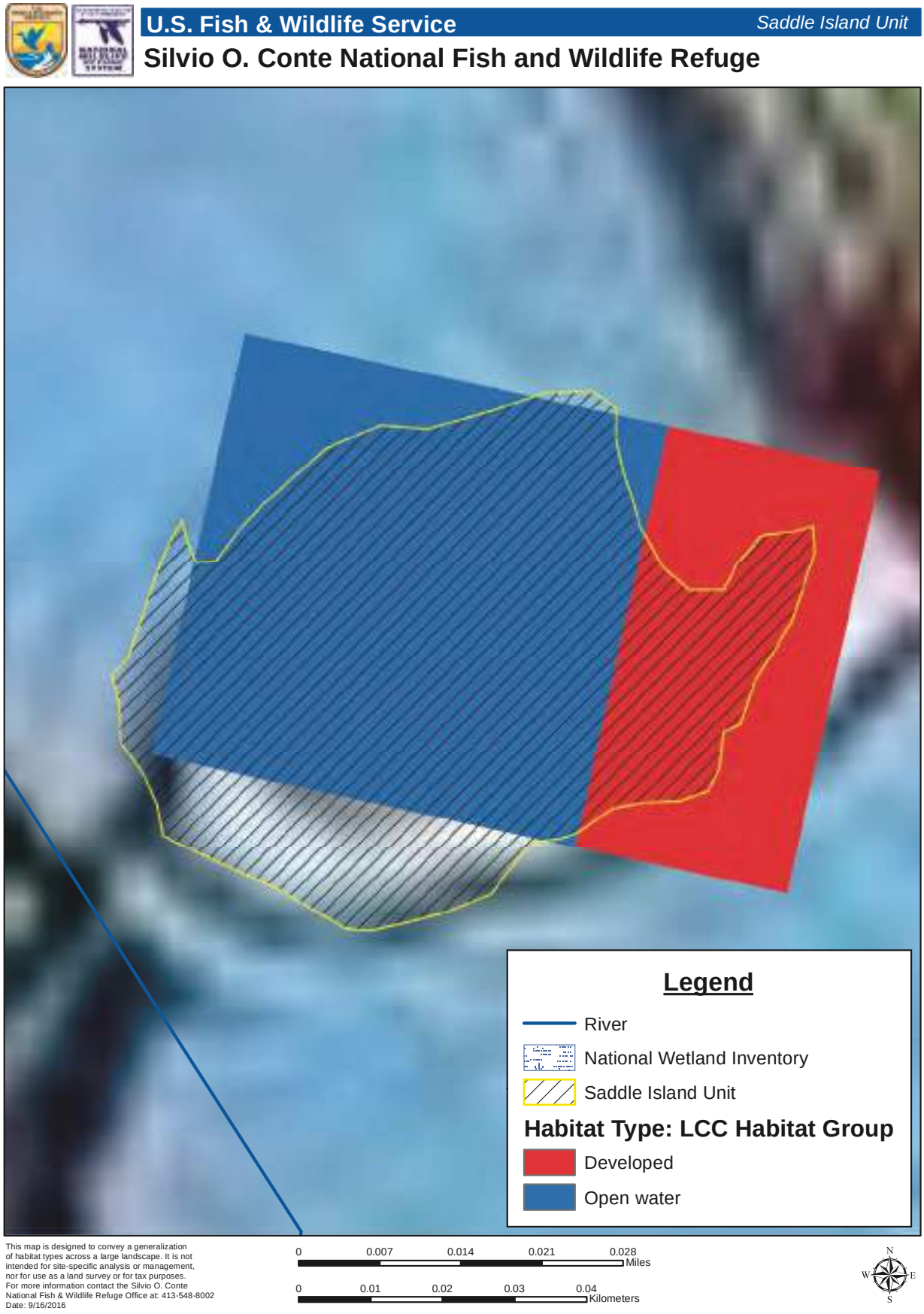


Table A.42. Saddle Island Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres[2]	Percent Unit
Forested Uplands and Wetlands		
Hardwood forest, open bedrock, riverbank	2	100.0%
TOTAL	**2**	**100.0%**

Notes:

2 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

3 All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Saddle Island Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
The Saddle Island Unit's small size and isolation from other refuge units, has led us to group our objectives and discussion under a single sub-objective that addresses the unit's contribution to the biological integrity, biological diversity, and environmental health of the wider Connecticut River watershed. While achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management, the Service also has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3), also known as BIDEH. This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes or allow them to occur when practicable. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines unit management that will benefit many species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Downed logs in a forest, a vernal pool, and a rocky outcrop in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a dead and downed logs, a vernal pool, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Saddle Island Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats, by virtue of the unit being an island, represent small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and provide additional structural and species diversity to the matrix. The island's wooded bluff and steep sparsely vegetated bedrock ledges, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna, such as uncommon herbaceous plants that thrive on frequently disturbed sites. One could make the case that these habitats are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually, and more targeted strategies for those rare, threatened, or endangered species that occur on the island. Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Manage invasive species that impact the native plants and communities that utilize microhabitats of the bedrock ledges, as well as those present within the islands forested bluff.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with partners, including the NH Wildflower Society, NH Fish and Game Natural Heritage Inventory and VT Fish and Wildlife Natural Heritage Inventory to monitor and maintain the Island's rare native plant and natural communities.
- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Saddle Island Unit will be unstaffed and no access is allowed, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Saddle Island Unit will be unstaffed and no access is allowed, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.2: Fishing

The Saddle Island unit is closed to public access.

Objective 3.3: Wildlife Observation and Photography

The Saddle Island unit is closed to public access.

Sprague Brook Conservation Focus Area

Richmond, New Hampshire

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	3,016	91%
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*3,016*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	290	9%
Total Acres in CFA[2, 4]	3,306	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Sprague Brook CPA (map A.76) encompasses the Sprague Brook CFA (map A.77) which contains a large wetland complex and is a high priority area for many groups, including The Nature Conservancy and local conservation groups. Service land conservation in this CFA will contribute to the larger Quabbin to Cardigan partnership, which is a collaborative, landscape-scale effort to conserve the Monadnock Highlands between two large protected areas: the Quabbin Reservoir in Massachusetts and Mount Cardigan in the White Mountain National Forest in New Hampshire. In addition, nearly all of the Sprague Brook CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 89.5%
- Shrub swamp and Floodplain Forest – 1.4%
- Freshwater Marsh – 2.2%

For more information on habitats in the CFA, see map A.78 and table A.43.

What are the resources of conservation concern for the CFA?

As noted in table A.44 below, there are nine Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species that rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to State Species of Greatest Conservation Need (SGCN) including wetland dependent species and forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

   The northeastern bulrush occurs within various wetlands in the CFA. This species has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Sprague Brook CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat for landbirds and waterbirds as well.

   The New Hampshire Chapter of The Nature Conservancy (TNC) identified Sprague Brook as one of 13 high priority habitat areas in the Ashuelot River Watershed. These areas were identified due to their ecological diversity and unfragmented landscape (Zankel 2004). Due to this designated priority, TNC initiated the collection of baseline bird and habitat data within the Sprague Brook area. A total of 63 species were recorded including high priority conservation concern forest interior species and wetland dependent species.

   Conservation of concern forest interior species observed in the Sprague Brook area include red-shouldered hawk, wood thrush, blackburnian warbler, black-throated blue warbler, ovenbird, and veery (Roth et al. 1996, Rosenberg et al. 2003) (Littleton et al. 2005). Wood thrush and blackburnian warbler are PRRC species that rely on the mature forests in the CFA. American woodcock, another PRRC species, was also recorded.

   The large wetland complex within the Sprague Brook CFA may provide suitable habitat for multiple pairs of herons, rails, and bitterns during the breeding season. Detected species include State Species of Greatest Conservation Need such as American bittern, great blue heron, and Virginia rail (Littleton et al. 2005).

   Other high priority species of conservation concern that may occur in the Sprague Brook CFA include Canada warbler, a PRRC species, cerulean warbler, Cooper's hawk, Northern goshawk, least bittern, Louisiana waterthrush, and whip-poor-will (Littleton et al. 2005).

3. **Waterfowl**
   Mallards, Canada geese, and wood ducks were detected using the large wetland complex in the Sprague Brook CFA. American black duck, a PRRC species, was not observed during a 2005 breeding bird survey, however, there is a high probability that this species may be present (Littleton et al. 2005).

4. **Diadromous fish**
   The streams and brooks within the Sprague Brook CFA provide high quality, intact aquatic habitat. Roaring Brook, and its Sprague Brook tributary, are free-flowing, with no dams, from their headwaters to the confluence with the Ashuelot River. These pristine brooks provide cold water habitat for PRRC species including Atlantic salmon and native Eastern brook trout. The intact forested landscape within the Sprague Brook CFA provides forested buffers along the streams and wetlands that help to maintain cool water temperatures.

5. **Wetlands**
   The large wetland complexes in the Sprague Brook CFA are influenced by Sprague Brook and its tributaries. The majority of these wetland systems can be characterized as a fen (Littleton et al. 2005), and contain a mosaic of conifer swamp, shrub-swamp, and floodplain forest, and freshwater marsh. The 150-acre wetland complex along the main stem, and 50-acre complex located along a tributary provides important habitat for a diversity of wetland dependent species.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse (different size classes) and native species will dominate. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- We will also manage wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.
- In open water (stream, rivers, and ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse in-stream habitat, and clear aquatic species passage to spawning and wintering habitat.

What public use opportunities will be a priority on refuge lands within the CFA?

We will focus on providing opportunities for the six priority, wildlife-dependent recreational uses: hunting, fishing, wildlife observation and photography, environmental education, and interpretation.

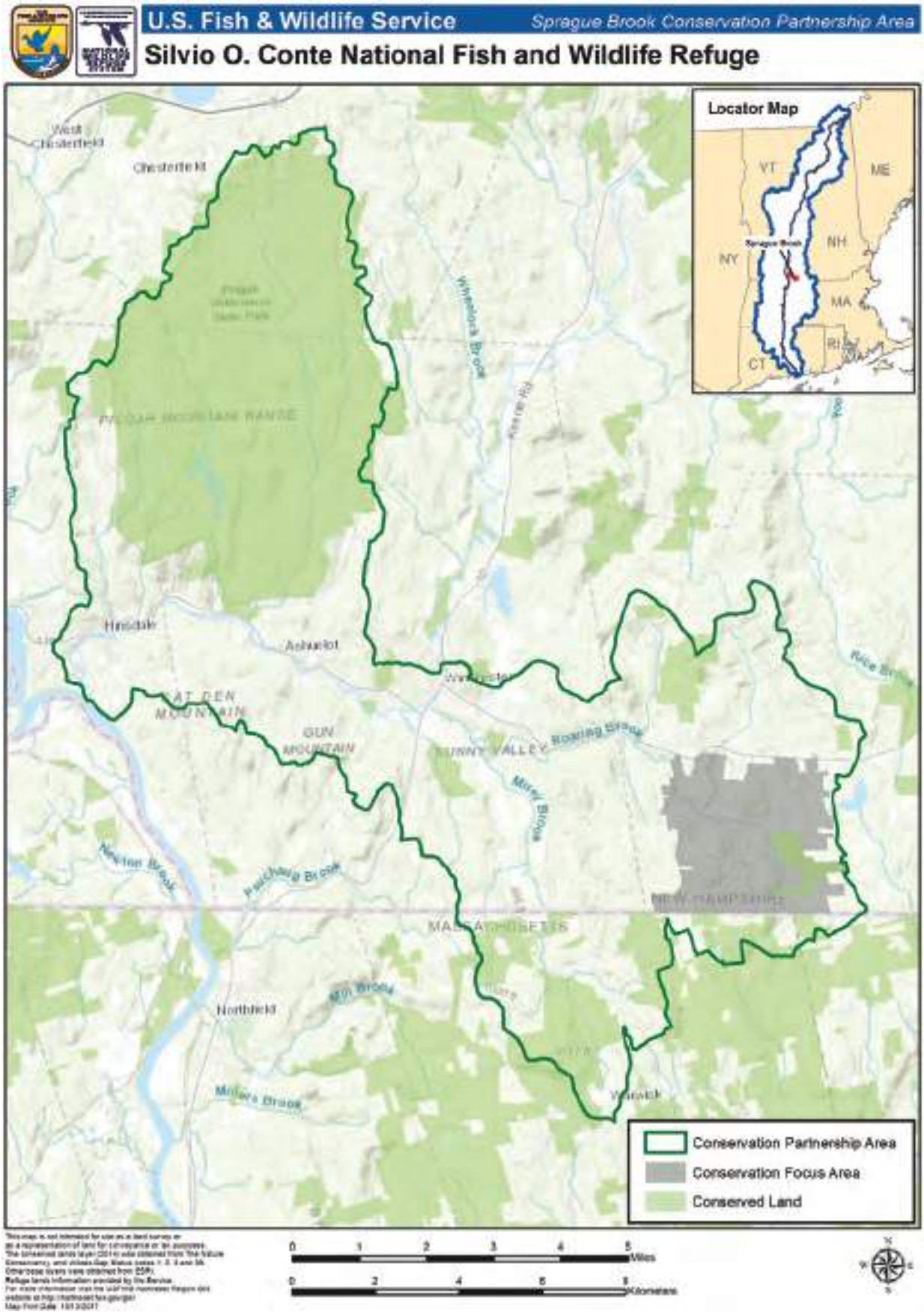
Were there other special considerations in delineating the CFA boundary?

Sprague Brook has been identified as a Quabbin to Cardigan Collaborative Conservation Focus Area. These focus areas have high ecological diversity and provide habitat connectivity between the Quabbin Reservoir in Massachusetts and Cardigan Mountain in New Hampshire. They were developed through a multi-agency and organizational partnership involving over 20 agencies and organizations from Massachusetts and New Hampshire.

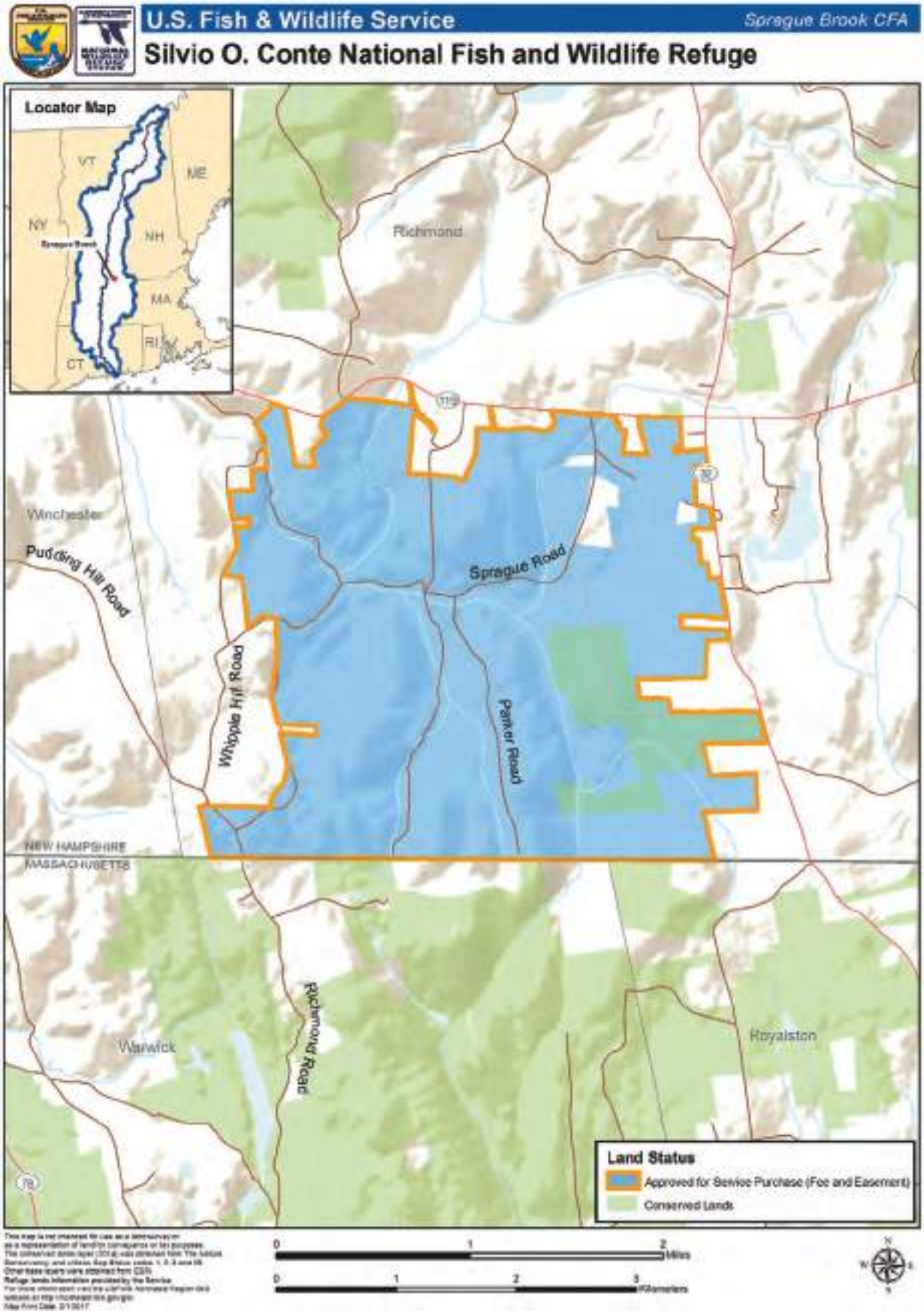
Sprague Brook was also identified by The New Hampshire Chapter of The Nature Conservancy (TNC) as one of 13 high priority habitat areas in the Ashuelot Watershed due to its ecological diversity and unfragmented landscape.

The native brook trout fishery, within the Sprague Brook CFA, has been designated as a Wild Trout Water, an area managed by New Hampshire Fish and Game Department to provide wild trout fishing experience.

Map A.76. Sprague Brook CPA.



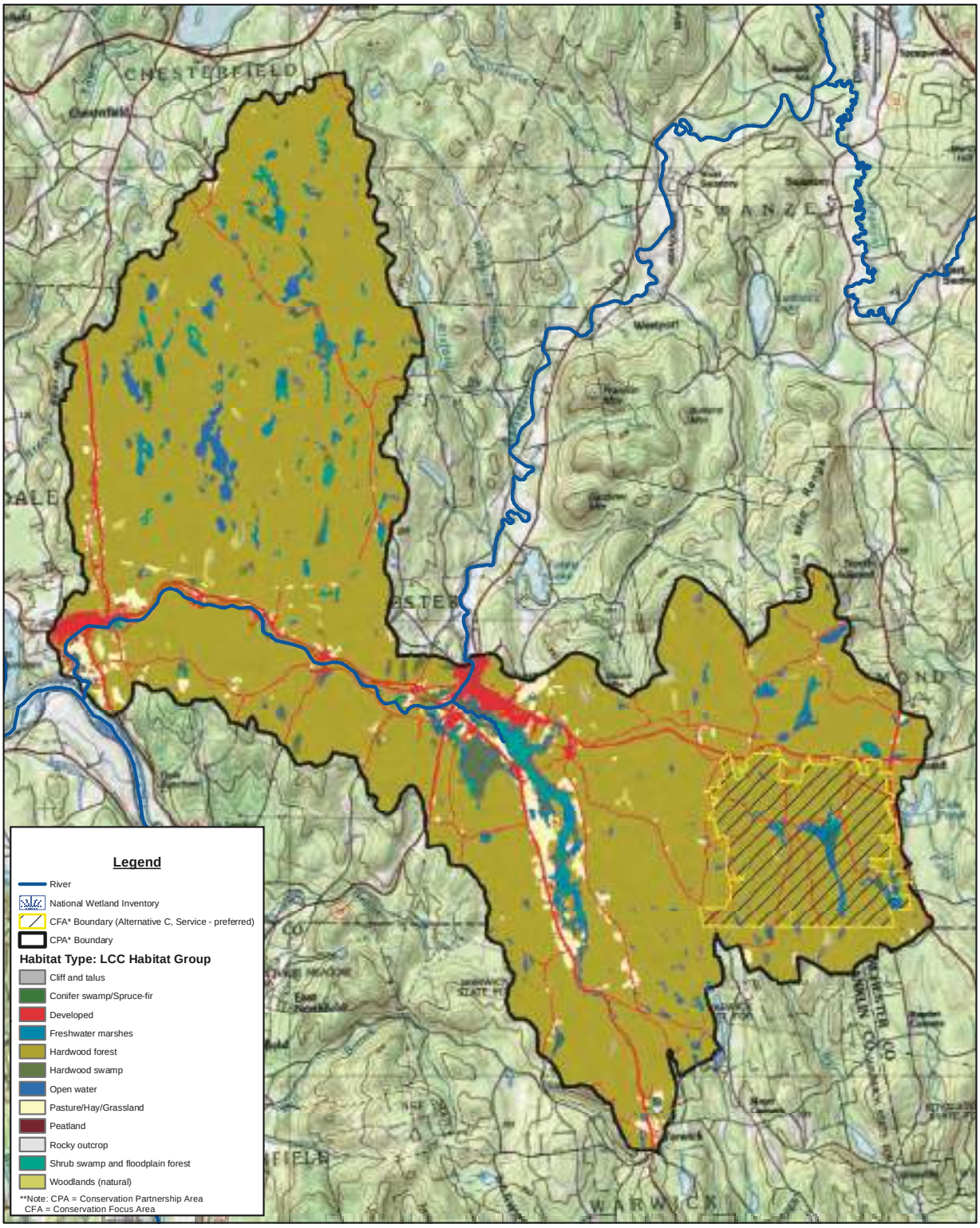
Map A.77. Sprague Brook CFA – Location.



Map A.78. Sprague Brook CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *Sprague Brook CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes.
For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 1 2 3 4 Miles

0 1.5 3 4.5 6 Kilometers

N W E S

Table A.43. Sprague Brook CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	250	0.6%	62	33	-	1.9%	25.0%
Hardwood forest	36,424	85.1%	2,993	227	-	89.6%	8.2%
Hardwood swamp	847	2.0%	2	-	-	0.0%	0.2%
Shrub swamp and floodplain forest	706	1.7%	45	5	-	1.4%	6.4%
Woodlands (natural)	220	0.5%	11	-	-	0.3%	4.9%
Forested uplands and wetlands subtotal	*38,447*	*89.9%*	*3,113*	*264*	-	*93.1%*	*8.1%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	56	0.1%	-	-	-	0.0%	0.0%
Freshwater marshes	438	1.0%	73	7	-	2.2%	16.7%
Pasture/hay/grassland	1,224	2.9%	5	-	-	0.1%	0.4%
Peatland	2	0.0%	-	-	-	0.0%	0.0%
Rocky outcrop	16	0.0%	-	-	-	0.0%	0.0%
Non-forested uplands and wetlands subtotal	*1,737*	*4.1%*	*78*	*7*	-	*2.3%*	*4.5%*
Inland aquatic habitats[9]							
Open Water	467	1.1%	7	-	-	0.2%	1.5%
Inland aquatic habitats subtotal	*467*	*1.1%*	*7*	-	-	*0.2%*	*1.5%*

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Other							
Developed	2,125	5.0%	144	16	-	4.3%	6.8%
Other subtotal	*2,125*	*5.0%*	*144*	*16*	-	*4.3%*	*6.8%*
TOTAL	**42,776**	**100.0%**	**3,342**	**287**	**-**	**100.0%**	**7.8%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.52 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.44. Sprague Brook CFA – Priority Refuge Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 2,991 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Red-shouldered Hawk[I,J] Jefferson Salamander[I,J] Veery[A] Bobcat[I] **Ovenbird**[A] Black-throated Blue Warbler[A] Black-throated Green Warbler[A] Eastern Wood Pewee[A,J] Northern Flicker[A,J] Yellow-bellied Sapsucker[A, J] Rose-breasted Grosbeak[A] **Chestnut-sided Warbler**[A,B] **Eastern Red Bat**[I] **Louisiana Waterthrush** Little Brown Bat[I] American Redstart[A,J] Baltimore Oriole[J] Black-and-white Warbler[J] Black-billed Cuckoo[A,J] Broad-winged hawk[I,J] Whip-poor-will[A,I,J] Great-crested Flycatcher[J] Northern Goshawk[A,I,J] Purple Finch[A,I] Ruffed Grouse[A] Black Racer[I]
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Conifer Swamp[5] - 63 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	Rose-breasted Grosbeak[A] Purple Finch[A,I] Veery[A] Wood Duck[A] Northern Parula[A]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Hardwood Swamp[5] - 2 acres		
North-Central Appalachian acidic swamp[H] North Central Interior and Appalachian rich swamp[H]	*North-Central Appalachian acidic swamps* are found in basins or on gently sloping seepage lowlands. Eastern hemlock is usually present and may be dominant. It is often mixed with deciduous wetland trees such as red maple or black tupelo. Species of the genus Sphagnum are an important component of the moss layer. *North Central Interior and Appalachian rich swamps* are found in basins where higher pH and/or nutrient levels are associated with a rich flora. Species include red maple, black ash, as well as calcium loving herbs. Conifers include American larch, but typically not northern white cedar, which is characteristic of more northern wetland systems. There may be shrubby or herbaceous openings within the primarily wooded cover. The substrate is primarily mineral soil, but there may be some peat development (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Shrub Swamp and Floodplain Forest[5] - 45 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**Warbling Vireo** **Willow Flycatcher** Black Racer[I] Ruffed Grouse[A] Eastern Ribbon Snake[I] Veery[A] American Redstart[A,J] Wood Duck[J] Eastern Kingbird[J] Gray Catbird[J]
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands, and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Woodlands (natural)[5] - 11 acres		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Freshwater Marshes[5] - 74 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	**American Bittern**[A,J] **Marsh Wren** **Virginia Rail**[I] Wood Duck[A,J] Northern Harrier[A,J] Northern Leopard Frog[I] Eastern Ribbon Snake[I] Canada Goose[A]
Northeastern Bulrush[B, D]	Inhabits herbaceous wetlands with seasonally fluctuating waterlevels (USFWS 2006)	
Pasture/Hay/Grassland[5] – 5 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/ or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[J] Northern Harrier[A,I,J]
Inland Aquatic Habitats[4]		
Open Water[5] – 7 acres		
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Northern Redbelly Dace[I] **Slimy Sculpin**[I] Burbot[I]
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/ coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 Northeastern Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A:2008 Bird Conservation Region 14.

I: 2015 New Hampshire Wildlife Action Plan (Species of Greatest Concern)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.52 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Sprague Brook CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, American woodcock, Canada warbler, blackburnian warbler and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
We envision healthy forests within the Sprague Brook CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of New Hampshire's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011). This large, contiguous block of matrix forest has been identified by a host of partners including the State of New Hampshire's Wildlife Action Plan, the Nature Conservancy's Lower New England-Northern Piedmont Ecoregional Plan, and the Quabbin-to-Cardigan Collaborative Conservation Plan.

Sprague Brook CFA's hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is most certainly available within the CFA. To date our review of Sprague Brook's habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Sprague Brook comes exclusively from a reading of forest history in New England—a legacy of intensive past-use has altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of Sprague Brook are remarkably more homogeneous than those of three centuries earlier, and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach combining passive management and the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Sprague Brook will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to

improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, and—if wetlands and riparian areas are present—Canada warbler (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009).

Sprague Brook's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape: canopy, midstory, understory, and ground layer. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils, and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who are thought to be strongly associated with the hemlock forests within Sprague Brook—and have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and—when along rocky bottomed streams—Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Identify forest stands where soils and species composition will support woodcock management.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Work with regional partners to survey forests for non-native invasive insects.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:

Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Conifer Swamp)

Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for refuge resources of concern including Canada warbler.

Rationale:

Of the forest types within the Sprague Brook CFA, softwood swamps frequently have undergone significant alteration and have potential for restoration. This habitat type is often found in small patches on mineral soils that are nutrient poor; there may be an organic layer, but generally deep peat soils are absent. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. The dynamic nature of the watertable drives complexes of forest upland and wetland species including red maple, balsam fir, red spruce, and ash species. Where soils tend more to alkaline conditions white cedar is a common tree species, and the shrub layer is generally more diverse. Within the Connecticut River watershed, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in softwood swamps are not well understood. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within Sprague Brook will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Where needed, restoration of softwood swamp habitats will create high-quality habitat for neotropical migratory birds. Closed canopy softwood forests that include white cedar and other softwoods provide important mast, food, nesting, and cover. Softwood swamp stands with large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert and Faccio 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Conifer swamps in the Sprague Brook CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Conifer swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the Sprague Brook CFA, and allow monitoring of population response to management actions (R. Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State of New Hampshire, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide breeding and foraging habitat for priority refuge resources of concern including American woodcock and American black duck.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

The wetland complex along Sprague Brook is relatively large, containing a mosaic of shrub swamp, conifer swamp, and freshwater marsh. Suitable habitat may exist for multiple pairs of herons, rails, and bitterns during the breeding season. There is also a high probability that this wetland complex will provide habitat for several state species of greatest conservation need including common moorhen, least bittern, and sora rail.

American woodcock are dependent on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

Management of the shrub swamp communities may be required to maintain shrub dominance. Most shrub swamps maintain themselves, but tree species, such as red maple, can become established, and dominate the wetland community. Invasive plants, such as common reed, are a threat to these communities, and mechanical and chemical treatment of this invasive reed is necessary. Management of these shrub swamps will not only benefit American woodcock, but other shrub swamp specialists, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation, and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests near foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation

of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complimented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Sprague Brook CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:

Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck, and maintain the natural water level variability in wetlands where the federally listed northeastern bulrush occurs.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams (Gawler 2008). These marshes are also maintained over time by beaver activity, an important natural disturbance process within the Sprague Brook watershed.

Our coarse-scale habitat analysis of this CFA identifies these wetlands as scattered throughout the CFA, with a large percent occurring along Sprague Brook. This wetland complex is relatively large, containing a mosaic of shrub swamp, conifer swamp, and freshwater marsh. Suitable habitat exists for multiple pairs of herons, rails, and bitterns during the breeding season. There is also a high probability that several state species of greatest conservation need may be present including common moorhen, least bittern, sora rail, and American black duck.

American black duck is a refuge priority resource of concern, and use freshwater marsh and shrub-swamp habitats for breeding and foraging. Well-concealed nests are placed on the ground in uplands near beaver impoundments, floodplains, alder-lined brooks and other wetlands. Brood rearing habitat includes emergent marsh or flooded wetlands with abundant emergent vegetation, sedges, submerged aquatic plants and scrub-shrub vegetation rich in invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001). An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for American black duck.

The northeastern bulrush, a wetland plant, occurs within various beaver wetlands in the CFA. This species is federally listed, and has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Encourage local landowners to use New Hampshire Best Management Practices within active agricultural fields that are located along the perimeter of marsh habitats.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.

- Survey wildlife use of existing wetlands.
- Map natural communities; protect rare or exemplary examples.
- Work with the State Natural Heritage Program to monitor the presence/absence of current northeastern bulrush populations in emergent wetlands.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock; areas not managed for woodcock will be allowed to revert to natural conditions.

Rationale:
Less than one percent of the Sprague Brook CFA is typed as pasture, hay, and grassland habitat. The management focus for the Sprague Brook CFA is to provide habitat for forest dependent species including wood thrush, blackburnian warbler, Canada warbler, and American woodcock (see Sub-objective 1.1a). American woodcock require varying habitat conditions, including open habitats such as pastures, hayfields, and grasslands. Habitats with minimal herbaceous cover in the spring are used for courtship displays, while open areas with sparse shrub or clumped herbaceous vegetation are used for roosting. Fields with moist soil conditions will also be used for foraging (McAuley et al. 1996).

Pasture, hay, and grasslands will be managed in conjunction with the other habitat conditions that woodcock require. Due to these specific habitat requirements, and our unfamiliarity with the overall habitat conditions in the CFA, a comprehensive, multi-scale forest and wildlife habitat inventory will be necessary to implement refuge strategies. This inventory will need to encompass all habitats within the CFA and associated landscape. Baseline information on the condition of pasture, hay, and grassland habitats at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Conduct an inventory of pasture, hay, and grassland habitats to determine their condition, size and location, and incorporate them into the management strategies for American woodcock in the HMP.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout and Atlantic salmon.

Rationale:
The streams and brooks within the Sprague Brook CFA provide high quality, intact aquatic habitat. Roaring Brook and its Sprague Brook tributary are free-flowing, with no dams, from their headwaters to the confluence with the Ashuelot River. These pristine brooks provide cold water habitat for Atlantic salmon and wild Eastern brook trout. Brook trout and Atlantic salmon are sensitive to extreme temperature fluctuations, and require water temperatures between 40-70 degrees Fahrenheit for spawning, growth, and survival. The intact forested landscape within the Sprague Brook CFA provides forested buffers along the streams and wetlands that help to maintain these cool temperatures. The native brook trout fishery, within the Sprague Brook CFA, has been designated as a Wild Trout Water, an area managed by New Hampshire Fish and Game Department to provide wild trout fishing experience.

Management of water resources in the Sprague Brook CFA will focus on providing rivers and streams with clear aquatic species passage to spawning and wintering habitat, and in-stream habitat that is cold and structurally diverse. The protection and restoration of these aquatic resources will further conservation in the Ashuelot River Watershed.

Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. We will work with partners to analyze current available data, and conduct additional assessments, as needed, to inform more detailed management and monitoring strategies within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity, and health.

- Work with partners to conduct stream assessments to identify manmade physical barriers (e.g. impassable road crossings, culverts and dams) to the movement of fish and other aquatic organisms.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Sprague Brook CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:

- Encourage schools, scout groups, and summer camps to develop curricula that use the Sprague Brook CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Sprague Brook CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Sprague Brook CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Sprague Brook CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Sprague Brook CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Sprague Brook CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Sprague Brook CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Sprague Brook CFA.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Sprague Brook CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Sprague Brook CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following state regulations, except as noted under Strategies below.

Rationale:
The Sprague Brook CFA is a popular area to hunt white-tailed deer, moose, Eastern wild turkey, black bear, and small game. Hunting, consistent with the final compatibility determination, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations

  (a) The season for hunting snowshoe hare and coyotes with dogs is from October 1 to March 15.

  (b) Use of bait is prohibited.

  (c) Allow temporary tree stands and blinds that meet state hunting regulations and do not harm trees or other refuge vegetation. Tree stands and blinds must have the owner's name and phone number clearly displayed, and they must be removed at the end of the hunt season.

- Allow hunters access to the refuge outside of the normal refuge open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with New Hampshire Fish and Game Department to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with New Hampshire Fish and Game Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Sprague Brook CFA kiosks, through a friends group, and in local businesses.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with New Hampshire Fish and Game Department to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of acquiring sufficient land to support hunting seasons:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Sprague Brook CFA after completing all administrative procedures to officially open refuge lands to fishing, based on New Hampshire Fish and Game Department regulations, and division-specific conditions, if necessary.

Rationale:
There are several streams in the CFA including Roaring Brook and Mirey Brook. Both streams support Eastern brook trout. A variety of other game fish are found in streams and ponds within the CFA including rainbow trout and largemouth bass. Fishing is a popular activity throughout this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk to post information on fishing seasons and other notices to visitors.

- The Sprague Brook CFA will be open to visitors actively engaged in fishing during the seasons and times established by the state in their annual fishing regulations.

Within 5 years of acquiring land with fishable waters:

- Produce a brochure that highlights fishing opportunities for distribution at a CFA kiosk and the refuge website.

- Work with the New Hampshire Fish to inventory and assess fish populations on the CFA.

Inventory and Monitoring Strategies:
Within 5 years of acquiring land with fishable waters:

- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available at the refuge website, refuge offices, CFA kiosks, through friends groups, and in local businesses.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the CFA.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. Local organizations such as the Monadnock Chapter of New Hampshire Audubon and others offer organized field trips to popular natural areas. A new division in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exceptions listed for hunters and anglers. The refuge manager may issue a special use permit for public uses during the closed hours.

- Install an informational kiosk to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring land:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups such as the Monadnock Chapter of New Hampshire Audubon and other environmental organizations to include wildlife-centered trips to the refuge.
- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring land:

- Develop a public access strategy and required planning (i.e. NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Sprague Brook CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource. Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Allow compatible outdoor recreational opportunities on the Sprague Brook CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge properties.

USFWS

Nulhegan River from the Nulhegan Basin Division, Vermont

State of Vermont

- **Nulhegan Basin Conservation Focus Area (Existing Refuge Division)**
- **Ompompanoosuc River Conservation Focus Area**
- **Ottauquechee River Conservation Focus Area**
- **West River Conservation Focus Area**
- **White River Conservation Focus Area**
- **Putney Mountain Unit (Existing Refuge Unit)**

Nulhegan Basin Conservation Focus Area (Existing Refuge Division)

Lewis, Bloomfield, Brunswick, Ferdinand, and Brighton, Vermont

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	32,779	99 %
■ *Existing Refuge Ownership in CFA*[1]	*26,605*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	6,174	
Existing Acres in CFA Permanently Conserved by Others[2,3]	353	1 %
Total Acres in CFA[2,4]	33,132	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Nulhegan Basin CPA (map A.79) encompasses the Nulhegan Basin CFA (map A.80). The existing Division is part of the larger 132,000-acre Kingdom Heritage Lands. The area includes a mosaic of conserved lands, including the Wenlock and West Mountain Wildlife Management Areas and working forest lands (e.g., Plum Creek Timber Company). Nearly all of the Nulhegan Basin CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Our expansion to the Nulhegan Basin CFA will fill in gaps in the conserved lands network within this larger core area and better protect the Nulhegan River watershed, particularly a very rich, northern boreal wetlands complex.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Spruce-fir – 55.7 percent.
- Peatlands – 1.2 percent.
- Shrub Swamps and Floodplain Forest - 1 percent.

See map A.81 and table A.45 for more detailed habitat information for the CFA.

What are the resources of conservation concern for the CFA?

As noted in table A.46 below, there are nine refuge priority refuge resources of concern (PRRC) terrestrial and aquatic species that rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to biological integrity diversity and environmental health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to Canada lynx, a federally threatened species recently confirmed breeding in northeastern Vermont, and as a deer wintering area for white-tailed deer. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA, especially those with active bat hibernacula, may contain important maternity and summer roosting sites, as well as foraging areas for this species.

   Canada lynx, a federally threatened species, have been confirmed breeding in northeastern Vermont. A family group was detected in the winters of 2012 and 2013 within the Nulhegan Basin CFA. In consultation with the Service's New England Field Office, it was concluded that the refuge will not manage habitats specifically for Canada lynx. This determination was based in large part on our understanding that the use of these lands by lynx and their long-term occupancy potential are poorly understood. In addition, critical habitat for Canada lynx in Vermont has not been designated under the authority of the Endangered Species Act, and neither the State of Vermont nor the Service has developed a lynx recovery plan.

   Conservation efforts for this species will be done at the regional scale, and additional information is necessary to evaluate the importance of Vermont for Canada lynx and to determine what measures are needed to ensure their persistence within the State. We will continue to monitor Canada lynx populations in the Nulhegan Basin CFA, and work with partners to develop a lynx management plan for the State. We will also work with our New England Field Office to ensure that none of our programs or activities can result in an incidental take of lynx.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA) and habitats along the river's main stem receive higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Nulhegan Basin CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat as well.

   The Nulhegan Basin CFA is part of a larger 132,000-acre conservation area known as the Kingdom Heritage Lands. The CFA is one of three large parcels that were conserved through a complex partnership of public and private entities, including the Vermont Agency of Natural Resources, and now, Plum Creek, LLC. This combination of ownerships and easements provides long-term conservation of contiguous habitat important for many species, including migratory birds.

   The bogs, fens, shrub-dominated wetlands, and swamps, as well as lowland conifer, montane, and hardwood forests in the CFA support a diversity of breeding birds. Six years of breeding landbird survey data, and countless observations made by expert birders have detected numerous species of high conservation concern. Several of these species are uncommon in the Northeast, occurring at the southern periphery of their range. These include resident and migratory boreal species including boreal chickadee, black-backed woodpecker, spruce grouse, gray jay, bay-breasted warbler, rusty blackbird, and olive-sided flycatcher. The contiguous forests in the Nulhegan Basin area also provide habitat for forest interior species such as Canada warbler, ovenbird, blackburnian warbler, black-throated blue warbler, and black-throated green warbler. Blackburnian warbler, Canada warbler ,and black-throated blue warbler are PRRC species that require different plant species composition and structure within a mature forest. While American woodcock and rusty blackbird, also PRRC species, rely on early successional forests in the CFA.

3. **Waterfowl**
   Shrub swamps, peatlands, slow moving streams, secluded ponds, and numerous beaver wetlands provide breeding and migrating habitat for various waterfowl species including American black duck, a PRRC species, wood ducks, common mergansers, hooded mergansers, and Canada geese.

4. **Diadromous fish and other aquatic species**
   The Nulhegan River and three of its four major tributaries—the North, Yellow, and Black branches—flow through the Nulhegan Basin CFA. These cold water rivers provide important habitat for PRRC species including brook trout. This species is a high priority for conservation for the State and the Service's Northeast Region. Native brook trout populations are also present in Lewis and McConnell Ponds within the CFA.

5. **Wetlands**
   The CFA is predominately forested, interspersed with streams and various wetlands. More than 3,000 acres of conifer dominated forested wetlands occur in the CFA, as well as 413 acres of peatlands and 348 acres of shrub swamp and floodplain forest. The majority of these wetlands are concentrated in the lower elevations, and associated with the streams and ponds in the CFA.

6. **Other**
   The Nulhegan Basin contains a deer wintering area (DWA), which is important to the species' survival during winter. DWAs have two important components: core areas of softwoods with high crown closure that provide shelter, and patches of mixed hardwood providing accessible browse within or near the core of the DWA. Functional shelter for deer includes softwood cover at least 35 feet tall with at least 70 percent crown closure (Reay et al. 1990). In addition to providing shelter from severe weather and accessible browse, good wintering areas ensure that deer can travel easily to forage and escape predators.

   Within the CFA, the majority of the basin bottom was historically used by wintering deer. Management within this area will focus on providing a multi-age lowland spruce-fir forest with an appropriate age and diameter distribution for core winter shelter, and early successional forests for winter browse. A diversity of forest composition and structure will also provide habitat for refuge priority resources of concern.

What habitat management activities will be a priority on refuge lands within the CFA?

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. Forests in the CFA will be structurally diverse (different size classes) and native species will dominate. Appendix J provides general forest management definitions and guidelines.

- Our wetland management will focus on maintaining the natural hydrology and native species composition. Given their low occurrence, invasive plant management will be a priority.

- In open water habitats (streams, rivers and ponds), we will focus on maintaining forested stream buffers, structurally diverse instream habitat, and continuous aquatic species passage to spawning and wintering habitat.

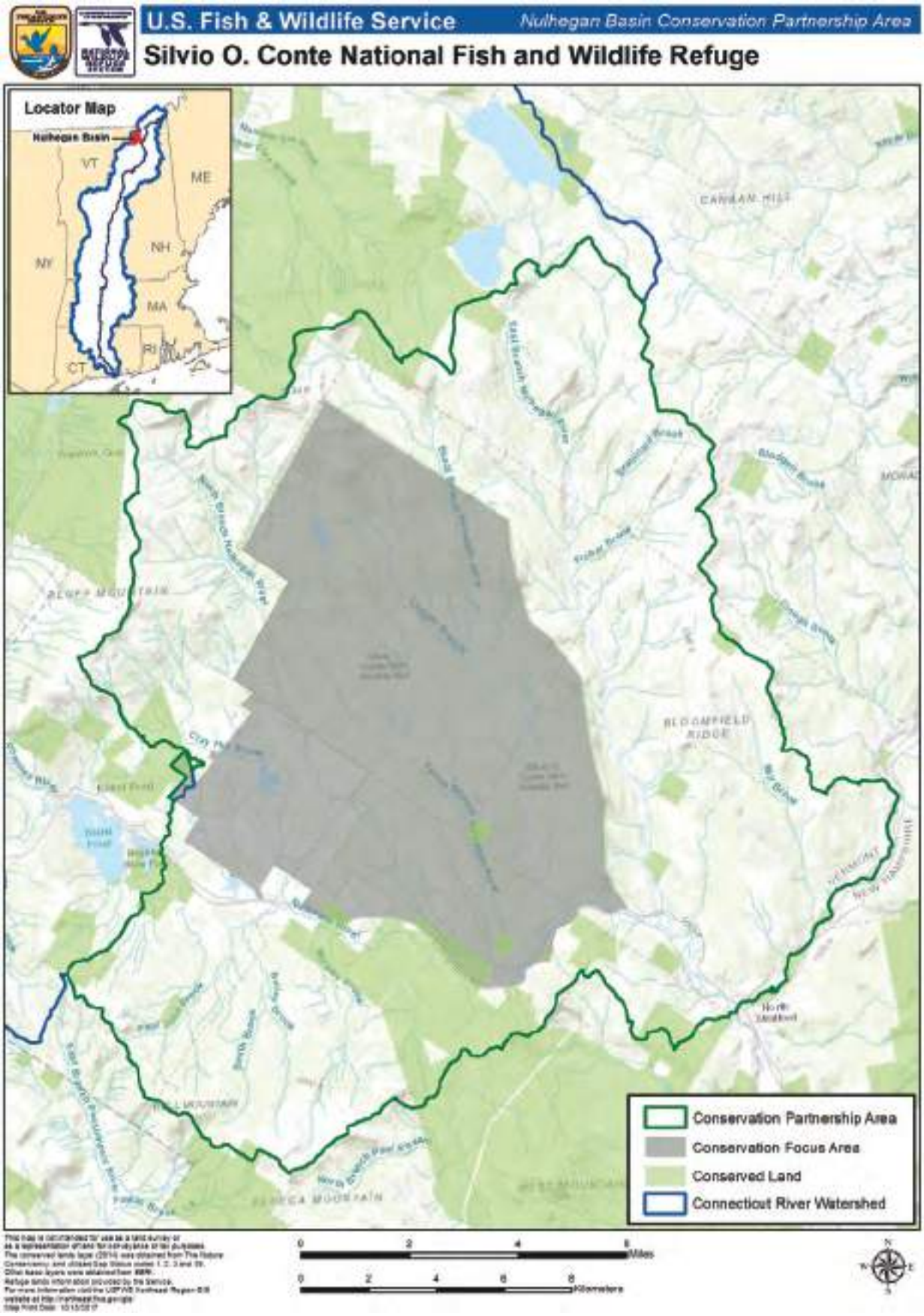
What public use opportunities will be a priority on refuge lands within the CFA?

The National Wildlife Refuge System Improvement Act of 1997 identified hunting, fishing, wildlife observation, photography, interpretation, and environmental education as priority, wildlife-dependent uses. As such, these uses will receive priority on refuge lands. The larger Nulhegan Basin has a long history as a valued landscape for hunting and fishing, while in recent years, wildlife observation has increased in popularity. The area is also popular for snowmobiling in the winter. Map A.82, map A.83, and map A.84 show the public use infrastructure.

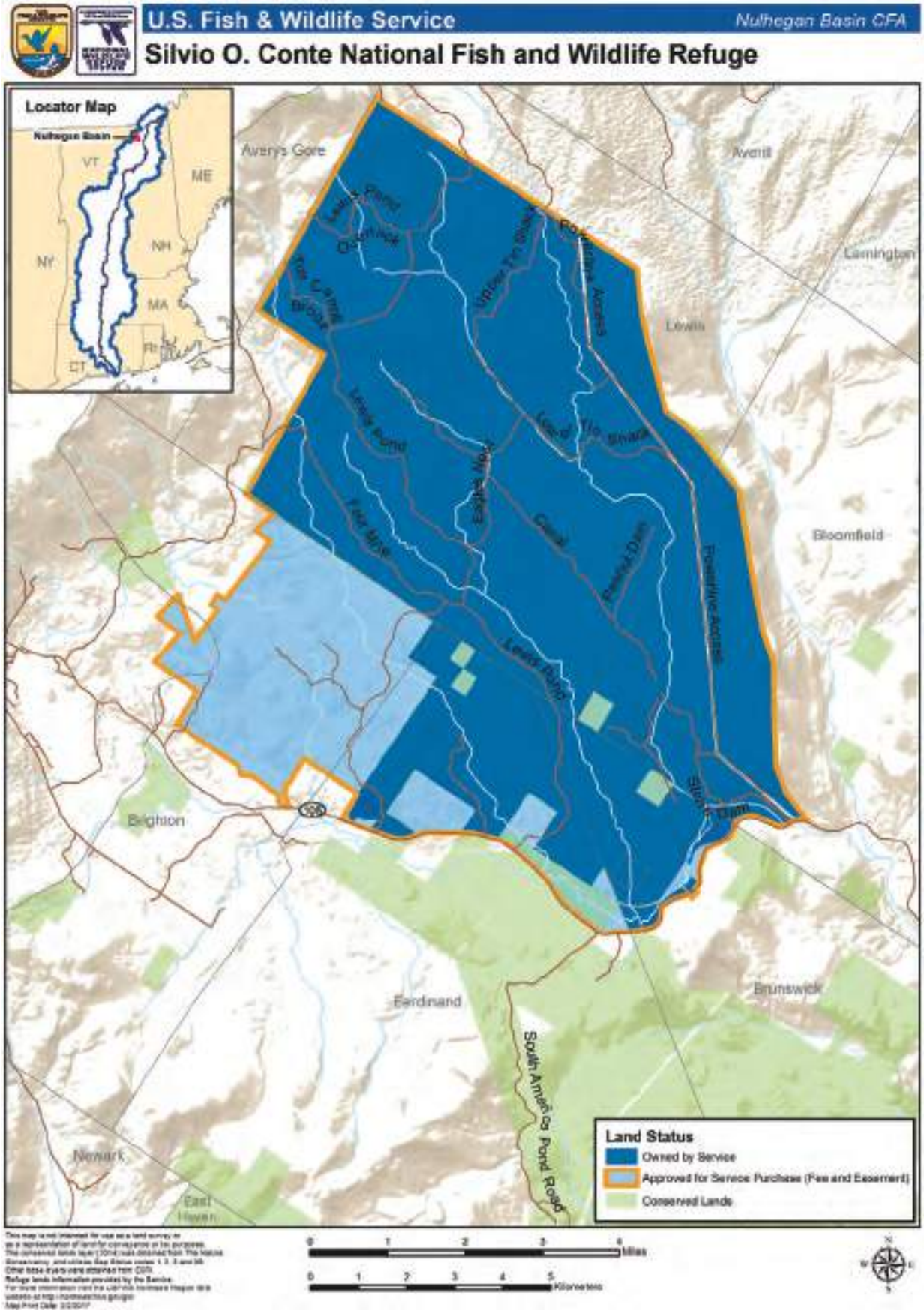
Does the CFA have special ecological, cultural, or recreational features or designation of regional, State, or local importance?

The National Audubon Society recognizes the Nulhegan Basin as an Important Bird Area (IBA) (National Audubon Society 2013). The extensive boreal habitat is home to many rare species, including the State endangered spruce grouse and common loon. Other species found in the IBA include gray jay, Cape May warbler, bay-breasted warbler, boreal chickadee, and black-backed woodpecker.

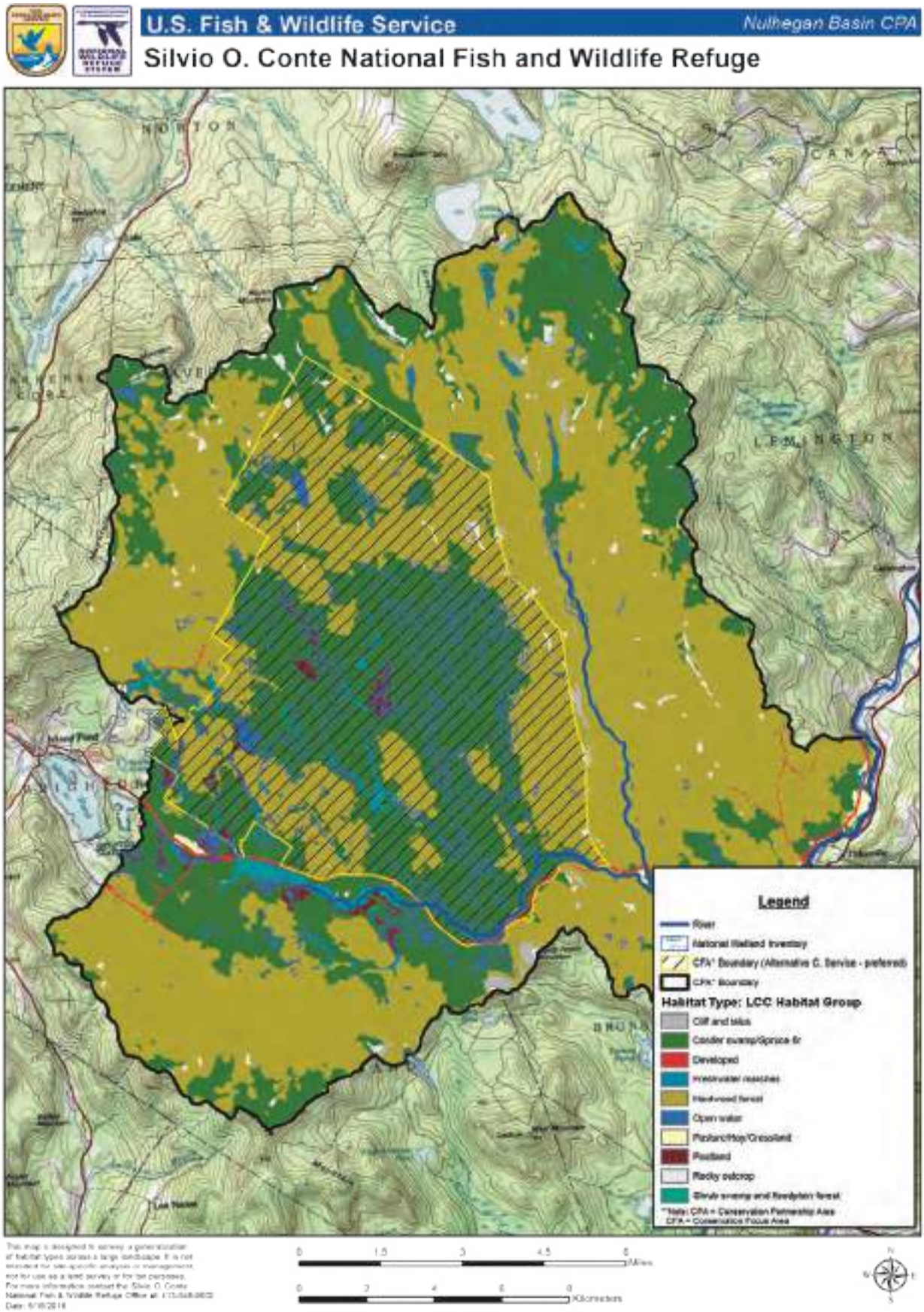
Map A.79. Nulhegan Basin CPA.



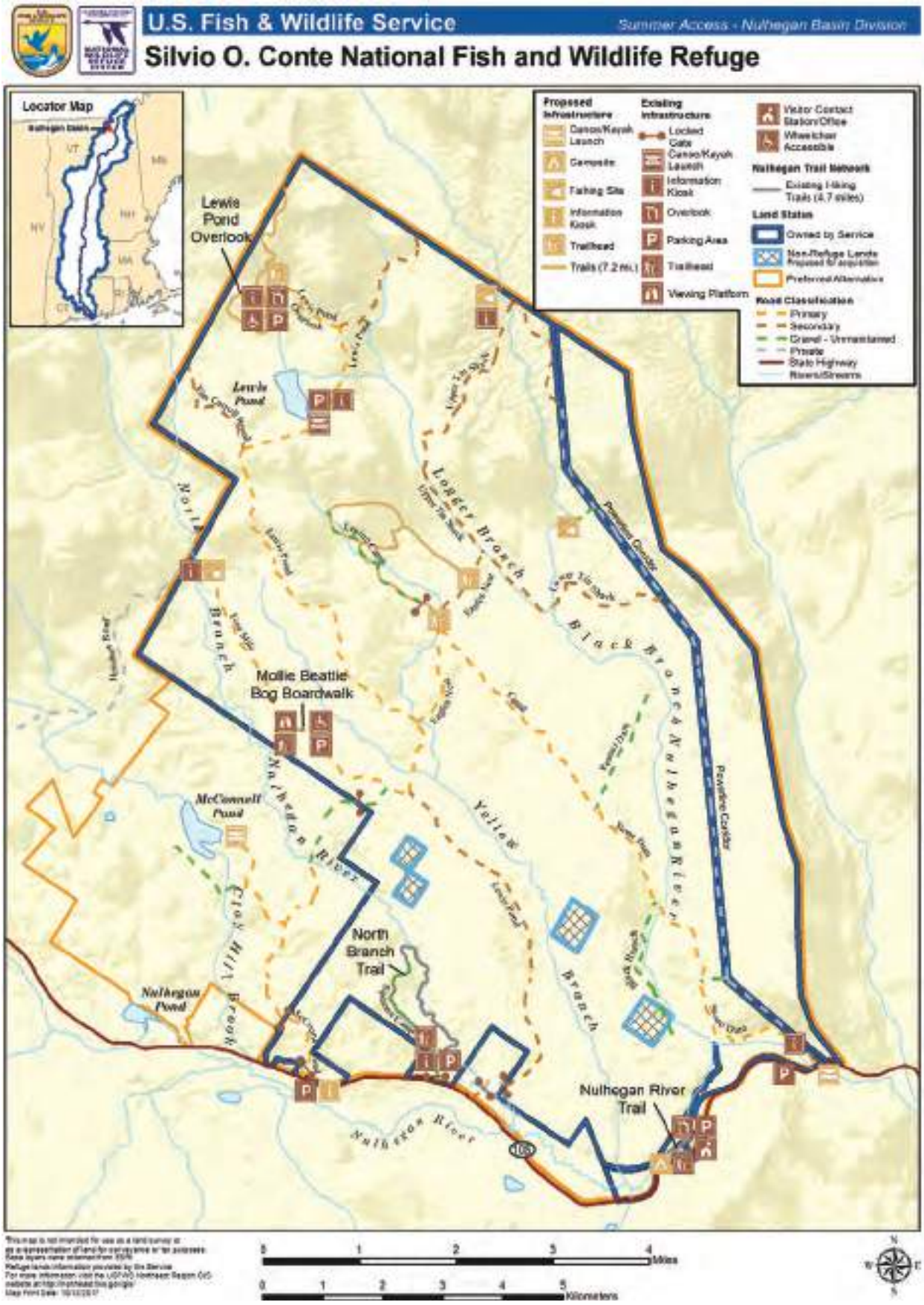
Map A.80. Nulhegan Basin CFA – Location.



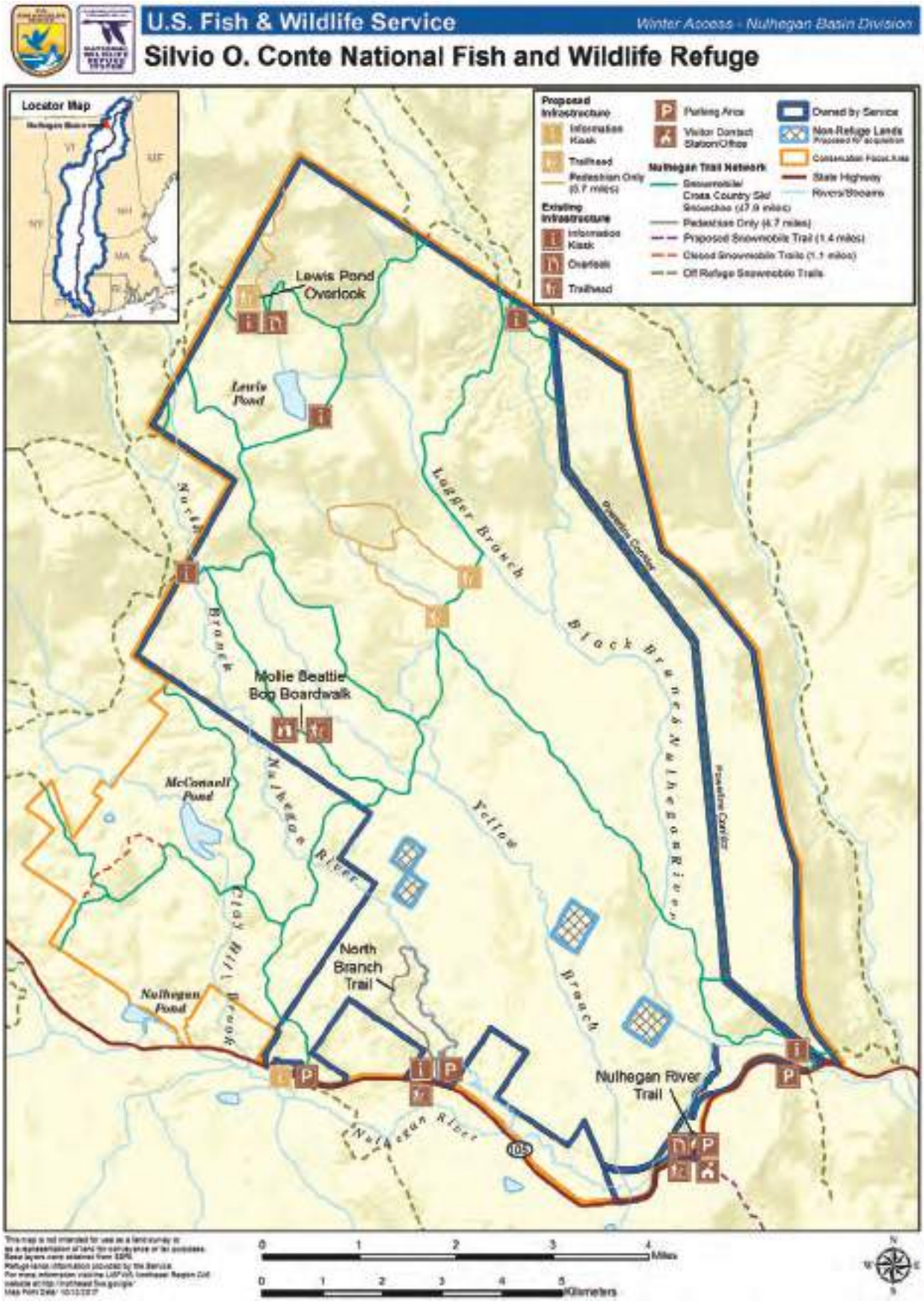
Map A.81. Nulhegan Basin CPA/CFA – Habitat Types.



Map A.82. Nulhegan Basin CFA – Summer Public Access.



Map A.83. Nulhegan Basin CFA – Winter Public Access.



Map A.84. Northern Forest Canoe Trail on Nulhegan Basin Division.

Table A.45. Nulhegan Basin CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	38,172	38.0%	18,560	2,458	15,179	55.7%	48.6%
Hardwood forest	57,036	56.7%	13,471	1,918	10,766	40.4%	23.6%
Shrub swamp and floodplain forest	1,211	1.2%	347	94	204	1.0%	28.6%
Forested uplands and wetlands subtotal	*96,420*	*95.9%*	*32,378*	*4,470*	*26,149*	*97.2%*	*33.6%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	485	0.5%	40	-	40	0.1%	8.3%
Freshwater marshes	14	0.0%	4	2	2	0.0%	26.6%
Pasture/hay/grassland	512	0.5%	2	-	-	0.0%	0.3%
Peatland	896	0.9%	412	110	265	1.2%	45.9%
Rocky outcrop	1,185	1.2%	200	-	198	0.6%	16.9%
Non-forested uplands and wetlands subtotal	*3,091*	*3.1%*	*657*	*112*	*506*	*2.0%*	*21.3%*
Inland aquatic habitats[9]							
Open Water	261	0.3%	163	91	72	0.5%	62.7%
Inland aquatic habitats subtotal	*261*	*0.3%*	*163*	*91*	*72*	*0.5%*	*62.7%*
Other							
Developed	773	0.8%	119	18	65	0.4%	15.4%
Other subtotal	*773*	*0.8%*	*119*	*18*	*65*	*0.4%*	*15.4%*
TOTAL[10]	**100,545**	**100.0%**	**33,318**	**4,691**	**26,792**	**100.0%**	**33.1%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.46. Nulhegan Basin CFA – Priority Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Conifer Swamp/Spruce-fir Forest[5] - 18,549 acres		
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	Cape May Warbler[A, J] Boreal Chickadee[A, J] Purple Finch[A, J] Black-throated Green Warbler[A, J] **Spruce Grouse**[A, I] **American Marten**[I] Canada Lynx[I, J] Gray Jay[A, I, J] Black-backed Woodpecker[A, I, J] Bay-breasted Warbler[A, I, J] **White-throated Sparrow** **Blackpoll Warbler**[A, I] Brown Creeper[J] Northern Saw-whet Owl[J] Olive-sided Flycatcher[A, I, J] Palm Warbler[A,J] Pine Grosbeak[A, J] Sharp-shinned Hawk[J] Yellow-bellied Flycatcher[J] Northern Parula[A]
Rusty Blackbird[A, C]	Breeding habitat includes conifer dominated forested wetlands interspersed with shrub swamps and peatlands. Young spruce and fir may be required for nesting (Greenland et al, 2010, Powell et al., 2010, and Matsuoka et al, 2010).	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Hardwood Forest[5] - 13,448 acres		
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	**Ruffed Grouse**[A, I] Whip-poor-will[A, I, J] Smooth Green Snake[I] Canada Lynx[I] **Chestnut-sided Warbler**[A,B] Purple Finch[A, J] **Ovenbird**[A] **Eastern Red Bat**[I] Little Brown Bat[I] American Redstart[A, J] Black-and-white Warbler[J] Broad-winged hawk[J] Eastern Wood-pewee[A, J] Northern Flicker[A, J] Northern Goshawk[A, I, J] Red-shouldered Hawk[I, J] Rose-breasted Grosbeak[A,J] Canada Warbler[A,I] Yellow-bellied Sapsucker[A, J] Veery[A] Black-billed Cuckoo[A,I] Black-throated Green Warbler[A] Northern Parula[A]
Black-throated Blue Warbler[A]	Breeding habitat includes mature deciduous and mixed deciduous-conifer forests with a shrubby understory (DeGraaf et al. 2001, Hodgman et al. 2000, Dobbs 2007, Dunn et al. 1997)	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Dunn et al. 1997, Morse 2004).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Shrub Swamp and Floodplain Forest[5] - 348 acres		
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands, and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	Chestnut-sided Warbler[A,B] Black Racer[I] Ruffed Grouse[A, I] **Warbling Vireo** **Willow Flycatcher** **Wood Turtle**[I] American Redstart[A, J] Eastern Kingbird[J] Gray Catbird[J] Wood Duck[A, J] Veery[A]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	
Non-Forested Uplands and Wetlands[4]		
Rocky Outcrop[5] - 200 acres		
Northern Appalachian-Acadian rocky heath outcrop[H] Laurentian-Acadian calcareous rocky outcrop[H]	*The Northern Appalachian-Acadian rocky heath outcrop system* occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including Sheep laurel, Low-bush blueberry, Black huckleberry, and Black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open. *Laurentian-Acadian calcareous rocky outcrop* occurs on ridges or summits of circumneutral to calcareous bedrock. Sites are often exposed and dry; however, there may be local areas of more moist conditions. The vegetation is often a mosaic of woodlands and open glades. This system may also occur on rocks that are primarily acidic but with a local influence of calcium through weathering (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Freshwater Marshes[5] - 4 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Peatlands[5] - 413 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Olive-sided Flycatcher[A, I, J] Southern Bog Lemming[I, J] **Mink Frog** **Palm Warbler**[A] Black-backed Woodpecker[A, I, J] Eastern Kingbird[J] Northern Harrier[A, I, J]
Cliff and Talus[5] – 40 Acres		
Laurentian-Acadian acidic cliff and talus[H] Laurentian-Acadian calcareous cliff and talus[H]	These cliff systems occur at low to mid elevations, well below treeline. The vegetation within the *acidic cliff and talus system* is patchy and often sparse, punctuated with patches of small trees such as birches and spruce species. Species that prefer calcium rich soils are absent. In north-facing or other sheltered settings where cold air accumulates at the bottom of slopes, a shrubland of heaths and reindeer lichens can develop. *The calcareous cliff and talus system* has more nutrient rich soils, and the vegetation is often sparse, but may include patches of small trees including northern white cedar, which may be the dominate species. Ash species and basswood are woody indicators of the enriched setting (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Open Water[5] - 163 acres		
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Eastern Pearlshell[I] Riffle Snaketail[I] Brook Snaketail[I] Maine Snaketail[I] Zebra Clubtail[I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Canada Goose[A] Wood Duck[A] Hooded Merganser[J] Green-winged Teal[J] Mallard[J] **Common Merganser** **Ring-necked Duck** **Common Loon**[A,I]

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 Vermont Wildlife Action Plan (Species of Greatest Conservation Need)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 4 - CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 5 - These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Nulhegan Basin CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Spruce-fir Forests)
Improve the diversity of seral stages (where and when possible), restore historic composition and structure, and improve landscape connectivity of spruce-fir habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including blackburnian warbler, rusty blackbird, and Canada warbler.

Rationale:
There is a greater likelihood of meeting more species' requirements when more varied habitat conditions are present, and thus a higher degree of wildlife diversity can be expected (MacArthur and MacArthur 1961, Hunter Jr. 1990, Askins 2002, DeGraaf et al. 2006). And further, a traditional principle of ecology holds that diverse ecosystems are more stable than ecosystems that are less diverse (Elton 1958). This has important implications for climate change and wildlife conservation.

At the landscape-scale (here defined as the CFA) managing forests for diversity requires managing the patterns of succession that determine the age structure of the landscape. This is important for two reasons: (1) some successional stages have more species than others; and (2) each stage has a different, although not usually unique, set of species. In this discussion we refer to managing the age structure of the landscape, rather than managing succession, because the age of the forest stand is a reasonable index of its successional state.

While much of our forest management will attempt to move the Nulhegan Basin's relatively young spruce-fir forests (majority of the forest is younger than 30-45 years old (Lapin and Engstrom 2002)) toward an older condition, across the CFA spruce-fir forests will contain a variety of patches in different size classes and developmental stages. Species dependent upon disturbances that create early successional forested habitats, like rusty blackbird, are declining as remaining patches of young forest mature (Matsuoka et al. 2010, Powell et al. 2010, C. Foss personal communication). Maintaining stands of young spruce-fir adjacent to wetland areas within the CFA may benefit rusty blackbirds. Enhancing the horizontal structure of spruce-fir forests across the CFA should support other species of conservation concern like bobcat, palm warbler, spruce grouse, and—if wetlands and riparian areas are present—Canada warbler (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009).

Early successional spruce-fir also serves as preferred habitat for snowshoe hare, an important prey species for the Federally-endangered Canada lynx recently documented within the CFA. While we recognize the importance of early successional habitat to Canada lynx, critical habitat for Canada lynx in Vermont has not been designated under the authority of the Endangered Species Act. Further, neither the State of Vermont nor the Service has developed a management plan that evaluates the importance of Vermont for Canada lynx and measures needed to ensure their persistence within the State. Although these planning efforts are not available to inform Canada lynx management needs at the Nulhegan Basin CFA, an evaluation was conducted by the Service's New England Field Office and refuge staff on the importance of the CFA to Canada lynx.

We assume that all elements that are considered essential for supporting breeding Canada lynx are present within the Nulhegan Basin landscape, as evidenced by recent breeding records. Aubry et al. (2000) suggest the average home range for Canada lynx in southern boreal forests, such as those found in Vermont, is approximately 18,000 acres for females and 37,000 acres for males. The Nulhegan Basin CFA is approximately 33,000 acres;

we estimate that the CFA will support no more than two female and one male Canada lynx. Within the larger Nulhegan Basin, we estimate support for no more than 11 female and 5 male Canada lynx. Based on these estimates, we assume the Nulhegan Basin is incapable of supporting a standalone Canada lynx population, and the persistence of Canada lynx in Vermont may be reliant upon receiving periodic dispersal from larger source populations, such as those found in Maine. To ensure that Canada lynx persist in Vermont, it is important that efforts to conserve the species be developed at a landscape scale, since no single landowner is likely to support enough habitat for this species. We will continue to monitor Canada lynx populations in the Nulhegan Basin CFA, and work with adjacent landowners, the VFWD, the New Hampshire Fish and Game Department, and the New England Field Office to develop a lynx management plan for northern Vermont and New Hampshire.

Maintaining diversity across the landscape must include an adequate number and area of old forests simply because they represent one portion of the successional sequence, and especially because they represent what is likely to be the most biologically diverse portion of the sequence (largely due to tree bole users). Areas like the Nulhegan Basin CFA, where natural disturbance regimes are small-scale and relatively uncommon, old forests once dominated the landscape (Lorimer 1977, Bormann and Likens 1979, Cogbill 2000, Fraver et al. 2009). While we are unable to return to a pre-European settlement forest, we can redress some of the imbalance currently within the CFA. Through a combination of silviculture aimed at restoring old-growth characteristics (Keeton 2004, D'Amato and Catanzaro 2007, Bauhus et al. 2009), long rotation systems and unmanaged areas we hope to create an important habitat condition missing from the hardwood and mixed-wood forests of the Nulhegan. By arranging long rotation stands to encircle a core of forests determined to possess late successional characteristics we can buffer these areas, significantly increasing its effective size. These efforts will aid a suite of species that include numerous bat species that require large diameter trees for roosting, barred owls, ovenbirds, and red bats.

Ecologically sustainable management in red spruce-balsam fir forests in the Nulhegan will ideally retain spruce as the dominant species because this long-lived species stabilizes the light environment in the understory, influences the texture and chemistry of forest litter, provides habitat for numerous birds and mammals, and is commercially valuable for timber and pulp. Red spruce appears to be vulnerable to temporary displacement by balsam fir and other fast-growing pioneer species (including red maple, trembling aspen, big-tooth aspen, and paper birch), particularly after stand-replacing disturbances or preferential high-grading and disease (Frank and Bjorkbom 1973, Seymour and Hunter Jr. 1992, Bouchard et al. 2007). Its seeds are short-lived and do not persist in the soil seed bank (Blum 1990). Individual longevity can be longer than 300 years, and is considerably longer than that of balsam fir (about 70 years). Since red spruce is economically valuable for timber and pulp (Seymour 1992), and usually has better health and sizes than balsam fir, it has been harvested repeatedly on the same sites in the Nulhegan Basin since the mid-1800s (Whitney 1996; Cogbill 2000). It has low genetic variability and may lack adaptability to environmental stress including global climate change (DeHayes and Hawley 1992). Red spruce is in documented decline in some parts of its range (Siccama et al. 1982; Adams and Stephenson 1989; Klein et al. 1991; Battles and Fahey 1995). Improving the representation of red spruce in the Nulhegan's spruce-fir stands will provide food and cover for various animals and birds. The spruce grouse feeds on the buds and foliage; red squirrels eat both the buds and seeds; varying hare species browse twigs and foliage; and porcupines feed upon the bark.

Our understanding of the forest structure within Nulhegan Basin comes from a forest-based habitat inventory conducted in 2007 (USFWS unpublished), aerial photo interpretation by contractors and a reading of the forest history within the Nulhegan Basin (Cogbill 2000; Gove 2003). Much of the spruce-fir forest within the Nulhegan Basin CFA was harvested prior to refuge ownership using techniques that produced a structurally homogenous, relatively young forest landscape. This in contrast to a natural disturbance regime within spruce-fir characterized by small-scale disturbances: insect outbreaks (spruce budworm [*Choristoneura fumiferand*] and bark beetles [*Dendroctonus rufipennis*]) and wind storms recurring at intervals of several decades (Lorimer 1977, Seymour 1992). Unlike the commercial clearcuts that dominated softwood management in the Nulhegan, these disturbances are usually not stand replacing, and thus lead to the development of a wider range of age structures. The greater potential diversity in both species composition and age structure offers a broader array of habitats for refuge focal species.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes at the stand-level, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. Nulhegan Basin's spruce-fir forests should have all forest layers present and distributed throughout a stand and across the landscape: canopy, midstory, understory, and ground layer. Enhanced vertical structure will provide the greatest number of bird species with the greatest number

of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0 to 5 feet in height) created via group selection silviculture are of particular importance. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like rusty blackbird and black-throated green warblers. Improving vertical diversity of spruce-fir forests during management may provide an important habitat component for blackburnian warblers, who are canopy foragers who preferentially breed in forests with substantial cover taller than 60 feet (18 meters) (Morse 1976).

Dying, dead, and down trees are important components of forest ecosystems, because during the process of death and decay they are inhabited by an extraordinarily diverse succession of organisms ranging from woodpeckers and other cavity-users, to myriad invertebrates, fungi, and microorganisms. While studies examining snags and downed logs specifically in spruce-fir ecosystems are lacking, research in other forest types has shown timber extraction of the sort that impacted the Nulhegan's spruce-fir forests tends to minimize the number of snags and logs in a stand (Goodburn and Lorimer 1998, Fraver et al. 2002, Hura and Crow 2004). Our management efforts will explicit retain, or where appropriate create, dead wood. Generally, 2-4 large (defined as greater than 14″ DBH) snags per acre is thought to be adequate to maintain most wildlife populations.

Extensive and preferential removal of softwood species from the Nulhegan's mixed-wood stands is thought to have reduced the habitat quality of corridors linking large expanses of spruce-fir. Because the problems of forest fragmentation have been documented largely for small patches of forest surrounded by agriculture (REFS), it is not known how relevant these issues are in forested landscapes that have been fragmented by shifted species composition. Nevertheless restoring red spruce, eastern hemlock, and other softwood species to our mixed-wood stands in proportions closer to historical norms, will improve these corridors for species that may move between patches of spruce-fir forest, including white-tailed deer and American marten.

Management Strategies:
Within 5 years of CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure.
- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition.
- Use forest management treatments (commercial and non-commercial) where and when appropriate to improve habitat. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.
- Ensure this habitat type provides effective winter shelter for wintering deer.
- Participate in the North Atlantic Landscape Conservation Cooperative efforts to develop climate change vulnerability assessment models.
- Work with partners and the USFWS New England Field Office to develop a lynx management plan for northern Vermont and New Hampshire, and evaluate the importance and role of habitats in the Nulhegan Basin CFA to lynx populations in the southern boreal forest.

Within 10 years of CCP approval:

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Promote stands dominated by early seral stages where appropriate to support nesting Canada warbler, rusty blackbirds, and Canada lynx.
- Promote stands dominated by late seral stages in the CFA interior to support blackburnian warbler, including consideration of a refuge-designated "natural area" free from management actions.

- In managed stands, promote increased compositional and structural heterogeneity, including dense canopies, large-diameter trees, and large-diameter coarse woody debris and snags.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Continue to monitor Canada lynx populations in the CFA. For example, monitor Canada lynx with telemetry to determine home ranges, den sites, and other information.

- Map vernal pools and seeps.

Within 10 years of CCP approval:

- Conduct wildlife and habitat surveys to monitor temporal changes and trends resulting from management actions.

Sub-objective 1.1b. (Hardwood Forests)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure for the diversity of species present, including American woodcock, black-throated blue warbler, blackburnian warbler and, northern long-eared bat and tricolored bat (if appropriate).

Rationale:
Again, there is a greater likelihood of meeting more species' requirements when more varied habitat conditions are present, and thus a higher degree of wildlife diversity can be expected (MacArthur and MacArthur 1961, Hunter Jr. 1990, Askins 2002, DeGraaf et al. 2006). And further, a traditional principle of ecology holds that diverse ecosystems are more stable than ecosystems that are less diverse (Elton 1958). This has important implications for climate change and wildlife conservation.

At the landscape-scale (here defined as the CFA) managing forests for diversity requires managing the patterns of succession that determine the age structure of the landscape. This is important for two reasons: (1) some successional stages have more species than others; and (2) each stage has a different, although not usually unique, set of species. In this discussion we refer to managing the age structure of the landscape, rather than managing succession, because the age of the forest stand is a reasonable index of its successional state.

Much of our forest management in our hardwood and mixed-wood stands will attempt to move the Nulhegan's forests toward an older condition. Biologists and managers have long recognized the ability of silviculture to create wildlife habitat structures (Tubbs 1977, DeGraaf et al. 1989), and more recent work has shown silviculture can create or accelerate the creation of late successional traits in northern hardwood forests (Keeton 2006, McKenny et al. 2006, D'Amato and Catanzaro 2009). While this will represent the largest proportion of our silviculture, we envision the hardwood forests within the CFA will include a variety of patches in different size classes and developmental stages. Species dependent upon disturbances that create early successional forested habitats, like American woodcock and Canada warbler, are declining as remaining patches of young forest mature (Askins 2001, Hallworth et al. 2008). Maintaining stands of young hardwood and mixed-wood forests adjacent to wetland areas have been shown to be important breeding habitat for Canada warbler (Hagan et al. 1997, Lambert and Faccio 2005). Enhancing the horizontal structure of hardwood and mixed-wood forests across the CFA should support other species of conservation concern like chestnut-sided warbler, American woodcock, black and white warbler and—if wetlands and riparian areas are in close proximity—Canada warbler (Lambert et al. 2005, DeGraaf et al. 2006, Reitsma et al. 2008, Chace et al. 2009).

Early successional hardwood and mixed-wood forest also serves as preferred habitat for American woodcock, a species in decline throughout the Connecticut River watershed. The Nulhegan Basin CFA is home to an approximately 260 acre Woodcock Management Demonstration Area. The American woodcock uses particular seral stages of northern hardwood forests, including younger stands dominated by shade-intolerant species like birch and aspen. Woodcock require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008).

Maintaining diversity across the landscape must include an adequate number and area of old forests simply because they represent one portion of the successional sequence, and especially because they represent what is likely to be the most biologically diverse portion of the sequence (largely due to tree bole users). Areas like the

Nulhegan Basin CFA, where natural disturbance regimes are small-scale and relatively uncommon, old forests once dominated the landscape (Lorimer 1977, Bormann and Likens 1979, Cogbill 2000, Fraver et al. 2009). While we cannot return to a pre-European settlement forest, we can redress some of the imbalance currently within the CFA. Through a combination of silviculture aimed at restoring old-growth characteristics (Keeton 2004, D'Amato and Catanzaro 2007, Bauhus et al. 2009), long rotation systems and unmanaged areas we hope to create an important habitat condition missing from the spruce-fir forests of the Nulhegan. For example, we've identified approximately 189 patches of older spruce-fir forests (closed canopy of trees approximately 40 years old) ranging in size from <5 acres to more than 60 acres (Lapin and Engstrom 2002). By arranging long rotation stands to encircle a core of forests determined to possess late successional characteristics we can buffer these areas, significantly increasing its effective size. These efforts will aid a suite of species that include northern parula, bay-breasted warbler, black-backed woodpeckers, American martens, white-tailed deer, and boreal chickadees.

Ecologically sustainable management in northern hardwood and mixed-wood forests in the Nulhegan will ideally retain shade intolerants as the dominant species, and reduce the commonality of red maple in both broad forest types. Favoring shade tolerant, long-lived species like sugar maple and red spruce helps to stabilize the light environment in the understory, influence the texture and chemistry of forest litter, and provide habitat for numerous birds and mammals. The Nulhegan's red spruce appear to be vulnerable to temporary displacement by balsam fir and other fast-growing pioneer species (including red maple, trembling aspen, big-tooth aspen, and paper birch), particularly after preferential high-grading and disease (Frank and Bjorkbom 1973, Seymour and Hunter Jr. 1992, Bouchard et al. 2007). Its seeds are short-lived and do not persist in the soil seed bank (Blum 1990), making ascendancy to the canopy often dependent upon advanced regeneration. Individual longevity can be longer than 300 years, and is considerably longer than that of balsam fir (about 70 years). Red spruce is in documented decline in some parts of its range (Siccama et al. 1982; Adams and Stephenson 1989; Klein et al. 1991; Battles and Fahey 1995). Improving the representation of red spruce in the Nulhegan's mixed-wood stands will provide food and cover for various animals and birds. The spruce grouse feeds on the buds and foliage; red squirrels eat both the buds and seeds; varying hare species browse twigs and foliage; and porcupines feed upon the bark.

Our understanding of the forest structure within Nulhegan Basin comes from a forest-based habitat inventory conducted in 2007 (USFWS unpublished), aerial photo interpretation by contractors and a reading of the forest history within the Nulhegan Basin (Cogbill 2000; Gove 2003). Most of the hardwood and mixed-wood forests within the Nulhegan Basin CFA were harvested prior to refuge ownership using a combination of clearcutting and high-grading, resulting in a structurally homogenous, relatively young forest landscape. This in contrast to a natural disturbance regime characterized by catastrophic wind and ice storms, including hurricanes and cyclonic storms, thunderstorms, derechos, and tornados (Lorimer and White 2003). Unlike much of the forest management that has occurred within the CFA, these disturbances are usually not stand replacing, and thus lead to the development of a wider range of age structures. The greater potential diversity in both species composition and age structure offers a broader array of habitats for refuge focal species.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes at the stand-level, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. Nulhegan Basin's hardwood and mixed-wood forests should have all forest layers present and distributed throughout a stand and across the landscape: canopy, midstory, understory, and ground layer. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0 to 5 feet in height) created via group selection silviculture are of particular importance. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like Canada warbler and black-throated blue warbler. The black-throated blue warbler, prefers continuous tracts of mature forests dominated by deciduous tree species; a moderately open canopy; and a moderate to dense shrub layer (Morse 1994, Dunn and Garrett 1997, DeGraaf and Yamasaki 2001). Improving the diversity in canopy layers of hardwood and mixed-wood forests during management may provide an important habitat component for blackburnian warblers, who are canopy foragers who preferentially breed in forests with substantial cover taller than 60 feet (18 meters) (Morse 1976). Blackburnian warblers are one of six NALCC representative species for northern hardwoods. The Nulhegan Basin CFA falls within Bird Conservation Region 14, and supports 32 percent of the global population of black-throated blue warblers, making their conservation a priority.

Dying, dead, and down trees are important components of forest ecosystems, because during the process of death and decay they are inhabited by an extraordinarily diverse succession of organisms ranging from woodpeckers and other cavity-users, to myriad invertebrates, fungi, and microorganisms. Studies examining snags and downed logs specifically in hardwood and mixed-wood communities has shown timber extraction of the sort that impacted the Nulhegan's forests tends to minimize the number of snags and logs in a stand (Goodburn and Lorimer 1998, Fraver et al. 2002, Hura and Crow 2004). Our management efforts will explicit retain, or where appropriate create, dead wood. Generally, 2-4 large (defined as greater than 20″ DBH) snags per acre is thought to be adequate to maintain most wildlife populations. We will maintain a higher concentration of dead or dying trees in areas that support roosting bat populations. Trees that are >3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat (USFWS 2014).

Extensive and preferential removal of softwood species from the Nulhegan's mixed-wood stands is thought to have reduced the habitat quality of corridors linking large expanses of spruce-fir. Because the problems of forest fragmentation have been documented largely for small patches of forest surrounded by agriculture or suburban development (Gates and Gysel 1978, Wilcove 1985, Fahrig 2003), it is not known how relevant these issues are in forested landscapes that have been fragmented by shifted species composition. Nevertheless restoring red spruce, eastern hemlock, and other softwood species to our mixed-wood stands in proportions closer to historical norms, will improve these corridors for species that may move between patches of spruce-fir forest, including white-tailed deer and American marten.

Management Strategies:
Within 5 years of CCP approval:

- Manage Woodcock Demonstration Management Units (WDMU) following the WDMU Plan.
- Use forest management treatments (commercial and non-commercial) where and when appropriate to improve habitat. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

Within 10 years of CCP approval:

- In managed stands, promote increased compositional and structural heterogeneity, including large-diameter coarse woody debris and snags.
- Stands with late seral characteristics should be conserved wherever they exist, and restored where appropriate within the CFA.
- Use management techniques that emulate natural ecological disturbances (e.g., single tree mortality in late seral stands).
- Enhance representation of more uncommon species, such as yellow birch and eastern hemlock, and conserve as much American beech as possible.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Map vernal pools and seeps.
- Continue to conduct acoustic bat inventories, especially in areas where northern long-eared bats may have been detected during past efforts. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.

Within 10 years of CCP approval:

- Conduct wildlife and habitat surveys to monitor temporal changes and trends resulting from management actions.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide foraging habitat for priority refuge resources of concern including American woodcock and American black duck. Priority will be to maintain the alder-dominated shrub swamps within the woodcock management units.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the Nulhegan Basin. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

American woodcock are dependent on early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood-rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Shrub swamps in the CFA provide moist, rich soils for foraging and the dense shrubs provide cover from predators.

The woodcock management units in the CFA are being managed to provide the mosaic of habitat conditions that woodcock require. Management of the shrub swamp communities may be required to maintain shrub dominance and stem densities. Tree species, such as red maple, tend to replace mature shrub species and established invasive plants compete for nutrients and space. These invading species require management in order to maintain the native shrub diversity of the community. A high shrub stem density is also important as it provides birds with cover from predators and more leaf surface area for gleaning. Cover for American woodcock, for example, is ideal in a 10-15 year old shrub swamp (USDA 2001). Shrub species, in particular alder, tend to die back as they reach maturity, and as a result stem density decreases. Periodic rejuvenation of shrubs is necessary to maintain required stem densities. Management priority will be given to shrub swamps that are part of the CFA woodcock management areas. Management of these shrub swamps will benefit other species that use these communities, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests in the vicinity of foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Management Strategies:
Within 5 years of CCP approval:

- Manage WDMU following the WDMU Plan.
- Create and maintain alder in suitable density and size class to provide quality foraging habitat for American woodcock.
- Manage non-native plant species.
- Assess hydrology of wetland communities, evaluate impacts, and prioritize restoration opportunities.
- Manage beaver created shrub wetlands that provide brood habitat through annual modifications to the beaver trapping program.

- Protect rare or exemplary natural communities.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Monitor American black duck productivity, and use of shrub wetlands.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Peatlands)
Manage peatland communities to support natural and rare ecological communities, and provide breeding and foraging habitat for priority refuge resources of concern including American black duck.

Rationale:
Peatland communities in the Nulhegan Basin CFA occur at the lower elevations. The groundcover in these peatland communities is dominated by sphagnum moss, and the vegetation is semi-treed or dominated by low shrubs, such as sheep laurel and Labrador tea. Sedges and grasses are common in the understory (Gawler 2008). There are several treed bogs in the Nulhegan Basin CFA, including the 75 acre Mollie Beattie Bog, which is among the most significant black spruce bogs in Vermont.

The peatlands that surround McConnell Pond, and those that occur along slow moving streams, including the Yellow Branch of the Nulhegan River, may provide important breeding and foraging habitat for American black duck, and other waterfowl species such as wood duck, mallards, and hooded mergansers. Wetland habitats, such as peatlands, are used by black ducks for breeding and foraging. Well-concealed nests are placed on the ground in adjacent uplands or dry hummocks in the wetland, and adult ducks and their broods forage on seeds and herbaceous vegetation of sedges, rushes, and submerged aquatic plants, as well as invertebrates (Longcore et al. 2000, DeGraaf and Yamasaki 2001).

American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these peatland wetland communities from potential threats, including invasive species introduction, and altered hydrology will contribute to the conservation of this species.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Minimize refuge activities that disturb wetland communities.
- Protect rare or exemplary natural communities.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Continue to survey wildlife use of wetlands.

Sub-objective 1.2b. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect or restore habitats, absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The biological integrity, diversity, and environmental health (BIDEH) policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Nulhegan Basin CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (i.e., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water Habitat)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and unimpeded aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout. Also provide undisturbed breeding and foraging habitat for American black duck, and other waterfowl species.

Rationale:
The Nulhegan River and three of its four major tributaries— the North, Yellow, and Black branches—flow through the Nulhegan Basin CFA. These cold water rivers provide important habitat for brook trout. This species is a high priority for conservation for the State and the Service's Northeast Region. Native brook trout populations are also present in Lewis and McConnell Ponds within the CFA.

Since the late 1800s, timber harvesting and associated activities have impacted riparian habitats within the Nulhegan Basin CFA. Rivers were reshaped; trees removed from river banks, and constructed logging roads impeded aquatic species passage. A change in stream habitat characteristics resulted, impacting fish populations. The refuge, Trout Unlimited, and the VFWD recognize the importance of restoring, protecting, and maintaining populations and habitats of brook trout and other aquatic species of concern. Efforts are underway to assess current habitat conditions, and prioritize restoration efforts.

VFWD also have concerns with the introduction and recruitment of smallmouth bass into Lewis Pond. Smallmouth bass prey on brook trout, and inventories have determined that brook trout populations are decreasing, while smallmouth bass populations are on the rise. Monitoring of Lewis Pond fish populations will continue, and appropriate management actions will be determined.

McConnell and Lewis Ponds, and the surrounding wetland habitats, are also important breeding and foraging areas for waterfowl species. Mergansers, wood ducks, mallards and black ducks forage on invertebrates and aquatic vegetation in backwater areas, and adjacent wetlands. Common loons are often found feeding on small fish in Lewis Pond, though breeding has not been confirmed.

Management Strategies:
Within 5 years of CCP approval:

- Continue to support partners in performing stream assessments to evaluate physical, chemical, and biological condition of the Nulhegan Basin Division's fish community structure, productivity, and health; and support in-stream habitat restoration efforts.

- Continue to support partners in performing stream assessments to identify man-made physical barriers (impassable road crossings, culverts and dams) to movement of fish and other aquatic organisms, implement a remediation plan of identified obstacles to aquatic species passage. Work with partners to identify and replace undersized culverts important to the restoration of aquatic organism passage.

- In coordination with VFWD, develop and implement a plan for elimination of the non-native smallmouth bass, fathead minnow, and other non-native species in Lewis Pond.

Within 10 years of CCP approval:

- Develop a plan for protection or restoration of native races of brook trout in North Branch, Yellow, and Black Branches of Nulhegan River.

- Develop and implement a plan for remediation and enhancement of stream morphology (instream habitat) in support of brook trout populations (e.g., recruitment of large woody debris).

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Perform habitat surveys and quantification of potential spawning and nursery habitat for brook trout in the Nulhegan River North, Yellow, and Black Branches.

Within 10 years of CCP approval:

- Assess status of brook trout populations, including genetic characteristics, in all waters of the Nulhegan Basin Division.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable to the Nulhegan Basin CFA

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable to the Nulhegan Basin CFA

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Work with communities, school systems, public and non-profit organizations, and private educational organizations to develop quality model environmental education curricula and to recruit and develop individuals to conduct high quality environmental education at the Nulhegan Basin Division. Priority will be given to programs for those residents within the communities local to the Nulhegan Basin Division, including, but not limited to Bloomfield, Brunswick, Ferdinand, and Brighton, VT, and North Stratford, NH. Further priority will be given to participants within a 1-hour commute of the division. Environmental education programs will be designed to:

- Take into account the needs of the target audience, as well as the relevance to the target audience's everyday lives.
- Be student and community-centered.
- Be curriculum-based, with goals and measurable objectives.
- Be inquiry driven and involve direct experiences with nature.
- Involve educators in the development and implementation.
- Be linked to multiple relevant learning standards.
- Coordinate with state and private environmental education programs.

- Relate to refuge management goals, objectives, and purposes.
- Have tools for evaluation and measurable outcomes throughout development and execution.
- Involve repeated contact with the same students.
- Be sustainable (i.e., have the resources necessary to continue over the long term).
- Involve interactions that occur in the natural, the built/developed, and the social environment.
- Aim to develop awareness, attitudes, understanding, skills, and feelings of empowerment.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Because the Nulhegan Basin Division does not have full time visitor services staff, environmental education efforts must be conducted through volunteers, Friends members, and partners.

Management Strategies:
Within 5 years of CCP approval:

- Design or adapt curricula for the Nulhegan Basin Division that focuses on watersheds, on local habitats, and on local natural and cultural resources. Curricula will:
  - ✓ Incorporate multiple relevant learning standards.
  - ✓ Coordinate with existing state and national environmental education programs.
  - ✓ Take into account student and teacher needs.
  - ✓ Be refuge- and/or place-based.
  - ✓ Incorporate nationally recognized education initiatives, when appropriate.
  - ✓ Be designed with specific goals and objectives.
  - ✓ Promote refuge purposes.
  - ✓ Contain consistent interpretive messages and themes.
  - ✓ Promote other refuge divisions and partner-conserved lands and facilities such as state wildlife management areas and parks, science museums, and nature centers as environmental education resources.
  - ✓ Incorporate nationally recognized initiatives (e.g., North American Association of Environmental Education (NAAEE), and Science, Technology, Engineering, and Math (STEM)).
  - ✓ Incorporate national based curricula (e.g., Project WILD, Project Aquatic WILD, Project WET, Flying Wild, and Project Learning Tree).
- Identify and strive to engage non-traditional audiences regarding environmental education opportunities.
- Support the Service's initiatives with regards to environmental education.
- Promote the Nulhegan Basin Division as a destination for field trips and increase the number of students by two percent per year for the next five years.

- Provide support for curriculum-based programs such as Scouts, 4H, Boys and Girls Clubs, Road Scholar (former ElderHostel program), etc.
- Support state environmental education programs (e.g., Hunter and Angler Education, Furbearer Education, Becoming a Great Outdoors Woman, etc.)
- Keep current with state-of-the-art technologies and incorporate them into environmental education programming.
- Work with academic institutions to create issue-oriented experiential activities and programs for use at the Nulhegan Basin Division.

Within 10 years of CCP approval:
- Offer the Nulhegan Basin Division as an outdoor classroom.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Develop an evaluation system to assess the effectiveness of all environmental education curricula.

Sub-objective 2.1b. (Environmental Education Delivery)
In collaboration with other government agencies, non-profit organizations, private educational organizations, staff, volunteers, and members of the Friends of the Nulhegan, offer high quality environmental education programs at the Nulhegan Basin Division, at partner lands and facilities, and at schools in Essex County, VT, and Coos County, NH. The refuge will seek to:

- Facilitate partnerships between local schools within a maximum 1-hour commute of the Nulhegan Basin Division, such as Brighton Elementary and North Stratford School and private environmental education providers to offer experiential refuge programming to these audiences multiple times per year.
- Facilitate the use of refuge and partner lands by educator-led classes.
- Work with local environmental education providers to implement the refuge's Adopt-a-Habitat initiative to help schools and individuals learn about and connect with natural features their local environments.

Rationale:
See rationale for sub-objective 2.1a.

Management Strategies:
Within 5 years of CCP approval:
- Facilitate partnerships between local schools, such as Brighton Elementary and North Stratford School, and private environmental education providers to offer experiential refuge programming to these audiences multiple times per year.
- Use staff, volunteers, and members of the Friends Group to facilitate teachers and students at the Nulhegan Basin Division. The intention is to host up to 10 classes the first year and increase the number of students by 2 percent per year for the next 5 years.
- Promote partner lands and facilities as outdoor classrooms; help deliver priority educational programs at those partner facilities.
- Actively support and recruit partners that seek funding for watershed-based environmental education.
- Allow commercial guiding for the purposes of environmental education, pursuant to the conditions of a special use permit.

Within 10 years of CCP approval:
- Formalize cooperative relationships with environmental education providers through development of agreements and MOUs.

- Develop more detailed environmental education objectives and strategies as part of a Visitor Services Plan.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Formally evaluate the quality of existing environmental education program and as a result of evaluation, plan for the next 5 years.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
Work with communities, public and non-profit organizations, private individuals and for-profit organizations, staff, volunteers, and members of Friends groups to offer quality interpretive programming at the Nulhegan Basin Division.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an expansive road network and multiple trails on site, and a rich natural, cultural, and geologic history, the Nulhegan Basin Division is well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the habitats and cultural resources found on the property. Interpreting the stories about these resources in an effective manner is an important responsibility for the Service. Maps A.62 and A.63 show the existing and planned public use trails on the division.

Management Strategies:
Within 5 years of CCP approval:
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.
- Collaborate with partners to create meaningful, consistent, thematic statements to be used in the delivery of programming at the Nulhegan Basin Division.
- Offer opportunities for commercially available interpretive guiding through the special use permit process.
- Develop more detailed interpretive objectives and strategies as part of a Visitor Services Plan.
- Develop a core set of interpretive programs that can be modified on an as needed basis.
- Provide resources and trainings to refuge staff, Friends, and volunteers in support of interpretive programs.

Within 10 years of CCP approval:
- Develop self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Establish relationships with tribes and local historical societies to incorporate cultural history into interpretive programs.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members and the general public, with priority given to refuge affiliates.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Build a process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with partners to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Through cooperative agreements with local organizations, annually provide quality interpretive programs at refuge facilities and properties.
- Initiate a "refuge host" program, or utilize SCA interns and volunteers to provide personal contacts at the visitor contact station to initiate discussion and answer questions, at least between Memorial Day and Labor Day.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge Web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures (e.g., general brochure and bird checklist that incorporate refuge interpretive messages and themes).
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of CCP approval:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Evaluate the effectiveness of interpretive materials/programs.

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Sub-objective 2.3a. (Local Residents, Community Leaders, and Elected Officials)
Through effective outreach, the refuge will work to increase public awareness of the benefits of Nulhegan Basin Division within the surrounding communities. Individuals will become aware of public offerings, resources, and programs offered at the Nulhegan Basin Division, and of the interpretive messages of the Silvio O. Conte National Fish and Wildlife Refuge.

Rationale:
Strategic, quality outreach targeted at specific audiences is vital to communicate with individuals about watershed and refuge concerns, to work toward a shared vision for the Connecticut River watershed and to gain support for refuge activities. Nulhegan Basin Division lands were originally part of a much larger holding of industrial timber lands. Therefore, in addition to a differing land management philosophy, there are also some activities once allowed that have changed due to safety considerations, natural resource concerns, as well as, overall compliance with Refuge System regulations. As a result of that history, many local residents and long-time users are curious about possible changes and future planning for the area. It is critically important to keep people informed of all management and recreational activities occurring and planned for Nulhegan Basin Division lands and to keep communication open to prevent misunderstandings.

Management Strategies:
Continue to:

- Prepare an annual summary of activities at the division and circulate to local governments, elected officials, partner organizations, and post for the general public.
- Continue to nurture a relationship with Brighton and Maidstone State Parks related to the cross-promotion of each facility's public offerings.

Within 5 years of CCP approval:

- Maintain good lines of communication with refuge neighbors and community leaders.
- Develop consistent outreach messages.
- Attend select board/board of governors and Chamber of Commerce meetings, and visit town clerks, planners and other elected officials as needed to keep them apprised of refuge issues and projects.
- Host open houses to introduce residents and local officials to the refuge.
- Provide refuge publications, posters, and other outreach materials to interested businesses and partner facilities in northern Essex County, whose customers may have an interest in refuge offerings.
- Write issue driven outreach plans to keep elected officials informed of refuge and partner accomplishments and of issues within the larger watershed that have possible impacts to the refuge.
- Proactively schedule consistent meetings with elected officials to share and update each other on constituent concerns and opportunities.
- Develop messages and actions that describe the division's benefits to the local community. Examples include: environmental education and interpretation programming, special events hosted for the community, employment for local youth through Youth Conservation Corps (YCC), mutual aid agreements, etc.
- Develop Conte Corners at the welcome centers in Island Pond and St. Johnsbury, Vermont.

Within 10 years of CCP approval:

- Develop and implement an outreach plan for communicating with area residents about the importance of this area to the larger watershed and describe how they can contribute to improving watershed quality. Possible components will include demonstration sites, behind-the-scene tours, special open houses, and technical publications.

Sub-objective 2.3b. (State and National-level Elected Officials)
Through effective outreach to Congress and State officials, as needed, the refuge will work to increase awareness of the benefits of Nulhegan Basin Division and the Silvio O. Conte National Fish and Wildlife Refuge.

Rationale:
See rationale for sub-objective 2.3a.

Management Strategies:
Within 5 years of CCP approval:

- Provide briefings to members of Congress and state officials, or their staff as needed or as requested.

Within 10 years of CCP approval:

- Monitor and evaluate the need for future outreach efforts.

Sub-objective 2.3c. (Media)
Through effective outreach to the media, the refuge will work to increase public awareness of the Nulhegan Basin Division and the Silvio O. Conte National Fish and Wildlife Refuge within the surrounding communities. Individuals will become aware of public offerings, resources, and programs offered at the Nulhegan Basin Division, and of the interpretive messages of the Silvio O. Conte National Fish and Wildlife Refuge.

Rationale:
See rationale for sub-objective 2.3a.

Management Strategies:
Within 5 years of CCP approval:

- Write press releases detailing large refuge projects and accomplishments, and the joint efforts and accomplishments of the refuge and refuge partners.
- Develop and implement an outreach plan that uses state of the art technology to disseminate program information and division offerings to the public.
- Host local media representatives at the Nulhegan Basin Division.
- Routinely use community-based outreach methods, such as newspapers and local access television to publicize refuge events and run public service programming on environmental issues.

Within 10 years of CCP approval:

- Monitor and evaluate the need for future outreach efforts.

Sub-objective 2.3d. (Greater Watershed Community)
Through effective outreach, the refuge will work to increase public awareness of the Nulhegan Basin Division and the Silvio O. Conte National Fish and Wildlife Refuge within the greater watershed communities. Individuals will become aware of public offerings, resources, and programs offered at the Nulhegan Basin Division, and of the interpretive messages of the Silvio O. Conte National Fish and Wildlife Refuge.

Rationale:
See rationale for sub-objective 2.3a.

Management Strategies:
Within 5 years of CCP approval:

- Encourage landowners to take advantage of cooperative land management programs available through the Service and other agencies such as Natural Resources Conservation Service (NRCS) as a way of enhancing environmental quality on and around the refuge.
- Draft annual reports that introduce residents to the refuge, describe refuge accomplishments, detail visitor opportunities, and discuss refuge operations and current and future refuge projects.
- Implement an Adopt-a-Habitat program to be used in part as an outreach tool for schools and community residents to learn about and become stewards of their local environment.
- Promote the refuge as a destination for recreation, interpretation, and environmental education opportunities.
- Promote refuge lands for special events such as National Wildlife Refuge Week, International Migratory Bird Day, Earth Day, etc.
- Use the WoW Express as an outreach tool to connect with audiences throughout the watershed at fairs, festivals, etc.
- Support the Friends of the Nulhegan.
- Provide outreach materials at partners' facilities.
- Promote cooperation with partners for the use of facilities, programs, and staff when conducting outreach.

Within 10 years of CCP approval:

- Produce conservation messages that reach a wide range of audiences through a variety of media (e.g., print, broadcast, social media).

- With partners, explore communication strategies to reach targeted audiences with common messages.
- Sponsor at least one Bio Blitz on refuge lands in each state, and ultimately in each division/or local community in conjunction with Adopt-a-Habitat program.
- Monitor and evaluate the need for future outreach efforts.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Sub-objective 2.4a. (Institutions of Higher Learning and Other Partners)
Develop relationships with institutions of higher learning and other partners conducting conservation research relevant to the Division's focal species such as the University of Vermont and Lyndon State College, and private organizations, such as the Vermont Institute of Natural Science and Vermont Center for Eco-studies and encourage their use of refuge lands for wildlife-related research. Take advantage of partners' scientific based resources and enlist partners in Strategic Habitat Conservation and other resource protection activities.

Rationale:
One of the six legislative purposes guiding the establishment of the Silvio O. Conte National Fish and Wildlife Refuge is "to provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access to the extent compatible with other purposes . . ." The Nulhegan Basin Division is actively managed and roughly one hour from Lyndon State College, while the University of Vermont is two hours away. The abundance of natural and cultural resources in the local area makes the Nulhegan Basin Division a key resource for students looking for mentoring experiences, and for students looking to conduct research projects relating to conservation, wildlife management, resource protection, and human dimensions. Similarly, student research will benefit the refuge by answering management questions, and helping to guide management strategies.

Management Strategies:
Continue to:
- Work with partners to conduct research relevant to refuge management issues.
- Support the Northern Forest Land Management Research Demonstration (LMRD) project by actively participating in planning efforts and implementing appropriate land treatment efforts.
- Implement the American woodcock habitat demonstration project.

Within 5 years of CCP approval:
- Formulate a list of important natural resource research questions of management importance to the Division and Northern Forest and share them with colleges and universities as possible graduate and undergraduate research projects.
- Develop formal agreements with Cooperative Wildlife Research Units, universities, and other partners to answer the Conte Refuge's most critical research needs.
- In collaboration with the Friends of Conte, seek funding for high priority research.

Within 10 years of CCP approval:
- Support the development of new appropriate research projects on refuge lands, as well as continue to support current research projects on refuge lands. See chapter 3 in the CCP for a description of current research projects.
- Identify opportunities for LMRD projects on lands adjoining the Division.

- Promote refuge lands to universities and other partners as a location for conservation and cultural resource-related research.

Sub-objective 2.4b. (Technology and Information Exchange)
Participate, coordinate, and/or host professional conferences, workshops and seminars related to wildlife biology, wildlife management, environmental education and interpretation at the Nulhegan Basin Division.

Rationale:
See rationale for sub-objective 2.4a.

Management Strategies:
Within 5 years of CCP approval:

- Encourage staff to participate in relevant, natural and cultural resource conferences that will contribute to making good decisions.
- Distribute 'lessons learned' from refuge management to interested parties.
- Provide inventory and monitoring summaries through the refuge Web site.

Within 10 years of CCP approval:

- Sponsor/host science based conferences as opportunities arise.

Sub-objective 2.4c. (Mentoring)
Provide quality mentoring opportunities for local students and interested individuals.

Rationale:
See rationale for sub-objective 2.4a.

Management Strategies:
Continue to:

- Host a YCC crew and spend staff time with members informing them of refuge job duties and career options within the Service.

Within 5 years of CCP approval:

- Offer student internships and host field trips.
- Offer to periodically present refuge and career information to classes at local high schools and colleges.
- Seek opportunities to participate in student workshops, trainings, and events.

Within 10 years of CCP approval

- Develop a mentoring program to work with students to help them identify their career goals and introduce career paths within the Service.
- Participate in undergraduate and graduate level classes at local universities and colleges, presenting information on various topics and issues of importance to the refuge.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

The Nulhegan Basin Division's lands are open to the public 24 hours a day, 7 days a week. A network of snowmobile trails provides winter access. The road network is gated to wheeled vehicles during spring mud season, which usually lasts from mid-April through late May. During this time, only pedestrian access is allowed.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following State- and refuge division-specific regulations.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. The Nulhegan Basin Division has been a popular area for hunters extending back for generations. The refuge lands are especially prized for the opportunities to hunt American woodcock, ruffed grouse, snowshoe hare, moose, and white-tailed deer. Some of these species, especially woodcock, grouse, and moose, are hunted by residents as well as, non-residents, many of whom travel to the area from other northeastern states, while white-tailed deer, grouse, and snowshoe hare are more sought after by local residents and the camp leaseholders and their friends who maintain cabins both on the refuge and surrounding lands. Hunting guides can aid the local economy and enhance a users' experience, especially for those individuals from outside the immediate area. Refer to Appendix D, "Findings of Appropriateness and Compatibility Determinations," for additional details on how the use will be allowed.

Management Strategies:
Continue to:

- Allow hunting based on VFWD regulations and the following division-specific regulations:
  - ✓ Shooting across, over, or within 10 feet of the traveled portion of any gravel road is prohibited.
  - ✓ Temporary blinds are permitted, but must have the owner's name and address visible on the blind.
  - ✓ All decoys, shell casings, and other personal equipment and refuse must be removed from the refuge at the end of each day.
  - ✓ We allow the use of retrieving, flushing, pointing, and pursuit dogs; however dogs must be under control as is reasonable and customary for that activity, such as voice command or remote telemetry.
  - ✓ We prohibit the use of all-terrain vehicles (ATVs or OHVs).
  - ✓ The use or possession of alcoholic beverages while hunting is prohibited.
  - ✓ Nighttime raccoon hunting with dogs requires a special use permit.

Within 1 year of CCP approval:

- Update the refuge-specific CFR regulations to clarify that the prohibition on shooting across "the traveled portion of any gravel road" only applies to roads that are contemporaneously open to motor vehicles.
- Update the refuge-specific CFR regulations to note that any nighttime hunting will require a special use permit.
- Maintain a contact list of those individuals training and/or hunting with pursuit hounds (bobcat, bear, coyote) on the refuge, as well as those training beagles in order to share information regarding the identification of lynx and their sign and proper conduct when lynx are present (e.g., leashing and removing hounds from the area) as well as a means to contact users immediately should critical information become available (e.g., the discovery of a lynx den).
- Request that the VFWD promote hunting by featuring refuge opportunities in their annual hunting and fishing digest; also use the digest to describe any refuge-specific regulations.
- Ensure any necessary safety zone (i.e., no hunting zone) around the division's headquarters and visitor contact station are clearly marked on refuge brochures, hunt maps, and signs.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

Within 5 years of CCP approval:

- Complete hunting opening package to formally open newly acquired lands to hunting, consistent with compatibility determinations.
- Work with the VFWD to determine whether opportunities exist for state-recognized disabled hunters, and if so, identify potentially new infrastructure needs.
- Mow 1 mile of former logging haul road annually to provide enhanced hunter access.
- Mow roadside "pullouts" on a 2 to 3 year rotation to allow enhanced hunter access.
- Offer opportunities for commercial hunting guides to operate on the division through the issuance of a special use permit.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with VFWD to evaluate the effectiveness and success of the refuge hunt program in contributing to State population objectives.
- Develop a system to monitor and evaluate the hunting program; involve hunters and other users in collecting feedback; determine whether refuge management objectives are being met; and allow for adaptive management.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide State-sponsored hunter education classes access to the Nulhegan Basin Division. Conduct directed outreach to ensure hunters are informed about refuge-specific regulations, hunter ethics, and safety considerations. Develop programs, including brochures, web pages, media releases, etc.

Rationale:
Hunting is a priority public use that can also serve as a population management tool. Providing hunter education instructors the opportunity to use the division with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience. The division's visitor contact station and its surrounding grounds provide an ideal setting for this type of instruction. In addition, the meeting space and grounds can also be used for complete onsite archery programs, directed by volunteers, with staff support.

Management Strategies:
Continue to:

- Work with VFWD to inform hunters of the field identification differences between bobcat and federally threatened Canada lynx, and ruffed grouse (i.e., partridge) and the State-endangered spruce grouse with flyers at division kiosks, the refuge Web site, etc.
- Offer to host VFWD-sponsored hunter education courses at the division's visitor contact station.

Within 1 year of CCP approval:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at Nulhegan Basin Division informational kiosks, through the Friends of the Nulhegan, and in local businesses.
- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.
- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Work with VFWD to encourage youth hunting at the division as a means of introducing young people to hunting.
- Offer division facilities and staff to guide and support volunteer "Becoming a Bowhunter"- type programs.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Nulhegan Basin Division. Complete all administrative procedures to officially open refuge lands to fishing, based on VFWD regulations, and any division-specific conditions.

Rationale:
Fishing is a priority public use on national wildlife refuges and a popular outdoor recreational activity. The division has been open to fishing since establishment and we plan to continue to offer this use. Although fishing is not as popular as hunting or wildlife observation at the Nulhegan Basin Division, there are opportunities for visitors to fish Lewis Pond and the Black and North Branches of the Nulhegan River. Fishing guides can aid the local economy and enhance a users' experience, especially for those individuals from outside the immediate area. Most anglers seek out brook, brown, and rainbow trout, although Lewis Pond had been stocked illicitly with smallmouth bass in the past. Each year, the VFWD stocks Lewis Pond with roughly 2,000 fall fingerling brook trout and the Black Branch of the Nulhegan River with approximately 100 yearling brook trout. They also stock the main stem Nulhegan River with 100 yearling brook trout, which can easily make their way into the refuge. Map A.82 shows fishing access points.

Management Strategies:
Continue to:

- Provide the opportunity for a quality fishing experience on ponds, rivers, and streams at the Nulhegan Basin Division, wherever feasible.

Within 1 year of CCP approval:

- Complete all administrative requirements to maintain fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Publicize the access and fishing opportunities provided to anglers via the newly opened North Branch Trail.
- Open newly acquired lands to fishing, consistent with the final approved compatibility determination.

Within 5 years of CCP approval:

- Work with the VFWD to develop additional fishing access points for the North and Black Branches.
- Work with VFWD to explore restoring a native cold-water trout fishery to Lewis Pond, including outreach to camp leaseholders and visitors about the consequences of introducing bass. Any pond-wide reclamation effort involving the use of chemicals will adhere to all Service, Federal, and State environmental regulations.
- Offer opportunities for commercial fishing guides to operate on the division through the issuance of a special use permit.
- Assess user interest in an ADA-compliant fishing access site at Lewis Pond or McConnell Pond (subject to Service acquisition).

- If the larger tract is acquired by the Service, construct a car-top boat launch at McConnell Pond.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:
- Develop a system to monitor and evaluate the fishing program; involve anglers and other users in collecting feedback; determine whether refuge management objectives are being met; and allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, Web site pages, media releases, etc. to inform visitors of fishing opportunities at the division.

Rationale:
Both the VFWD and Trout Unlimited are important partners. Opportunities exist to work with both of these entities to develop a closer link to the neighboring communities with fishing by creating fishing maps and publications and hosting fly-tying, fly-casting, or other fishing-related seminars at the visitor contact station.

Management Strategies:
Continue to:
- Offer the visitor contact station as a site to host fly-tying and other fishing-related seminars. Focus on expanding efforts to engage women and children.

Within 1 year of CCP approval:
- Inform the VFWD and private partners of the availability of the visitor contact station to host a "Take Me Fishing" event.

- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Within 5 years of CCP approval:
- Work with the VFWD and Trout Unlimited to highlight the native brook trout fishery on the division.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Nulhegan Basin Division by maintaining existing and planned trails and parking areas, watercraft launch sites, tour routes, and commercially guided activities, as compatible.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity at the Nulhegan Basin Division. The division's landscape is vast, with nearly unlimited wildlife viewing opportunities, although unlike many refuges, its formal infrastructure is both limited and rustic. Moose is perhaps the single most desired animal for wildlife viewing. The division also hosts nearly 100 species of nesting birds, principally, forest-dependent songbirds, and the woods are alive with their songs during the May—June breeding season. In particular, experienced bird watchers are drawn to the Nulhegan Basin Division for the opportunity to view four boreal species typically found much further north: spruce grouse, black-backed woodpecker, gray jay, and boreal chickadee. Currently, visitors can travel the nearly 40 miles of gravel roads, five miles of developed hiking trail, and dozens of miles of old logging roads to pursue wildlife observation and photography opportunities.

User groups with an existing presence in the area requested certain infrastructure additions, such as a hiking trail originating at the Lewis Pond Overlook, a riverside campsite on the Nulhegan River below the visitor contact station, and a canoe/kayak launch at the junction of the Nulhegan River and Route 105. In all cases, these improvements build on and encourage use of existing infrastructure, provide additional visitor opportunities to observe and experience wildlife in a variety of forms, and offer a means to connect varied audiences with the refuge and National Wildlife Refuge System. In addition, three rustic fishing access sites, consisting of a signpost and footpath, are planned as a means of showing visitors with little knowledge of the division, potential fishing locations. A rustic "backcountry" trail loop is planned as a means of incorporating existing logging haul roads into a trail without the amenities found on the other division trails, thereby providing a slightly different experience for bird watchers and as an access point for hunters. Lastly, if the McConnell Pond tract is acquired as planned, the road leading to McConnell Pond will be opened to the public and maintained as a primary road, and a car-top boat launch will be established.

Management Strategies:
Continue to:

- Allow wildlife observation and photography throughout the Nulhegan Basin Division.
- Maintain the current visitor infrastructure including the Nulhegan River Trail, North Branch Trail, Mollie Beattie Bog Boardwalk, Headquarters Overlook, Lewis Pond Overlook, kiosks, and parking areas.
- Invest a majority of our road maintenance funds in our principal road network (Stone Dam, Canal, Eagle's Nest, Upper Lewis Pond, Lewis Pond Overlook, and Four Mile Roads), such that they are accessible to a wide range of visitors, including those with passenger cars and trucks.
- Support Northeast Kingdom Audubon's public bird watching trips.

Within 1 year of CCP approval:

- As an enhancement to the visitor experience and as an aid to the local economy, allow for professionally guided wildlife tours, subject to compatibility and a special use permit.
- Allow photography blinds on the division that do not negatively impact wildlife behavior. Blinds must be removed each day, unless arrangements have been made via special use permit.

Within 5 years of CCP approval:

- Construct a 1.3 mile native surface loop trail (0.5 miles of which is existing, cleared trail) with its trailhead at the Lewis Pond Overlook. The trail will be built to the "rustic" standards found elsewhere on the surrounding publicly accessible lands, with minimal vegetation clearing.
- If interest exists, convert 4.2 miles of primarily former logging roads to a "back country" trail that is minimally maintained (i.e., native surface, no structural improvement, only vegetation trimming), and have limited signage.
- Offer opportunities for commercial wildlife observation guides to operate on the division through the issuance of a special use permit.

Within 15 years of CCP approval:

- Evaluate feasibility of providing safe motor vehicle access from McConnell Pond Road (if acquired by the Service) to serve as a second, direct access point to the division. This will require sufficient funding to rebuild one to two miles of road and construct a new bridge.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the wildlife observation and photography program on the refuge.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people that visit the division. Work closely with the Friends of Nulhegan and other partners who host events designed to view wildlife on the division.

Rationale:
The entire division is available for wildlife observation and photography. A modest amount of printed and electronic observation and photography aids currently exist, but such materials can be expanded to include a wider range of wildlife and habitats. Whenever possible, we will try to use new technologies to help enhance viewing opportunities on the refuge (e.g., online materials, social media sites, applications for mobile devices). Unfortunately, much of this is dependent on cell phone coverage, which is poor within the division. Should service improve in the next decade, this can be a valuable tool for informing the public across a large landscape in a self-directed way.

Management Strategies:
Continue to:

- Provide the Nulhegan Basin Division bird guide at kiosks, the visitor contact station, and on the refuge Web site.

Within 5 years of CCP approval:

- Create additional species guides, such as guides for butterflies and moths, amphibians, and mammals. Include a map within the guides that identifies "hotspots" where viewing opportunities are more likely and also encompass varied habitat types. Make these guides available at kiosks, the visitor contact station, and on the refuge Web site. Explore the feasibility of using social media to distribute species lists.

- Support wildlife observation events led by partners, organizations including International Migratory Bird Day, Big Sit, etc.

Within 10 years of CCP approval:

- Explore the feasibility of using cell phone technology to advance a users' experience, such as phone applications, QR codes, or calling codes that will enable visitors to learn about various natural features while on the division.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Develop compatible opportunities on Nulhegan Basin Division that promote state and watershed-wide initiatives that facilitate wildlife observation and photography, such as the Connecticut River Birding Trail and state roadside wildlife viewing areas, and which raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
The Nulhegan Basin Division's visitor contact station hosts more than 4,500 visitors annually. Many of these visitors are from outside the local area and are looking for accessible wildlife viewing opportunities.

Management Strategies:
Continue to:

- Promote the Connecticut River Birding Trail by emphasizing the Nulhegan Basin Division as one of the featured locations and by making the guides available at the visitor contact station.

Within 1 year of CCP approval:

- Make guides and published materials supporting the Connecticut River Byway and the Connecticut River Blueway available at the visitor contact station.

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities)
Develop compatible opportunities on the Nulhegan Basin Division that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
The division benefits directly with the Nulhegan River's inclusion in the Northern Forest Canoe Trail, a 740-mile water trail from upstate New York to Maine. Hundreds use the trail each year; some are "through" paddlers, while others paddle shorter sections of less than a day to several days. The division has the opportunity to connect with this user group by making the visitor contact station and the division's other resources available to them. Map A.84 shows the Northern Forest Canoe Trail campsite and a planned canoe/kayak launch site on the division.

The Connecticut River Paddlers' Trail passes through Bloomfield, Vermont, six miles from the visitor contact station. This is a relatively new initiative with the ambitious goal of creating a formal water trail, with launching areas and campsites for the 410-mile length of the Connecticut River. There are benefits to partnering with this organization given the likely overlap in user groups.

Management Strategies:
Within 1 year of CCP approval:

- Support the Northern Forest Canoe Trail and Connecticut River Paddlers' Trail by offering their literature to the public at the visitor contact station.

- Allow the Northern Forest Canoe Trail to construct canoe/kayak launching and landing sites (floating log ladder or stone water-land transition area) on the Nulhegan River:

  (1) Below the visitor contact station to support access to a planned campsite.

  (2) At the Nulhegan River/Route 105 crossing near Stone Dam Road to formalize an existing launching site adjacent to a state-maintained parking area. In addition to construction and on-going maintenance, the Northern Forest Canoe Trail will be responsible for obtaining any necessary permits.

- Allow the Northern Forest Canoe Trail to construct a primitive campsite and 500-foot native surface trail linkage from the Nulhegan River Trail to support long-distance paddlers and to establish a physical link between the water trail and the refuge via its visitor contact station. The campsite will include a cleared space for up to two tents, a picnic table, and a privy. The Northern Forest Canoe Trail's local river steward will be responsible for site maintenance. Refer to Appendix D, "Findings of Appropriateness and Compatibility Determinations," for additional details regarding use of the campsite.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities)
Develop compatible opportunities on the Nulhegan Basin Division that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
The Nulhegan Basin Division's size, road network, and proximity to regional trails present several opportunities to link with other existing land-based trails. The division is an important "hub" within the Vermont Association of Snow Travelers (VAST) snowmobile trail network in northern Essex County. Snowmobiling in this area preceded establishment of the division and continues to be a significant means of allowing the public access to the division's resources during a quarter of the year. Although snowmobiling accounts for the greatest amount of public use, the visitor contact station is only lightly used during winter; such use could increase significantly provided a connection to the trail network is established. The division's lands also offers connections to regional hiking and potentially, equestrian trails. Map A.83 shows the snowmobiling network on the division.

Management Strategies:
Continue to:

- Work with VAST to maintain and operate a snowmobile trail system on the division that provides opportunities to experience the division's habitats and wildlife, while also retaining important trail connections across the larger network. Virtually all of this network will overlay existing gravel roads. A 35 mph speed limit will be enforced. Refer to Appendix D, "Findings of Appropriateness and Compatibility Determinations," for additional details on how the use will be allowed.

Within 1 year of CCP approval:

- Allow VAST to construct an access trail to the visitor contact station, so that the thousands of annual snowmobilers will benefit from the exhibits and other services available at the contact station. This will entail building a 1.4-mile spur primarily across Plum Creek Timber Company lands and will therefore require the approval of Plum Creek and the Vermont Land Trust. Less than 500 feet of the new trail will occur on refuge land.

  ✓ In order to compensate for the 1.4 miles of new trail construction, approximately 1.1 miles of non-essential, redundant trail segment will be closed:

  ✳ Approximately 1.1 miles of secondary trail C102/114 between EX22 and EX32 (one-half of a small loop) on the McConnell Pond tract (if acquired by the Service).

  ✳ Such closures will only be implemented if and when the new trail is completed and open to the public.

- Open snowmobile trails to pedestrian uses, such as snowshoeing and cross-country skiing, as is similar to adjacent public lands.

- Partner with the Green Mountain Club to construct a 1.4-mile hiking trail segment to incorporate the division into their Gore Mountain Trail. This trail will originate at the Lewis Pond Overlook parking area and much of it will occur on Plum Creek Timber Company lands and will therefore require the approval of Plum Creek and the Vermont Land Trust. It will be built to a standard similar to other regional hiking trails, with a mineral soil tread and minimal vegetation clearing.

Within 5 years of CCP approval:

- If acquired by the Service, formalize a portion of the VAST network on the McConnell Pond tract as part of the established refuge network, subject to the compatibility determination findings.

Within 15 years of CCP approval:

- Evaluate whether refuge lands can form a continuous connection with the established equestrian trail on West Mountain Wildlife Management Area. If found appropriate and compatible, a portion of the division's gravel road network will be incorporated into the larger trail system.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)

Allow compatible outdoor recreational opportunities on the Nulhegan Basin Division that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:

In addition to the priority public uses, there are other appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the division. Maps A.62 and A.63 show the public use infrastructure on the division.

Management Strategies:

Continue to:

- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.

- Allow hiking both on and off the developed trail network.

- Allow occupancy and use of private recreational cabins on existing division lands subject to the terms of the established special use permit.

Within 1 year of CCP approval:

- When compatible, allow commercial guiding in support of priority public uses by special use permit.

- Allow snowshoeing and cross-country skiing everywhere on the division, including the VAST snowmobile network.
- Allow bicycling on the formal gravel road network (i.e., those named roads available to motor vehicle travel) during the snow-free season.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.

Within 5 years of CCP approval:

- Work with the Friends of Nulhegan to design and promote a virtual geocache course that integrates orienteering with refuge interpretive messages and that links the Nulhegan Basin Division to other refuge divisions.
- If the Service acquires the McConnell Pond tract, establish a special use permit for administration of any private recreational cabins acquired along with the tract. Similar to existing cabins on the division, those cabins occurring on the McConnell Pond tract will follow the same special use permit conditions (refer to appendix D) and leases will also terminate no later than July 21, 2049, pending negotiations with the current landowner.

Ompompanoosuc River Conservation Focus Area

Vershire, Fairlee, and West Fairlee, Vermont

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	15,072	98 %
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*15,072*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	311	2 %
Total Acres in CFA[2, 4]	15,383	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Ompompanoosuc River CPA (map A.85) encompasses the Ompompanoosuc River CFA (map A.86) which is is part of a larger high priority area for the State of Vermont because it is a relatively large, contiguous, block of northern hardwood forest and its importance to interior forest birds. Much of the Ompompanoosuc River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. There are several nearby conserved lands, including the Bradford and Fairlee Town Forests. However, the area is currently largely unconserved and Service land acquisition in the area can help fill this gap. Also, the CFA is expected to be resilient to climate change.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 86.4%
- Shrub Swamps and Floodplain Forest – 0.8%
- Freshwater Marsh – 0.6%

See map A.87 and table A.47 for more detailed habitat information for the CFA.

What are the resources of conservation concern for the CFA?

As noted in table A.48 below, there are twelve Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to various documented State Species of Greatest Conservation Need (SGCN), and to species that require large contiguous forest tracts such as forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the northern long-eared bat. During summer nights, these bats forage on insects within wetlands and forested habitats, and roost under the bark or within cavities of large (≥ 3 dbh) diameter trees during the day. This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA, especially those with active bat hibernacula, may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor for bird species. The lower portion of the watershed (CT and MA), and habitats along the main stem, receive higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Ompompanoosuc River CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat as well.

   This CFA is mostly forested, the topography steep in places, with elevations rising above 2,200 feet. The cliff and talus systems are used by nesting peregrine falcons, a Priority Refuge Resource of Conservation Concern and State Species of Greatest Conservation Need. Bald eagles and osprey, also PRRC and SGCN, take advantage of the open water on Lake Fairlee and the Connecticut River, and nest in supracanopy trees within the CFA. The unfragmented forests provide breeding habitat for species of conservation concern and forest interior dwelling species, including PRRC such as wood thrush, blackburnian warbler, Canada warbler, chestnut-sided warbler, and American woodcock.

3. **Waterfowl**
   There is potential breeding and foraging habitat for American black duck, a PRRC species, wood duck, Canada geese, and other waterfowl species within wetlands associated with slow moving streams and open water habitats.

4. **Diadromous fish and other aquatic species**
   The Ompompanoosuc River, and a few brooks and small ponds occur in the Ompompanoosuc River CFA. The Ompompanoosuc River occurs in the western portion of the CFA where it flows southeast through Eagle Hollow and West Fairlee to the Connecticut River main stem. A few small streams in the CFA flow into the Ompompanoosuc River, while Blood Brook and Middle Brook flow into Lake Fairlee, located outside of the CFA's southern boundary. These water resources provide high quality cold water habitat for PRRC species, including brook trout and potentially Atlantic salmon. These species are a high priority for conservation in the State and within the Service's Northeast Region. Other species that may occur in the Ompompanoosuc River CFA include creek chub, white sucker, slimy sculpin, and blacknose dace.

   The Ely Copper Mine is less than a mile from the Ompompanoosuc River CFA in Vershire, and is listed by the U.S. Environmental Protection Agency as a superfund site. Elevated metal and sulfide concentrations have affected nearby and downstream water resources, and the EPA has implemented a cleanup plan for portions of this site (U.S. Environmental Protection Agency 2013). Contamination of CFA habitats has not occurred, though the lower reaches of the Ompompanoosuc River has shown negative consequences. Providing healthy ecosystems within the CFA will assist with mitigating impacts from this superfund site.

5. **Wetlands**
   The Ompompanoosuc River CFA contains 109 acres of conifer swamp, 126 acres shrub-swamp, and floodplain forest, and 88 acres of freshwater marsh. Many of these wetlands are associated with slow moving streams or small ponds. Patch size ranges from 2 acres to over 80 acres.

6. **Other**
   The Ompompanoosuc River CFA southwestern boundary is less than a mile from the abandoned Ely Copper Mine. Over eight hundred bats have hibernated in this mine before the presence of white-nose syndrome, including little brown bats, northern long-eared bats, tri-colored bats, eastern small-footed and big brown bats. A survey by Vermont Fish and Wildlife in 2013 showed a drastic decline in bats, with just under 200 present (Darling personal communication). Little brown and northern long-eared bats were hit the hardest from white-nose syndrome. Northern long-eared bats were recently listed as federally threatened. Although this hibernaculum is less than a mile from the CFA boundary, the habitats within the CFA are still significant for roosting, feeding and for potential maternity sites

What habitat management activities will be a priority on refuge lands within the CFA?

- We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions: Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse (different size classes) and native species will dominate.

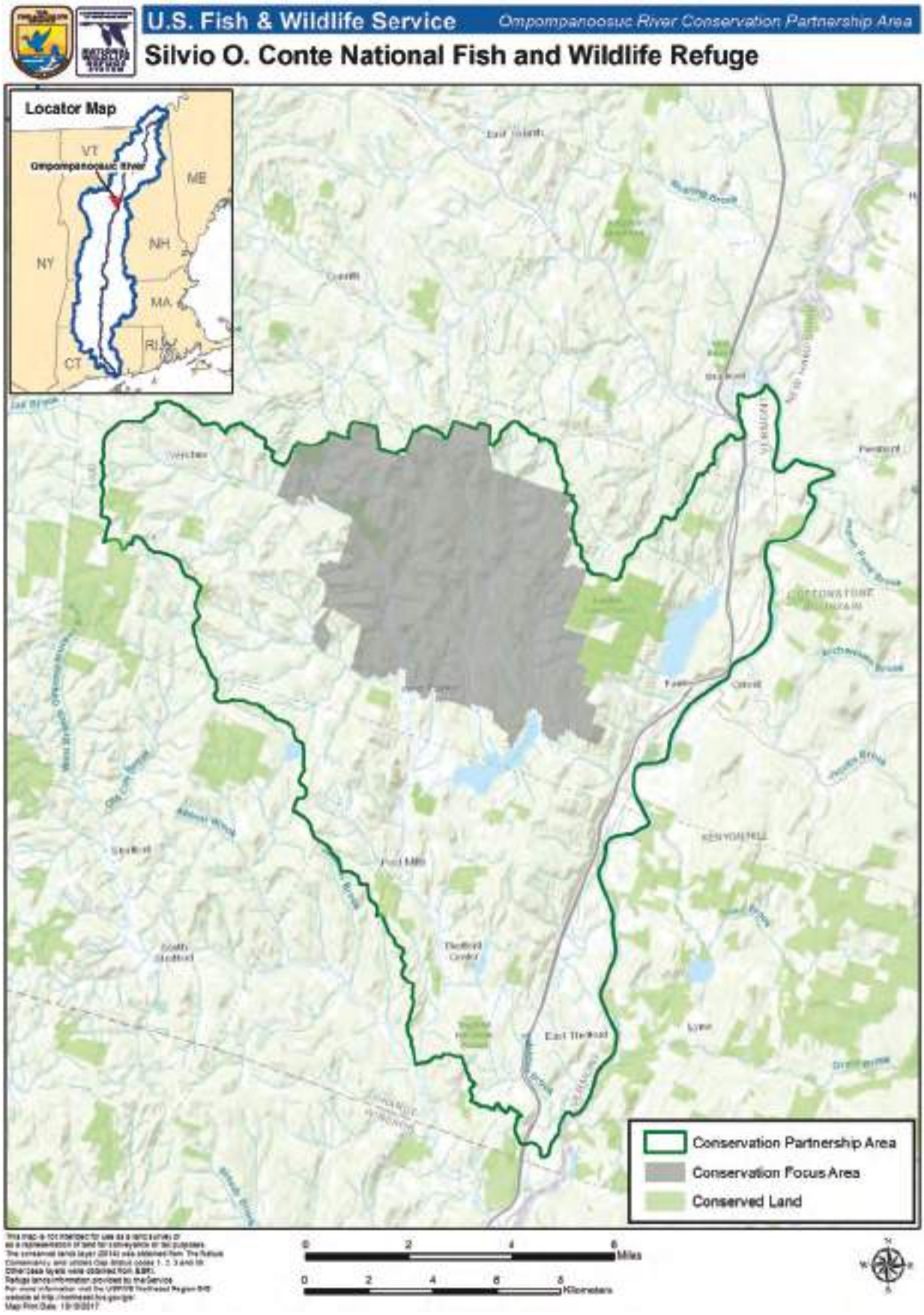
- We will conduct management activities in wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (stream, rivers, ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and uninterrupted aquatic species passage to spawning and wintering habitat.

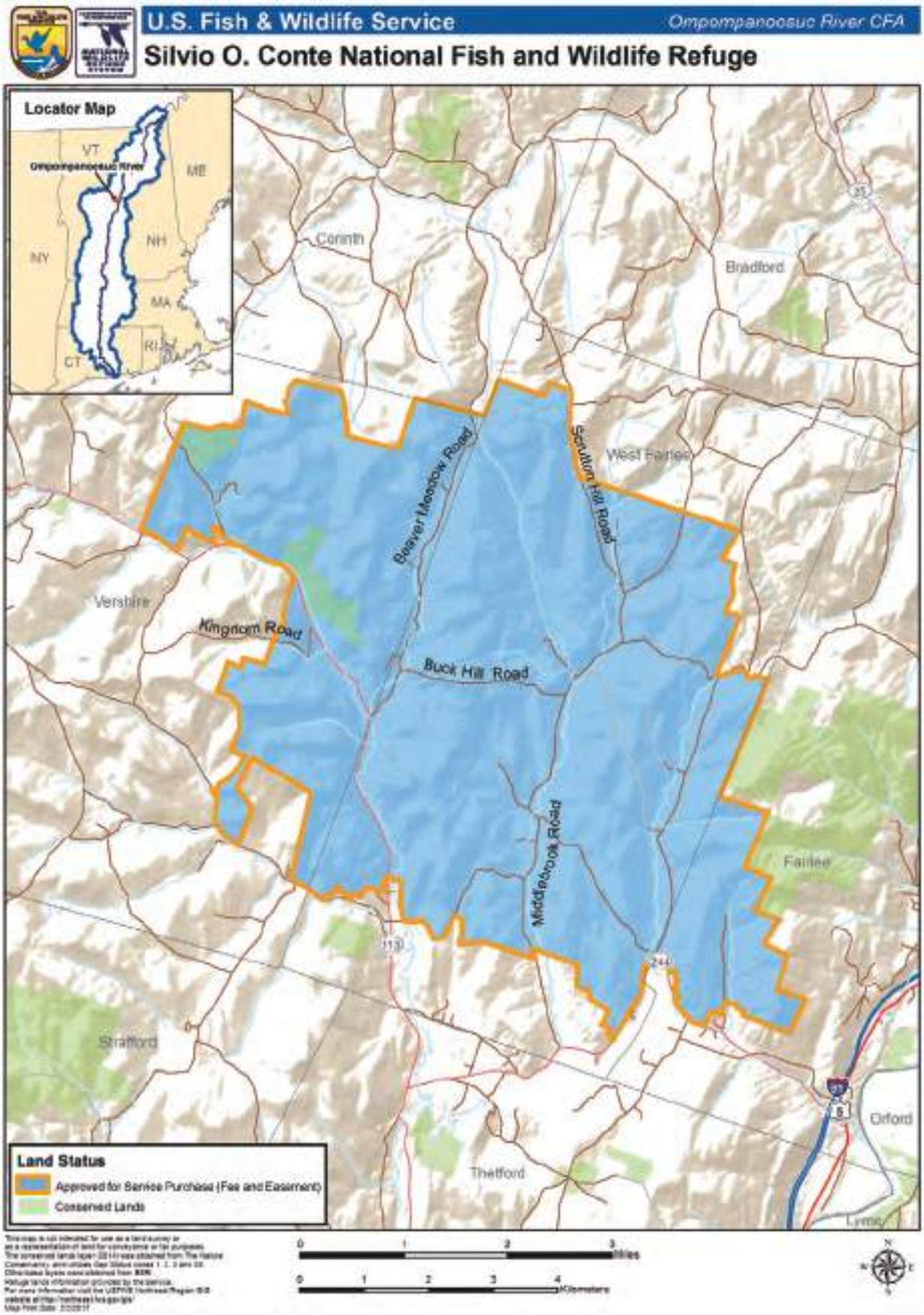
What public use opportunities will be a priority on refuge lands within the CFA?

The National Wildlife Refuge System Improvement Act of 1997 identified hunting, fishing, wildlife observation, photography, interpretation, and environmental education as priority, wildlife-dependent uses. As such, these uses will receive priority on refuge lands.

Map A.85. Ompompanoosuc River CPA.



Map A.86. Ompompanoosuc River CFA – Location.



Map A.87. Ompompanoosuc River CPA/CFA – Habitat Types.

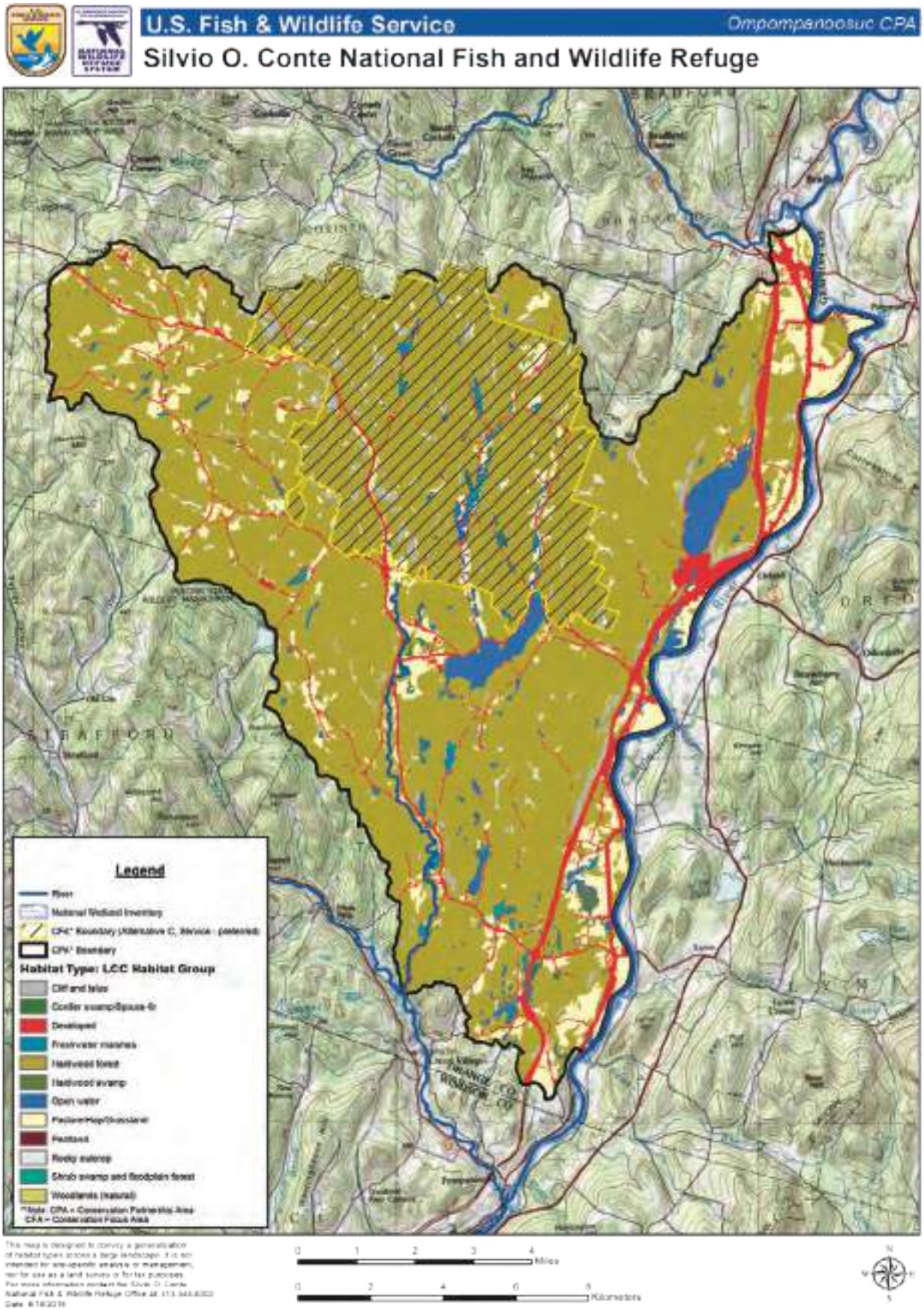


Table A.47. Ompompanoosuc River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	460	0.7%	109	-	-	0.7%	23.7%
Hardwood forest	415	0.7%	126	-	-	0.8%	30.4%
Hardwood swamp	88	0.1%	-	-	-	0.0%	0.0%
Shrub swamp and floodplain forest	88	0.1%	-	-	-	0.0%	0.0%
Woodlands (natural)	48,821	78.3%	13,534	503	-	88.1%	27.7%
Forested uplands and wetlands subtotal	*460*	*0.7%*	*109*	-	-	*0.7%*	*23.7%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	1,062	1.7%	465	52	-	3.0%	43.8%
Freshwater marshes	218	0.3%	88	-	-	0.6%	40.5%
Pasture/hay/grassland	5,926	9.5%	616	1	-	4.0%	10.4%
Peatland	2	0.0%	-	-	-	0.0%	0.0%
Rocky outcrop	732	1.2%	259	12	-	1.7%	35.3%
Non-forested uplands and wetlands subtotal	*7,940*	*12.7%*	*1,427*	*65*	-	*9.3%*	*18.0%*
Inland aquatic habitats[9]							
Open Water	1,267	2.0%	30	-	-	0.2%	2.4%
Inland aquatic habitats subtotal	*1,267*	*2.0%*	*30*	-	-	*0.2%*	*2.4%*
Other							
Developed	4,284	6.9%	378	8	-	2.5%	8.8%
Other subtotal	*4,284*	*6.9%*	*378*	*8*	-	*2.5%*	*8.8%*
TOTAL	**62,312**	**100.0%**	**15,368**	**577**	**-**	**100.0%**	**24.7%**

Notes:

5 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

6 Conservation Partnership Area

7 Conservation Focus Area

8 Percentage of the CPA represented by the habitat type

9 Acres in the CFA currently conserved by others (TNC 2014)

10 Acres in the CFA currently owned by the Service

11 Percentage of the CFA represented by the habitat type

12 Percentage of a given habitat within the CPA protected within the CFA

13 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

14 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.48. Ompompanoosuc River CFA – Priority Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 13,282 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	**Ruffed Grouse**[A, I] Whip-poor-will[A, I, J] **Chestnut-sided Warbler**[A,B] Brown Thrasher[I] **Ovenbird**[A] **Eastern Red Bat**[I] American Redstart[A, J] Black-and-white Warbler[J] Broad-winged hawk[J] Eastern Wood-pewee[A, J] Northern Flicker[A, J] Red-shouldered Hawk[I, J] Black-throated Blue Warbler[A] Yellow-bellied Sapsucker[A, J] Veery[A] Rose-breasted Grosbeak[A] Black Bear[I] Bobcat[I] Jefferson Salamander[I] Four-toed Salamander[I] Black-throated Green Warbler[A] Canada Warbler[A,I] Purple Finch[A] Black-billed Cuckoo[A,I] Northern Parula[A] Little Brown Bat[I] Eastern Small-footed Bat[I]
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Chestnut-sided Warbler[A,B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Hodgman et al. 2000, Dunn et al. 1997, Morse 2004).	
Bald Eagle[C, G] Osprey[G]	Breeding and migrating habitat includes large bodies of water with little human disturbance, and large canopy trees or other elevated sites for nesting, perching, and roosting (DeGraaf et al. 2001).	
Shrub Swamp and Floodplain Forest[5] - 126 acres		
Northern Long-eared Bat[D,I]	Caves used for hibernation. Roosting trees located in forested landscapes clustered in stands of large trees with cavities or loose bark. Cliffs, ledges, talus slopes also important for roosting/nesting. Maternity trees (8"-14" dbh) and travel corridors to water are also important (DeGraaf et al, 2001, and Darling Guidelines, unpublished).	Chestnut-sided Warbler[A,B] Black Racer[I] Ruffed Grouse[A, I] American Woodcock[A,I] **Warbling Vireo** **Willow Flycatcher** American Redstart[A, J] Eastern Kingbird[J] Gray Catbird[J] Wood Duck[A, J] Canada Goose[J] Mallard[J] Little Brown Bat[I] Tri-colored Bat[I] Eastern Small-footed Bat[I] Veery[A]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Swamps (Conifer)[5] – 109 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 feet within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	**Northern Waterthrush** Red-shouldered Hawk[I,J] Rose-breasted Grosbeak[A,J] Purple Finch[A] Veery[A,J] White-eyed Vireo[J] Willow Flycatcher[J] Wood Duck[A,J] Northern Parula[A]
Non-Forested Uplands and Wetlands[4]		
Cliff and Talus[5] – 463 acres		
Peregrine Falcon[C, G]	Nests on cliffs, ledges, and talus slopes near open habitats including rivers, lakes, and marshes, and lack of human disturbance (DeGraaf et al. 2001).	Uncommon plant community within the landscape that contributes to BIDEH*
Freshwater Marshes[5] - 88 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, fens, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Canada Goose[J] Mallard[J] **Marsh Wren** Northern Harrier[A,I,J] Great Blue Heron[I] **American Bittern**[A,I] Eastern Ribbon Snake[I] Water Shrew[I] Wood Duck[J]
Pasture/Hay/Grassland[5] - 619 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[J] Northern Harrier[A,I,J] Chestnut-sided Warbler[A,B] **Bobolink**[A,I] **Grasshopper Sparrow**[I] **Eastern Meadowlark**[I]
Rocky Outcrop[5] – 259 acres		
Laurentian-Acadian calcareous rocky outcrop[H]	This outcrop system occurs on ridges or summits of circumneutral (pH 5.5 to 7.4) to calcareous (pH >7.4) bedrock. Sites are often exposed and dry; however, there may be local areas of more moist conditions. The vegetation is often a mosaic of woodlands and open glades. This system may also occur on rocks that are primarily acidic but with a local influence of calcium through weathering (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Open Water[5] – 30 acres		
Brook Trout[B, F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Riffle Snaketail[I] Brook Snaketail[I] Maine Snaketail[I] Zebra Clubtail[I] Water Shrew[I]
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 Vermont Wildlife Action Plan (Species of Greatest Conservation Need)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD – These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Ompompanoosuc River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forests)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure for the diversity of species present, including wood thrush, American woodcock, chestnut-sided warbler, blackburnian warbler, Canada warbler, bald eagle, osprey, and cave dwelling bats.

Rationale:
We envision healthy forests within the Ompompanoosuc River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Vermont's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Ompompanoosuc River CFA hardwood forests are diverse and productive for wildlife, and abundant, high-quality habitat is most certainly available within the CFA. However, to date our review of Ompompanoosuc's habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Ompompanoosuc comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of Ompompanoosuc are more homogeneous than those of three centuries earlier, and include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management with the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Ompompanoosuc will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, bald eagles, and—if wetlands and riparian areas are present—Canada warbler (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Ompompanoosuc's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance to species like Canada warbler. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). Wood thrush also has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who dwell in the upper canopies of conifers, and are thought to be strongly associated with the hemlock forests within Ompompanoosuc. Blackburnian warblers have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Closed canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and black-throated blue warbler.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. The Ompompanoosuc River CFA southwestern boundary is less than a mile from the abandoned Ely Copper Mine (see sub-objective 1.2b for further discussion). Over eight hundred bats have hibernated in this mine before white-nose syndrome, including little brown bats, northern long-eared bats, tri-colored bats, eastern small-footed and big brown bats. A survey by Vermont Fish and Wildlife in 2013 showed a drastic decline in bats, with just under 200 present (Darling personal communication 2013). Little brown and northern long-eared bats were hit the hardest from white-nose syndrome. Northern long-eared bats were recently listed as threatened under the Endangered Species Act. Upon emergence from the hibernacula, females will travel to their summer range to give birth to pups in maternity colonies, while male bats often remain within 5 miles of the hibernaculum throughout the summer (Darling, unpublished). Crevices behind peeling bark of large diameter trees or cavities in partially decayed trees are used for maternity colonies and summer day roosts (Caceres and Pybus 1997). CFA habitats may still play a significant role as roosting, feeding, and potential maternity sites.

Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Emergent white pines — tall, large-diameter trees that extend above the canopy — provide special habitats that, when near open bodies of water, are utilized by bald eagles and osprey. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure, species composition, and/or ecological function. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Identify forest stands where soils and species composition will support woodcock management.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Retain and recruit 3 to 6 large (16 inch DBH) live or dead trees such as silver maple, beech, green ash, yellow birch, and sugar maple per acre within a 5-mile radius of bat hibernacula as bat roosting sites.
- Create small canopy openings to improve solar exposure of existing or potential roost trees.
- Maintain contiguous late successional forest cover within 2 to 3 miles of rock cliffs and ledges to protect potential roosting sites of eastern small-footed bats.
- Implement identified active forest management opportunities using accepted silvicultural practices.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:

Within 5 years of CCP approval:

- Conduct forest and wildlife inventories including bat inventories to determine locations of roosting trees, if any.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Sub-objective 1.1b. (Shrub Swamps and Floodplain Forest)

Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including bat species and American black duck.

Rationale:

Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including foraging bats and American black duck, priority refuge resources of concern.

A forested landscape comprised of large diameter trees, and openings provide the most suitable habitat for bats (see sub-objective 1.1a). Foraging activity generally occurs in forest cover, though the specific habitat often depends on the species flight ability and echolocation frequency. Stream corridors, wetlands, vernal pools, and ponds provide high insect populations for feeding bats, as well as a water source (Caceres and Pybus 1997, Zimmerman and Glanz 2000, Brooks and Ford 2005). Access to water is an important resource to prevent dehydration. Management in the CFA will focus on maintaining forested buffers along water bodies and shrub wetlands, and connectivity to forest habitats.

American black ducks also use shrub swamp communities, with a preference for shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation, and invertebrates

in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests near foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf and Yamasaki 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

American woodcock, a priority refuge resource of concern will also benefit from shrub swamp management. American woodcock require moist, rich soils dominated by dense shrub cover for foraging habitat. Shrub swamps dominated by alder is ideal, although young aspen and birch are also suitable as feeding areas and daytime cover. Woodcock require varying habitat conditions that are within close proximity of each other. These include clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Chestnut-sided warbler will also use shrub swamps. This species is declining across the region due to habitat loss, and is a HIGH species for conservation in BCR 14. Other species include willow flycatcher, ruffed grouse, and eastern ribbon snake.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Conifer Swamps)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the Ompompanoosuc Conservation Focus Area (CFA), conifer swamps frequently have been altered and have potential for restoration. This habitat type is often found in small patches on mineral soils that are nutrient poor; there may be an organic layer, but generally deep peat soils are absent. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. The dynamic nature of the watertable drives complexes of forest upland and wetland species including red maple, balsam fir, red spruce, and ash species. Where soils tend more to alkaline conditions, white cedar is a common tree species, and the shrub layer is generally more diverse. Within the Connecticut River watershed, agricultural practices and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition. Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in softwood swamps are not well understood. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within Ompompanoosuc will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Where needed, restoration of softwood swamp habitats will create high-quality habitat for neotropical migratory birds. Closed canopy softwood forests that include white cedar and other softwoods provide important mast, food, nesting, and cover. Softwood swamp stands with large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Lambert et al. 2005, Reitsma et al. 2008, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and frequent blow downs create canopy gaps. This provides a well developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Conifer swamps in the Ompompanoosuc River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Conifer swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the Ompompanoosuc River CFA, and allow monitoring of population response to management actions (R. Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the VFWD, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Cliff and Talus)
Protect cliffs, ledges, and talus slopes to maintain the biological integrity, health and diversity of associated natural and rare ecological communities. Emphasis will be on sites occupied by nesting peregrine falcons and roosting bats.

Rationale:
Cliff and talus systems within this CFA occur below treeline at low to mid elevations. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places (Gawler 2008). The type of rock, microclimate, and soil availability from higher elevation sources directly and indirectly influence vegetation within these systems (Thompson and Sorenson 2000). Rock types may include limestone, dolomite, granite, schist, slate, or shale which breakdown differently in the environment providing varying levels of nutrients, moisture, ground stabilization, and soil availability. Sun exposure, aspect, elevation, and moisture provide different microclimate conditions affecting vegetation type and growth. These systems provide unique niches for rare and uncommon plants, and habitat for snakes, including the rare eastern timber rattlesnake, black rat snake, and eastern garter snake. Exposed cliffs provide nesting habitat for turkey vultures, ravens, porcupines, and peregrine falcons, a state species of greatest conservation need. Peregrine falcons are also a refuge purpose species. Vermont's breeding population has increased steadily since they were extirpated from the eastern US in the mid to late 1960s due to indiscriminate use of DDT following World War II. Peregrines are nesting in Ompompanoosuc River CFA, and monitoring and management of Vermont's peregrine population is being coordinated by Audubon Vermont.

Bats will use caves or mines within the cliff and talus systems for "hibernacula," where they hibernate, and rock crevices for summer roosting sites. This region hosts bat hibernacula—the unused Ely Copper mine in Vershire. The Ely Copper mine has been surveyed each winter since 1992 by VFWD. More than 800 bats have hibernated in this mine before white-nose syndrome, including little brown, northern long-eared, tricolored, eastern small-footed, and big brown bats. A survey by VFWD in 2013 showed a drastic decline in bats, with just under 200 present (Darling personal communication 2013). Little brown and northern long-eared bats were hit the hardest from white-nose syndrome. Although this hibernaculum is less than a mile from the CFA boundary, the habitats within the CFA are still significant for roosting, feeding and for potential maternity sites (see sub-objective 1.1a for further discussion).

Conservation of cliff and talus systems in the Ompompanoosuc River CFA will begin with a comprehensive, multi-scale wildlife and habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of cliff and talus systems at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate and manage human (e.g., recreational) influences on cliff and talus ecosystem, and conduct outreach and education as necessary.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Identify historical, active, and potential peregrine falcon nesting sites.
- Coordinate with conservation organizations to conduct spring surveys of identified sites to determine occupancy.
- Work with partners to annually monitor active sites to determine occupancy status and reproductive outcome.
- Survey for and protect bat roosting sites.

Sub-objective 1.2b. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams (Gawler 2008). These marshes are also maintained over time by beaver activity, an important natural disturbance process within the Ompompanoosuc River watershed. Our coarse-scale habitat analysis of this CFA identifies the majority of the wetlands occurring along the North and Middle Brooks. This particular wetland complex, adjacent to open water habitat, will provide important breeding and foraging habitat for American black duck, and other waterfowl species. Located within the Connecticut River watershed, an important migration corridor, this area may also be important as staging areas for migrating waterfowl. An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for waterfowl species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Minimize impacts to wetlands from adjacent habitat management and recreational activities.
- Encourage local landowners to use Vermont Best Management Practices within active agricultural fields that are located along the perimeter of marsh habitats.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Survey wildlife use of existing wetlands.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.2c. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat, if present and appropriate.

Rationale:
More than four percent of the Ompompanoosuc River CFA is pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses, providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow. American woodcock, a refuge priority resource of concern, will use both habitat conditions when managed in conjunction with their other habitat needs.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland

breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Shrubland and grassland habitats will also be used by American woodcock, which require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Small clearings with minimal vegetation is required for courtship areas, and shrublands with clumps of tall vegetation or sparse shrubs will provide roosting habitat.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, and grassland acres can provide quality habitat, for these species, and American woodcock, if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Sub-objective 1.2d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and

species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Ompompanoosuc River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and unimpeded aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout and Atlantic salmon.

Rationale:
The Ompompanoosuc River, and a few brooks and small ponds occur in the Ompompanoosuc River CFA. The Ompompanoosuc River occurs in the western portion of the CFA where it flows southeast through Eagle Hollow and West Fairlee to the Connecticut River main stem. A few small streams in the CFA flow into the Ompompanoosuc River, while Blood Brook and Middle Brook flow into Lake Fairlee, located outside of the CFA's southern boundary. These water resources provide high quality cold water habitat for brook trout and Atlantic salmon. These species are sensitive to extreme temperature fluctuations, and require water temperatures between 40-70 degrees Fahrenheit for spawning, growth, and survival. Brook trout and salmon are a high priority for conservation by the State and the Service's Northeast Region. Other species that occur in the Ompompanoosuc River CFA include creek chub, white sucker, slimy sculpin, and blacknose dace.

The Ely Copper Mine is less than a mile from the Ompompanoosuc River CFA in Vershire, and is listed by the U.S. Environmental Protection Agency as a superfund site. Elevated metal and sulfide concentrations have affected nearby and downstream water resources, and the EPA has implemented a cleanup plan for portions of this site (U.S. Environmental Protection Agency 2013). Contamination of CFA habitats has not occurred, though the lower reaches of the Ompompanoosuc River have shown negative consequences. Providing healthy ecosystems within the CFA will assist with mitigating impacts from this superfund site.

Management of water resources in the Ompompanoosuc River CFA will focus on rivers and streams that provide continuous aquatic species passage to spawning and wintering habitat, are structurally diverse, with boulders and downed woody debris providing riffles and pools, and shade trees along riparian edges. Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Aquatic species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of open water habitat at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:
- Work with partners to implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with partners to conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity and health.
- Work with partners to conduct stream assessments to identify man-made physical barriers (e.g., impassable road crossings, culverts and dams) to the movement of fish and other aquatic organisms.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not Applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not Applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Ompompanoosuc River CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Design or adapt curricula for the Ompompanoosuc River CFA that focuses on watersheds, on local habitats, and on local natural and cultural resources.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Ompompanoosuc River CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Ompompanoosuc River CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Ompompanoosuc River CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the Ompompanoosuc River CFA will be suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Ompompanoosuc River CFA's habitats and cultural resources.

Management Strategies:
Within 5 years of acquiring sufficient land:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Ompompanoosuc River CFA.
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, print and social media, signs, and exhibits) when creating programming for natural and cultural resource interpretation.
- Make Certified Interpretive Guide (NAI) training available once every other year for refuge personnel, Friends Group members and the general public, with priority given to refuge affiliates.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:

- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Ompompanoosuc River CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:

- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Ompompanoosuc River CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the Sunderland and Nulhegan Basin Division Offices and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Ompompanoosuc River CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following state regulations, except as noted under Strategies below.

Rationale:
The Ompompanoosuc River CFA is a popular area to hunt white-tailed deer, Eastern wild turkey, black bear, and small game. Hunting will be allowed on a newly created division consistent with the final approved compatibility determination. Hunting, if found to be a compatible use, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal division open hours (i.e., 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with VFWD to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with VFWD to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc., to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Ompompanoosuc River CFA kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:

- Work with VFWD to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the Ompompanoosuc River CFA after completing all administrative procedures to officially open refuge lands to fishing, based on VFWD regulations, and any CFA-specific conditions.

Rationale:
There are several streams in the CFA including the Ompompanoosuc River, Middle Brook, Blood Brook, and Bear Notch Brook. The Ompompanoosuc River supports a cold water fishery with brook trout, brown trout, and rainbow trout. A variety of game fish are found in the other streams of the CFA, with quality fishing opportunities for brook trout in Middle Brook and Bear Notch Brook. Fishing is a popular activity throughout this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk to post information on fishing seasons and other notices to visitors.
- The Ompompanoosuc River CFA will be open daily to all visitors, including anglers, from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters.

Within 5 years of acquiring land with fishable waters:
- Work with the VFWD to inventory and assess fish populations on the CFA.
- Work with the VFWD to evaluate potential fishing enhancements, especially to Middle Brook and Bear Notch Brook.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine whether the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available at the refuge website, refuge offices, CFA kiosks, through friends groups, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. Local organizations such as Vermont Audubon chapters and others offer organized field trips to popular natural areas. A new division in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:
- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.

- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring sufficient land:
- Develop a public access strategy and required planning (e.g., NEPA compliance and compatibility determinations) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring sufficient land:
- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:
- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring sufficient land:
- Develop interpretive panels for kiosks and trails that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.

- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.

- Encourage local schools and groups such as a local chapter of Vermont Audubon and other environmental organizations to offer wildlife-centered trips to the refuge.

- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring sufficient land:
- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Ompompanoosuc River CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:
- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Ompompanoosuc River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:
- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that are part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Develop compatible opportunities on the Ompompanoosuc River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking; pets must be on a leash no longer than 6 feet long and must be under the control of their owners/handlers to avoid posing a threat to other visitors, staff, or wildlife.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Work with users to delineate winter cross-country trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of acquiring sufficient land:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Ottauquechee River Conservation Focus Area

Bridgewater, Vermont

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	5,985	100 %
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*5,985*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	0	0 %
Total Acres in CFA[2,4]	5,985	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The Ottauquechee River CPA (map A.88) encompasses the Ottauquechee River CFA (map A.89) which is located near a large network of conserved lands, including Les Newell Wildlife Management Area and extensive lands protected by the Vermont Land Trust lands. Virtually all of the Ottauquechee River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional land protection by the Service in this area will help better connect these conserved lands. The Appalachian Trail Corridor also abuts the CFA, providing outstanding recreational opportunities. The CFA encompasses contiguous forest, which is expected to be resilient to climate change impacts.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 87.5%

See map A.90 and table A.49 for more detailed habitat information for the CFA.

What are the resources of conservation concern for the CFA?

As noted in table A.50 below, there are six Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to species that require large contiguous forest tracts including American black bear, bobcat, and forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federal endangered Indiana bat, the federal threatened northern long-eared bat, and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared and Indiana bats roost under the bark or within cavities of large diameter trees during the day (USFWS 2014, USFWS 2007). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for these species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receive higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The Ottauquechee River CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat as well.

   Over 89% of the CFA is contiguous forest, interspersed with riparian, cliff and talus, and rocky outcrop communities. These habitats contribute to the larger core of undeveloped land within the landscape. The CFA provides breeding for a diversity of landbirds including species of conservation concern and forest interior dwelling species. This CFA is in the core range for many of these species including black-throated blue warbler, blackburnian warbler, chestnut-sided warbler, black-throated green warbler, and wood thrush. Wood thrush and chestnut-sided warbler are PRRC species that rely on different forest successional stages within the CFA. Peregrine falcon is another PRRC species, as well as a State Species of Greatest Conservation Need (SGCN). The cliff and talus systems in the CFA are used by nesting peregrine falcons, where the elevations can rise above 2,000 feet.

3. **Diadromous fish and other aquatic species**
   The North Branch of the Ottauquechee River flows along the west boundary of Ottauquechee River CFA. This branch flows southeastwardly through the towns of Killington and Bridgewater meeting up with the Ottauquechee main stem in Bridgewater Corners. The North Branch provides high quality cold water habitat for PRRC species including brook trout and Atlantic salmon. These species are high conservation concern for the State and the Service's Northeast Region. Other species that occur in the Ottauquechee River CFA include creek chub, white sucker, slimy sculpin, and blacknose dace.

4. **Other**
   The Ottauquechee River CFA western boundary is within a mile of the abandoned Bridgewater Mines, which were once occupied by more than 100 hibernating little brown, tricolored, big brown and northern long-eared bats. These mines are no longer being used by bats due to decimation by white-nose syndrome. Northern long-eared bats were recently listed as federally threatened. The habitats within the CFA may still provide current or future roosting, feeding and potential maternity sites.

   The rocky outcrops and forested habitats within the CFA provide denning sites for American black bear and bobcat, as well as a contiguous landscape for these wide ranging mammals to breed and disperse.

What habitat management activities will be a priority on refuge lands within the CFA?

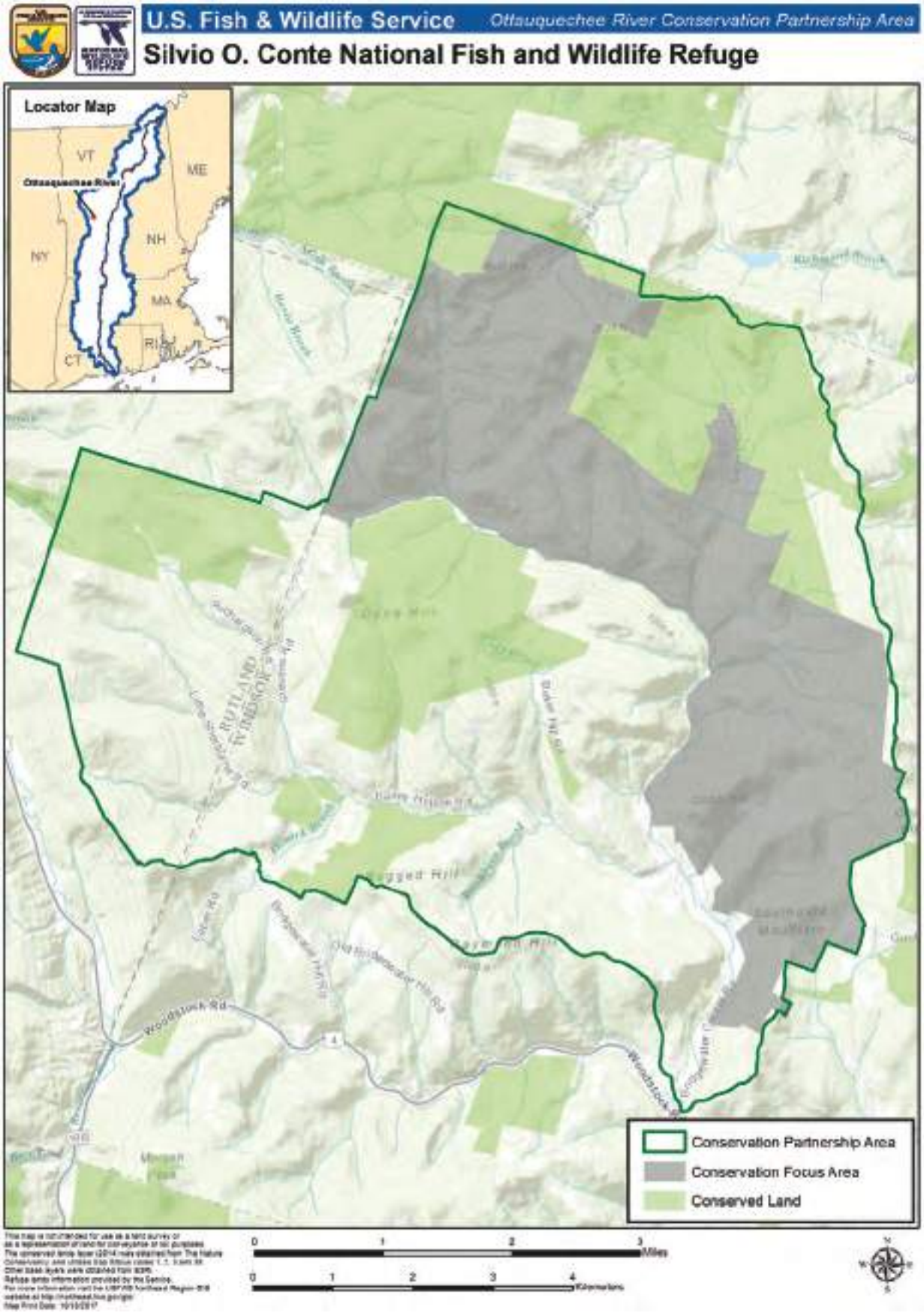
We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (e.g., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down HMP. Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse and appropriate for site conditions and location.
- In open water (stream, rivers) habitats, we will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and uninterrupted aquatic species passage to spawning and wintering habitat.

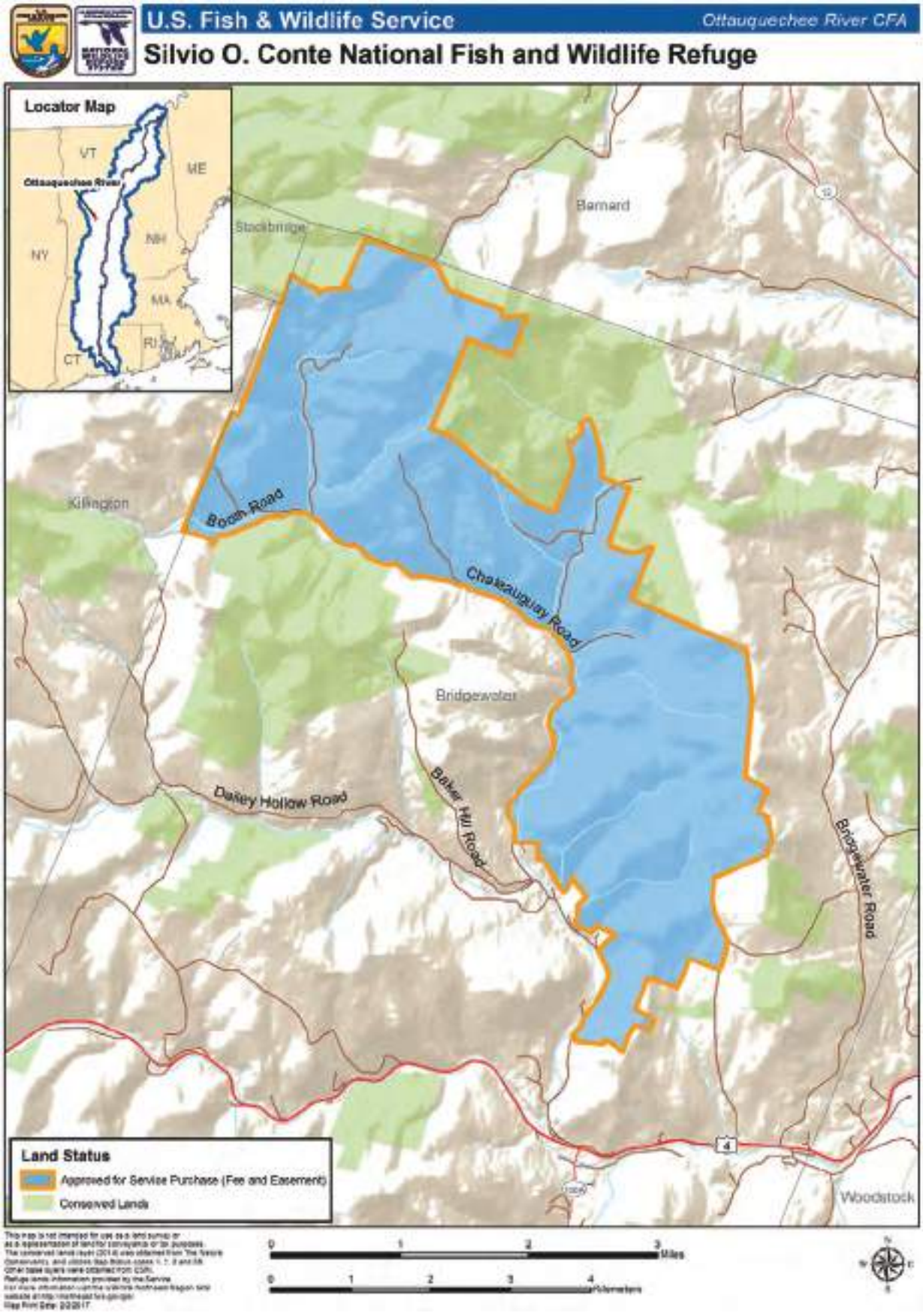
What public use opportunities will be a priority on refuge lands within the CFA?

The National Wildlife Refuge System Improvement Act of 1997 identified hunting, fishing, wildlife observation, photography, interpretation, and environmental education as priority, wildlife-dependent uses. As such, these uses will receive priority on refuge lands.

Map A.88. Ottauquechee River CPA.



Map A.89. Ottauquechee River CFA – Location.



Map A.90. Ottauquechee River CPA/CFA – Habitat Types.

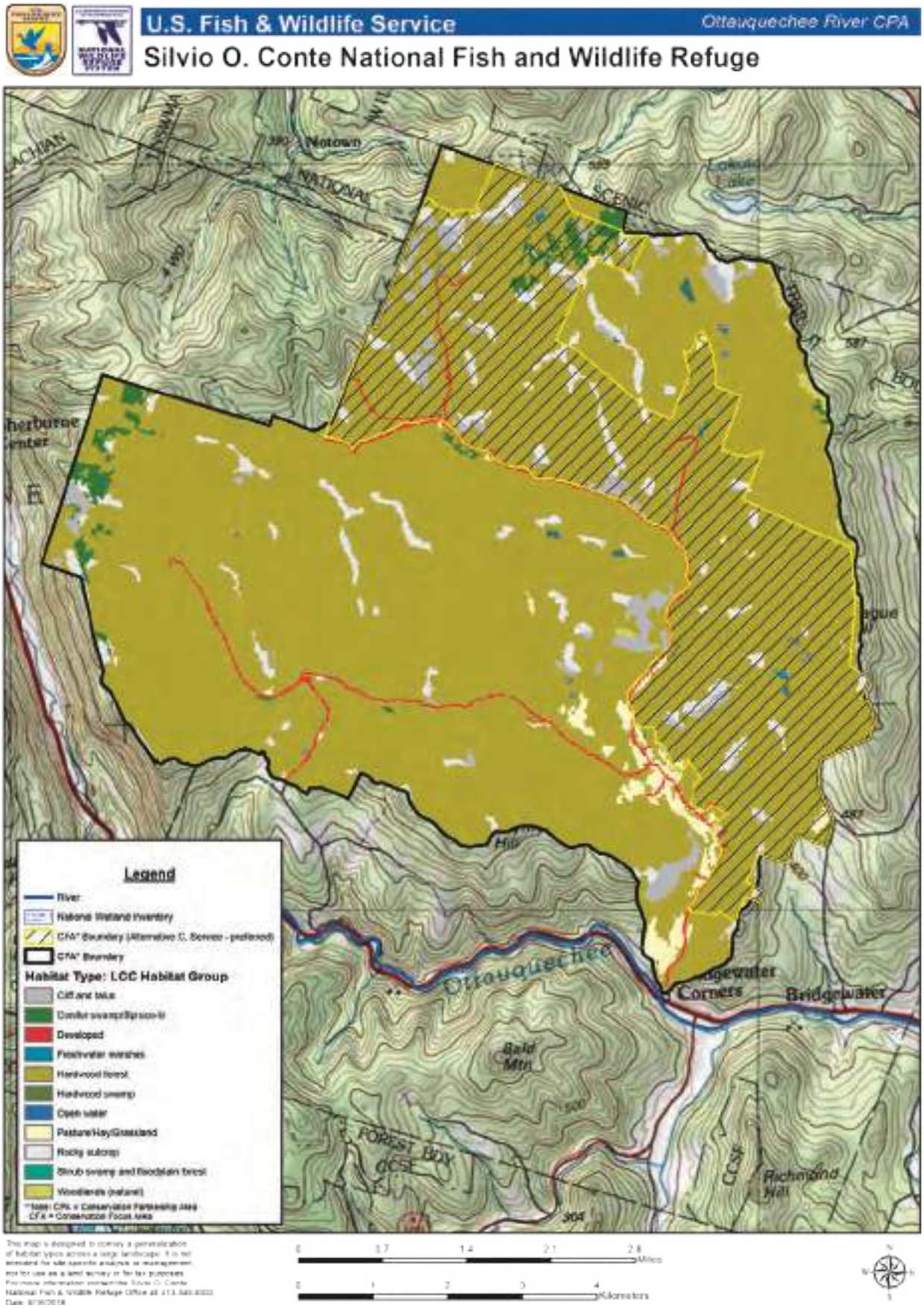


Table A.49. Ottauquechee River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	260	1.4%	92	0	-	1.5%	35.4%
Hardwood forest	15,858	88.6%	5,215	68	-	87.2%	32.9%
Hardwood swamp	3	0.0%	3	-	-	0.0%	100.0%
Shrub swamp and floodplain forest	4	0.0%	4	-	-	0.1%	100.0%
Woodlands (natural)	67	0.4%	2	-	-	0.0%	2.3%
Forested uplands and wetlands subtotal	*16,192*	*90.4%*	*5,316*	*68*	-	*88.9%*	*32.8%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	439	2.5%	201	3	-	3.4%	45.9%
Freshwater marshes	2	0.0%	2	-	-	0.0%	100.0%
Pasture/hay/grassland	292	1.6%	40	-	-	0.7%	13.6%
Rocky outcrop	752	4.2%	336	11	-	5.6%	44.6%
Non-forested uplands and wetlands subtotal	*1,485*	*8.3%*	*579*	*15*	-	*9.7%*	*39.0%*
Inland aquatic habitats[9]							
Open Water	1	0.0%	0	0	0	0.0%	0.0%
Inland aquatic habitats subtotal	*1*	*0.0%*	*0*	*0*	*0*	*0.0%*	*0.0%*
Other							
Developed	228	1.3%	88	-	-	1.5%	38.6%
Other subtotal	*228*	*1.3%*	*88*	-	-	*1.5%*	*38.6%*
TOTAL[10]	**17,906**	**100.0%**	**5,982**	**83**	**-**	**100.0%**	**33.4%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.50. Ottauquechee River CFA – Priority Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 5,321 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Baltimore Oriole[J] Black-and-white Warbler[J] Black-billed Cuckoo[A,I,J] Broad-winged hawk[J] Rose-breasted Grosbeak[A] Northern Flicker[A, J] Scarlet Tanager[J] Ruffed Grouse[A, I] Whip-poor-will[A, I, J] **Louisiana Waterthrush** Brown Thrasher[I] Blackburnian Warbler[A] **Ovenbird**[A] **Eastern Red Bat**[I] Little Brown Bat[I] Eastern Small-footed Bat[I] American Redstart[A, J] Eastern Wood-pewee[A, J] Red-shouldered Hawk[I, J] Black-throated Green Warbler[A] Black-throated Blue Warbler[A,I] Yellow-bellied Sapsucker[A,J] Bobcat[I] Long-tailed Weasel[I] Woodland Vole[I] Black Bear[I] Veery[A]
Chestnut-sided Warbler[A,B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
Northern Long-eared Bat[D] Tricolored Bat[E] Indiana Bat[D]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, USFWS 2007, MADFW 2015).	
Conifer Swamp[5] - 6 acres		
Laurentian-Acadian conifer-hardwood acidic swamp[H] Laurentian-Acadian alkaline conifer-hardwood swamp[H]	The *conifer-hardwood acidic swamps* occur on mineral soils that are nutrient-poor; there may be an organic top soil horizon, but the substrate is generally not deep peat. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. Red maple, ash, red spruce (rarely Black spruce), and balsam fir are the most typical trees. The herbaceous and shrub layers tend to be fairly species-poor, and include catberry and ferns of the genus Osmunda. Northern white cedar is a diagnostic canopy species within the *alkaline conifer-hardwood swamp*. It may dominate the canopy or mixed with other conifers or deciduous trees, most commonly Red maple or Black ash. Red osier dogwood is a common shrub. The herb layer tends to be diverse, and small open areas fed by mineral rich waters may occur within the wetland (Gawler 2008).	Uncommon plant communities within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Hardwood Swamp[5] – 3 acres		
North-Central Appalachian acidic swamp[H]	*North-Central Appalachian acidic swamps* are found in basins or on gently sloping seepage lowlands. Eastern hemlock is usually present and may be dominant. It is often mixed with deciduous wetland trees such as red maple or black tupelo. Species of the genus Sphagnum are an important component of the moss layer (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Shrub Swamp and Floodplain Forest[5] – 4 acres		
Laurentian-Acadian wet meadow-shrub swamp[H]	*Wet meadow-shrub-swamps* are often associated with lakes and ponds, but are also found along streams, where the water level does not fluctuate greatly. They are commonly flooded for part of the growing season but often do not have standing water throughout the season. The size of occurrences ranges from small pockets to extensive acreages. The system can have a patchwork of shrub and grass dominance; typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush. Trees are generally absent and, if present, are scattered (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Woodlands (Natural)[5] – 3 acres		
Central Appalachian alkaline glade and woodland[H]	The *alkaline glade and woodland* system consists of woodlands and open glades on thin soil over limestone, dolostone or similar calcareous rock. In some cases, the woodlands grade into closed-canopy forests. Eastern red cedar is a common tree, and chinquapin oak is indicative of the limestone substrate. In the northern periphery of the range, northern white cedar may replace eastern red cedar. Prairie grasses are the dominant herbs; forb richness is often high. Fire is an important natural disturbance vector (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Rocky Outcrop[5] – 338 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	The *Northern Appalachian-Acadian rocky heath outcrop* system occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including Sheep laurel, Low-bush blueberry, Black huckleberry, and Black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Freshwater Marshes[5] - 2 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Cliff and Talus[5] – 200 acres		
Peregrine Falcon[C, G]	Nests on cliffs, ledges, and talus slopes near open habitats including rivers, lakes, and marshes, and lack of human disturbance (DeGraaf et al. 2001).	Uncommon plant community within the landscape that contributes to BIDEH*
Pasture/hay/grassland[5] – 38 acres		
Where appropriate and supported by the local community, restore to forest habitat types	See species composition and structure above.	See species associated with forested habitat types above.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Open Water[5] – 1 acre		
Brook Trout[F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures and stream flow (VTWAP 2005).	Blacknose Shiner[I] Riffle Snaketail[H] Brook Snaketail[H] Zebra Clubtail[H]
Atlantic Salmon[F, G]	Spawn in cold freshwater moving streams w/ coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 Vermont Wildlife Action Plan (Species of Greatest Conservation Need)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the Ottauquechee River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, chestnut-sided warbler, and cave dwelling bats.

Rationale:
We envision healthy forests within the Ottauquechee River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Vermont's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

Hardwood forests within Ottauquechee River CFA are diverse and productive for wildlife, and abundant, high-quality habitat is most certainly available. To date our review of Ottauquechee habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within Ottauquechee comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of Ottauquechee are more homogeneous than those of three centuries earlier, and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000a, 2000b, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management with the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within Ottauquechee will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like chestnut warbler, a North Atlantic LCC (NALCC) representative species are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure will provide foraging opportunities for bats, and support other species of conservation concern like ruffed grouse, black-throated blue warbler, American redstart, and black bear.

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. Ottauquechee River's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils, and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region.

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Closed canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated blue warbler, black-throated green warbler, and— when along rocky bottomed streams— Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, which has implications for wildlife habitats and nutrient cycling. The Ottauquechee River CFA western boundary is within a mile of the Bridgewater Mines, which were formerly used by more than one hundred hibernating little brown, tricolored, big brown, and northern long-eared bats (see sub-objective 1.2a for further discussion). These mines are no longer being used by bats due to their decimation by white-nose syndrome. Norhtern long-eared bat was recently listed as threatened under the Endangered Species Act. Upon emergence from the hibernacula, females will travel to their summer range to give birth to pups in maternity colonies, while male bats often remain within 5 miles of the hibernaculum throughout the summer (Darling, unpublished). Crevices behind peeling bark of large diameter trees or cavities in partially decayed trees are used for maternity colonies and summer day roosts (Caceres and Pybus 1997). This CFA is within the eastern boundary of the northeast Indiana bat Recovery Unit (RU). These RUs serve to protect summer roosting habitat for core and peripheral populations (USFWS 2007). The habitats within the CFA may provide current or future roosting, feeding and potential maternity sites for Indiana, northern long-eared, tricolored and other bat species. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Identify sites appropriate for early successional management.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices.
- Retain and recruit 3 to 6 large (greater than 16 dbh) live or dead trees such as silver maple, beech, yellow birch, green ash and sugar maple per acre within a 5-mile radius of bat hibernacula as bat roosting sites.
- Create small canopy openings to improve solar exposure of existing or potential roost trees.
- Maintain contiguous late successional forest cover within 2 to 3 miles of rock cliffs and ledges to protect potential roosting sites of eastern small-footed bats.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.
- Work with VTFW to identify and protect active bat maternity colonies and summer roost sites. Assist with monitoring of nearby hibernacula.

Sub-objective 1.1b. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and

species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Ottauquechee River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Cliff and Talus)
Protect cliffs, ledges, and talus slopes to maintain the biological integrity, health and diversity of associated natural and rare ecological communities. Emphasis will be on sites occupied by nesting peregrine falcons and roosting bats.

Rationale:
Cliff and talus systems within this CFA occur below treeline at low to mid elevations. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places (Gawler 2008). The type of rock, microclimate, and soil availability from higher elevation sources directly and indirectly influence vegetation within these systems (Thompson and Sorenson 2000). Rock types may include limestone, dolomite, granite, schist, slate, or shale which breakdown differently in the environment providing varying levels of nutrients, moisture, ground stabilization, and soil availability. Sun exposure, aspect, elevation, and moisture provide different microclimate conditions impacting vegetation type and growth. These systems provide unique niches for rare and uncommon plants, and habitat for snakes, including the rare eastern timber rattlesnake, black rat snake, and eastern garter snake. Exposed cliffs provide nesting habitat for turkey vultures, ravens, porcupines, and peregrine falcons, a state species of greatest conservation need. Peregrine falcons are also a refuge purpose species. Vermont's breeding population has increased steadily since they were extirpated from the eastern US in the mid to late 1960s due to indiscriminate use of DDT following World War II. Peregrines are nesting in Ottauquechee River CFA, and monitoring and management of Vermont's peregrine population is being coordinated by Audubon Vermont.

Bats will use caves or mines within the cliff and talus systems for "hibernacula" where they hibernate, and rock crevices for summer roosting sites. This region hosted two bat hibernacula: two unused mines in Bridgewater. The Bridgewater mines were surveyed in the winter by VFWD between 2009 and 2013. More than one hundred bats were hibernating in each mine, including little brown bats, northern long-eared bats, tricolored bats, and big brown bats. These mines are no longer being used by bats due to decimation by white-nose syndrome. Although this hibernaculum is about a mile from the CFA boundary, and no longer used by bats at this time, the habitats within the CFA are still significant for roosting, feeding and for potential maternity sites (see sub-objective 1.1a for further discussion).

Conservation of cliff and talus systems in the Ottauquechee River CFA will begin with a comprehensive, multi-scale wildlife and habitat inventory. Wildlife species survival and breeding success is dependent on not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of cliff and talus systems at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate and manage human (e.g., recreational) influences, and conduct outreach and education as necessary.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Survey for and protect bat roosting sites.
- Identify historical, active, and potential peregrine falcon nesting sites.
- Coordinate with conservation organizations to conduct spring surveys of identified peregrine falcon nest sites to determine occupancy.
- Work with partners to annually monitor active sites to determine occupancy status and reproductive outcome.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) for shrub-dependent conservation concern species such as chestnut-sided warbler.

Rationale:
Less than one percent of the Ottauquechee River CFA is typed as pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Current pasture, hay, and grassland acres can provide quality habitat for these species, if managed appropriately. In order to make an informed management decision, it will be necessary to conduct a comprehensive, multi-scale wildlife and habitat inventory. Baseline information on the condition of these habitats will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- As new pasture, hay, and/or grassland habitat is acquired, evaluate its ecological importance to determine if it should be maintained, managed as shrubland or restored to native forest through tree plantings or natural succession.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

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The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout and Atlantic salmon.

Rationale:
The North Branch of the Ottauquechee River flows along the west boundary of Ottauquechee River CFA. This branch flows southeastwardly through the towns of Killington and Bridgewater meeting up with the Ottauquechee main stem in Bridgewater Corners. The North Branch provides high quality cold water habitat for brook trout and Atlantic salmon. Brook trout and Atlantic salmon are sensitive to extreme temperature fluctuations, and require water temperatures between 40 to 70 degrees Fahrenheit for spawning, growth, and survival. Brook trout and salmon are a high priority for conservation by the State and the Service's Northeast Region. Other species that occur in the Ottauquechee River CFA include creek chub, white sucker, slimy sculpin, and blacknose dace.

Management of water resources in the Ottauquechee River CFA will focus on providing rivers and streams that provide unimpeded aquatic species passage to spawning and wintering habitat and in-stream habitat that is cold and structurally diverse. Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Aquatic species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of open water habitat will further inform more detailed habitat prescriptions within a required step-down HMP.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity, and health.
- Work with partners to conduct stream assessments to identify man-made physical barriers (e.g., impassable road crossings, culverts, and dams) to the movement of fish and other aquatic organisms.

Within 10 years of land acquisition and CCP approval:

- Work with partners to implement a remediation plan for identified obstacles to aquatic species passage.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Ottauquechee River CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Ottauquechee River CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Ottauquechee River CFA as an outdoor classroom.

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Ottauquechee River CFA as an outdoor classroom.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of environmental education programs.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Ottauquechee River CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. At the Nulhegan Basin Division, interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail planned for the site, the Ottauquechee River CFA is well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the Ottauquechee River CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Ottauquechee River CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, print and social media, signs, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the Ottauquechee River CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:
- Contribute refuge interpretive information for scenic byways and other state publications and signs.

- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Ottauquechee River CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Ottauquechee River CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following state regulations, except as noted under Strategies below.

Rationale:
The Ottauquechee River CFA is a popular area to hunt white-tailed deer, Eastern wild turkey, and small game. Hunting will be allowed on a newly created division, consistent with the final approved compatibility determination. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners and determination that hunting is a compatible use at the CFA.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Allow hunters access to the refuge outside of the normal division open hours (i.e., 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Vermont Fish and Wildlife Department to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with Vermont Fish and Wildlife Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc., to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:
- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website, at Ottauquechee River CFA kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Vermont Fish and Wildlife Department to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the Ottauquechee River CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Vermont Fish and Wildlife Department regulations, and any CFA-specific conditions.

Rationale:
The North Branch Ottauquechee River and Cold Brook exist within the CFA. The North Branch Ottauquechee River provides quality fishing opportunities for wild brook trout and wild rainbow trout, with large brook trout reported by anglers. Fishing is a popular activity in this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk to post information on fishing seasons and other notices to visitors.
- The Ottauquechee River CFA will be open daily to all visitors, including anglers, from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters.

Within 5 years of acquiring land with fishable waters:
- Work with the Vermont Fish and Wildlife Department to inventory and assess fish populations on the CFA.
- Work with the Vermont Fish and Wildlife Department to evaluate potential fishing enhancements along the North Branch Ottauquechee River.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing.)

Within 1 year of acquiring land with fishable waters:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. Local organizations such as Vermont Audubon chapters and others offer organized field trips to popular natural areas. A new division in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.
- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring sufficient land:

- Develop a public access strategy and required planning (i.e., NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring sufficient land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring sufficient land:

- Develop interpretive panels for kiosks and trails that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.

- Encourage local schools and groups such as a local chapter of Vermont Audubon and other environmental organizations to offer wildlife-centered trips to the refuge.

- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring sufficient land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Ottauquechee River CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the Ottauquechee River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that are part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Develop compatible opportunities on the Ottauquechee River CFA that connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:
- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Work with users to delineate winter cross-country skiing trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of acquiring sufficient land:
- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

West River Conservation Focus Area

Londonderry, Windham, Jamaica, Townshend, Newfane, and Wardsboro, Vermont

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	22,947	88%
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*22,947*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	3,018	12%
Total Acres in CFA[2,4]	25,965	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The West River CPA (map A.91) encompasses the West River CFA (map A.92). The West River, and its major tributaries, was as a SFA in the 1995 Conte FEIS. The CFA is part of a larger high priority area for the State of Vermont because it is a contiguous block of northern hardwood forest and its importance to interior forest birds. The CFA is expected to be resilient to climate change. The West River CFA is located near a large network of conserved lands, including the Green Mountain National Forest, Jamaica State Park, and Townshend State Forest. Virtually all of the West River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional land protection by the Service in this area will help better connect these conserved lands.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 89.8%
- Shrub Swamps and Floodplain Forest – 0.2%
- Freshwater Marsh – 0.6%

See map A.93 and table A.51 for more detailed habitat information for the CFA.

What are the resources of conservation concern for the CFA?

As noted in table A.52 below, there are 12 Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species, including one federal listed species that rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to numerous state-listed species including mussels and plants, as well as potential habitat for the federal listed dwarf wedge mussel based on historic records. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   The northeastern bulrush, a wetland plant, occurs within various beaver wetlands in the CFA. This species is federally listed, and has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

   The 1993 Recovery Plan for the species called for protection measures such as land acquisition and conservation easements (USFWS 1993). The 5-year review echoed these recommendations, stating that the highest priority actions are to resurveying populations that have not recently been surveyed, securing protection on public and private lands, conducting periodic surveys of populations to determine trends and threats, and implementing management tools to reduce threats and monitor effectiveness of these actions (USFWS 2008).

   The aquatic habitats in the CFA support two candidate species, including American eel and brook floater. American eel enter the Connecticut River as juveniles, and migrate upstream to inhabit streams, lakes, and ponds of the West River CFA. Eels feed in these aquatic habitats until they reach sexual maturity and begin the long migration to their spawning grounds in the Sargasso Sea (ASMFC 2000). Brook floater require rivers and streams with high water quality, and are one among many species of freshwater mussels in the CFA.

   This CFA is within the range of the federally listed northern long-eared bat and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared bats roost under the bark or within cavities of large (> 3 dbh) diameter trees during the day (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for this species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The West River CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat as well.

   The West River CFA is part of a larger block of unfragmented forest that includes almost 4,000 acres of conserved land. It is characterized by a high quality riverine ecosystem, surrounded by intact forested uplands and productive tributary streams. These habitats provide breeding habitat for a diversity of landbirds including species of conservation concern and forest interior dwelling species. This CFA is in the core range for many of these species including PRRC such as wood thrush, blackburnian warbler, Canada warbler, chestnut-sided warbler, and American woodcock.

3. **Waterfowl**
   Potential breeding and foraging habitat for American black duck, a PRRC species, as well as wood duck, Canada geese, and other waterfowl species within wetlands adjacent to the Townshend Reservoir, West River tributaries and open water habitats.

4. **Diadromous fish and other aquatic species**
   The West River flows through the northern portion of the CFA, and along the eastern boundary as it enters and exits the Townshend Reservoir. The West River has been rated as having the highest abundance of high quality open water habitat as measured by a Vermont Index of Biotic Integrity, a measure of fish community health. It has a wide range of representative reaches extending from its headwaters to its mouth supporting diverse assemblages of fish species. The West River is also considered representative for assemblages of mussels and invertebrates in several locations, including Cobb Brook, which flows through the northern portion of the CFA.

The main stem and tributaries provide high quality cold water habitat for PRRC species, including brook trout and Atlantic salmon. The lower West River provides habitat for warm water species as well as diadromous fish such as American shad and American eel, which are refuge resources of concern. The West River CFA also provides important aquatic habitat for freshwater mussels, including brook floater, a species petitioned for Federal listing. Sea lamprey, another species of conservation concern, also occurs in this CFA providing important ecological benefits to aquatic systems. Other species that occur in the West River CFA include yellow perch, creek chub, white sucker, pumpkinseed, carp, slimy sculpin and blacknose dace. These species are hosts for the earliest life stages of resident mussels.

The Townshend Reservoir is located in the northern portion of the CFA. This man-made lake is associated with the Townshend Dam, which was built on the West River in 1961 by the U.S. Army Corps of Engineers to prevent flooding along the Connecticut River. This lake is managed by Vermont Fish and Wildlife Department and the Army Corps of Engineers, and supports rainbow, brown and brook trout, yellow perch, largemouth bass and bullhead.

5. **Wetlands**
   The West River CFA contains 118 acres of hardwood swamp, 34 acres of conifer swamp, 54 acres shrub-swamp and floodplain forest, and 163 acres of freshwater marsh. Many of these wetlands are associated with slow moving streams or small ponds. The largest wetland patch, 45 acres of hardwood swamp, occurs near the Townsend Reservoir. Some of the freshwater marshes contain the Federal listed northeastern bulrush.

6. **Other**
   There is potential habitat for cobblestone tiger beetle, a species that has been petitioned for federal listing, within the West River CFA. This tiger beetle prefers sparsely vegetated sandy cobble beaches (Pyzikiewicz 2005). The West River provides these habitat conditions, and the cobblestone tiger beetle has been found in the watershed. Other species of concern that occur in the West River watershed (not necessarily in the CFA) include the eastern pearlshell, eleven State rare plant species, as well as historic records of the federally listed dwarf wedgemussel.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan (HMP). Once inventory has been completed, then management will focus on maintaining the following conditions:

- Forest management activities will provide a diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse and appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

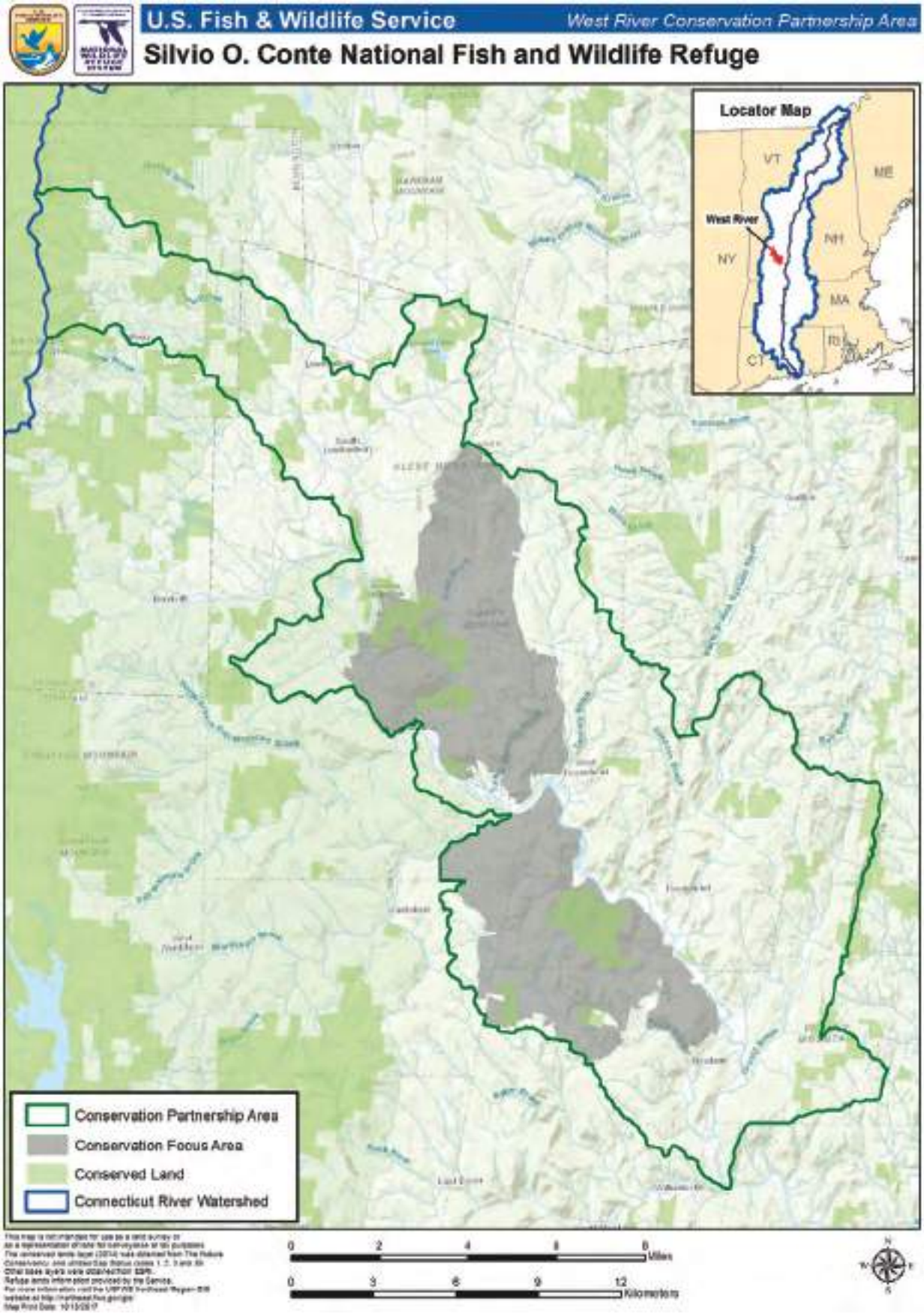
- Non-forest management activities will occur within wetland habitats, and pasture, hay, grassland habitats. Wetland management will focus on maintaining the natural hydrology and native species composition. Invasive plant management will be a priority.

- In open water (stream, rivers, and ponds) habitats, we will focus on maintaining forested stream buffers, a structurally diverse in-stream habitat, and uninterrupted aquatic species passage to spawning and wintering habitat.

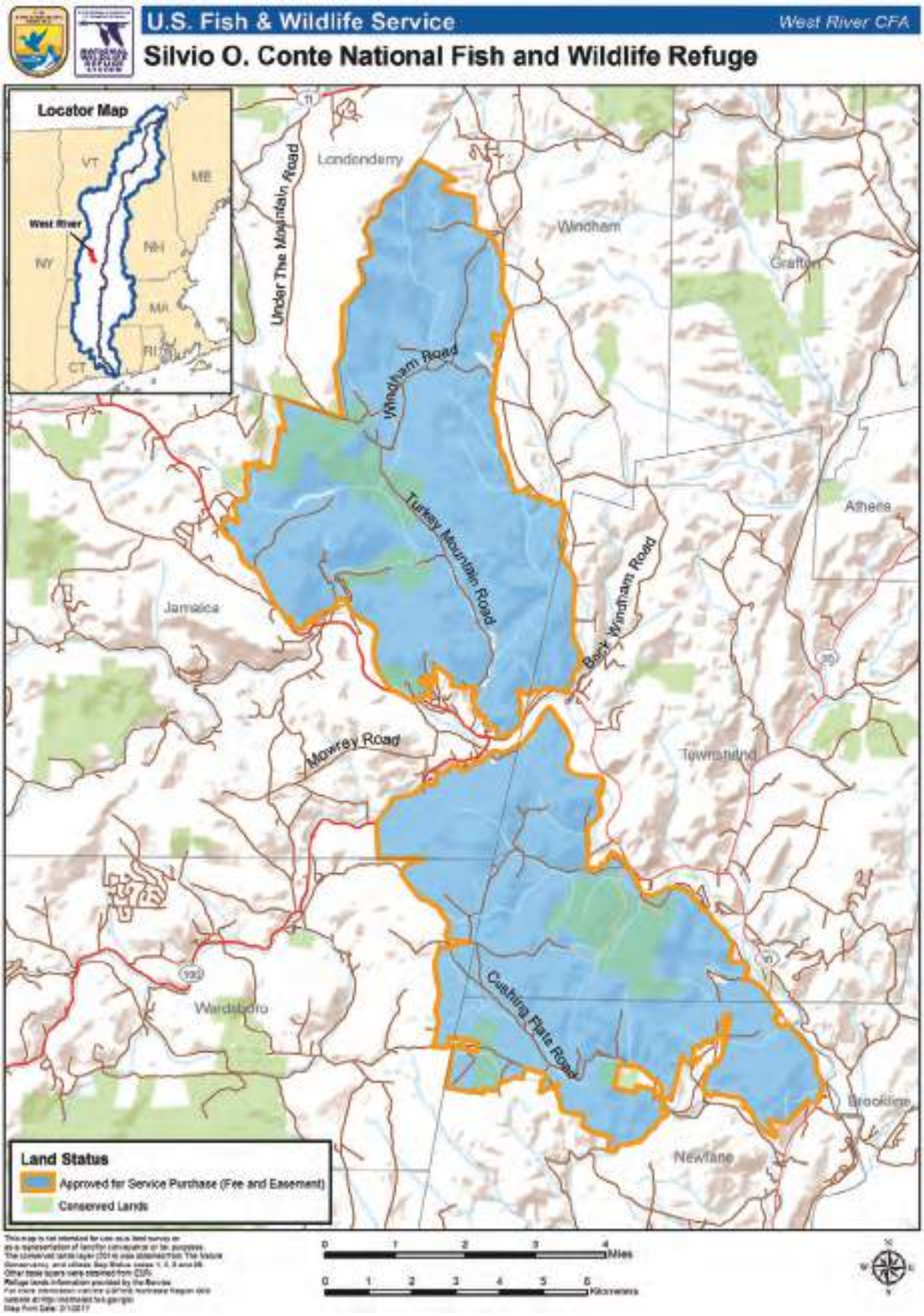
What public use opportunities will be a priority on refuge lands within the CFA?

The National Wildlife Refuge System Improvement Act of 1997 identified hunting, fishing, wildlife observation, photography, interpretation, and environmental education as priority, wildlife-dependent uses. As such, these uses will receive priority on refuge lands.

Map A.91. West River CPA.



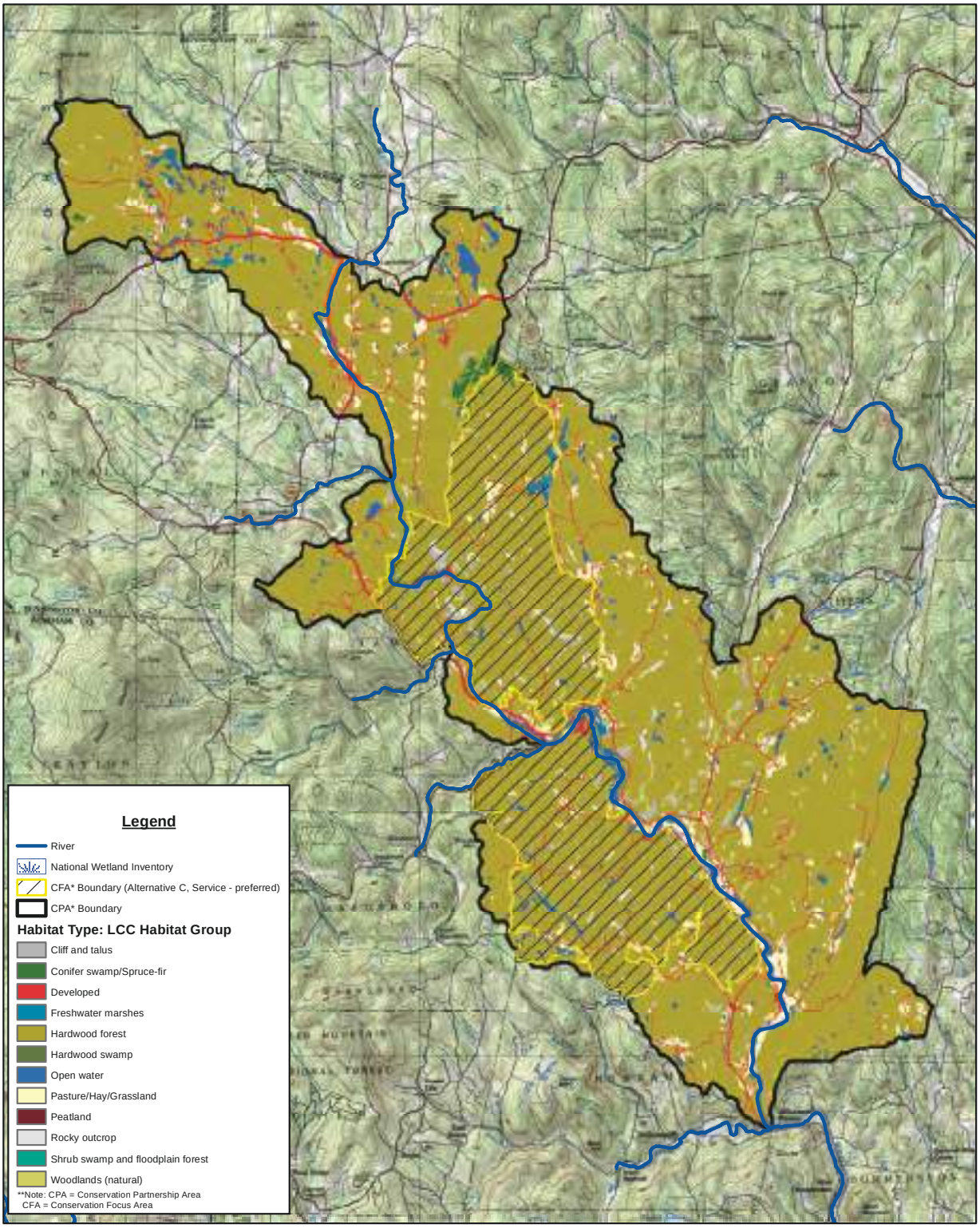
Map A.92. West River CFA – Location.



Map A.93. West River CPA/CFA – Habitat Types.

U.S. Fish & Wildlife Service *West River CPA*

Silvio O. Conte National Fish and Wildlife Refuge



This map is designed to convey a generalization of habitat types across a large landscape. It is not intended for site-specific analysis or management, nor for use as a land survey or for tax purposes. For more information contact the Silvio O. Conte National Fish & Wildlife Refuge Office at: 413-548-8002
Date: 9/16/2016

0 2 4 6 8 Miles

0 2.5 5 7.5 10 Kilometers

N W E S

Table A.51. West River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	795	0.9%	130	6	-	0	16.4%
Hardwood forest	79,658	85.7%	23,448	3,449	-	1	29.4%
Hardwood swamp	523	0.6%	117	89	-	0	22.3%
Shrub swamp and floodplain forest	338	0.4%	55	4	-	0	16.2%
Woodlands (natural)	619	0.7%	144	49	-	0	23.2%
Forested uplands and wetlands subtotal	*81,933*	*88.1%*	*23,893*	*3,597*	-	*1*	*29.2%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	996	1.1%	463	172	-	0	46.5%
Freshwater marshes	474	0.5%	162	31	-	0	34.1%
Pasture/hay/grassland	4,263	4.6%	486	14	-	0	11.4%
Peatland	12	0.0%	1	-	-	0	9.6%
Rocky outcrop	952	1.0%	382	54	-	0	40.1%
Non-forested uplands and wetlands subtotal	*6,698*	*7.2%*	*1,494*	*272*	-	*0*	*22.3%*
Inland aquatic habitats[9]							
Open Water	636	0.7%	126	74	-	0	19.8%
Inland aquatic habitats subtotal	*636*	*0.7%*	*126*	*74*	-	*0*	*19.8%*
Other							
Developed	3,688	4.0%	579	97	-	0	15.7%
Other subtotal	*3,688*	*4.0%*	*579*	*97*	-	*0*	*15.7%*
TOTAL[10]	**92,954**	**100.0%**	**26,092**	**4,039**	**-**	**1**	**28.1%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.52. West River CFA – Priority Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 23,537 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Baltimore Oriole[J] Black-and-white Warbler[J] Black-billed Cuckoo[A,I,J] Northern Flicker[A, J] Scarlet Tanager[J] Ruffed Grouse[A, I] Whip-poor-will[A, I, J] **Louisiana Waterthrush** Brown Thrasher[I] **Ovenbird**[A] **Eastern Red Bat**[I] American Redstart[A, J] Blackburnian Warbler[A] Eastern Wood-pewee[A, J] Red-shouldered Hawk[I, J] Black-throated Green Warbler[A] Sharp-shinned Hawk[J] Yellow-bellied Sapsucker[A,J] Rose-breasted Grosbeak[A] Northern Parula[A] Bobcat[I] Long-tailed Weasel[I] Woodland Vole[I] Black Bear[I] Veery[A] Little Brown Bat[I] Eastern Small-footed Bat[I] Black-throated Blue Warbler[A,I] Purple Finch[A]
American Woodcock[A, B, C]	Breeding and roosting habitat includes young deciduous and mixed forests (1-20 years old) dominated by aspen and birch, and 3+ acre forest openings with 60% shrub cover, in proximity to alder wetlands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	
Chestnut-sided Warbler[A, B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
Blackburnian Warbler[A]	Breeding habitat includes mature conifer, and conifer-deciduous forests (80+ years old) (DeGraaf et al. 2001, Hodgman et al. 2000, Dunn et al. 1997, Morse 2004).	
Northern Long-eared Bat[D] Tricolored Bat[E]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are typically $\geq$ 3 inches dbh, are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, MADFW 2015).	
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	
Hardwood Swamp[5] - 118 acres		
Canada Warbler[A, B, C]	Breeding habitat includes contiguous deciduous, mixedwood and coniferous forests interspersed with openings that provide an average overstory tree height of 55 ft within >30% canopy closure, a dense foliar mid-story and well developed shrub layer 7-20' in height, and moist soils (Chace et al. 2009, Lambert et al. 2005, Dunn et al. 1997).	**Northern Waterthrush** Red-shouldered Hawk[I,J] Rose-breasted Grosbeak[A,J] Veery[A,I,J] White-eyed Vireo[J] Willow Flycatcher[J] Wood Duck[A,J] Northern Parula[A]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Conifer Swamp[5] - 34 acres		
Laurentian-Acadian conifer-hardwood acidic swamp[H] Laurentian-Acadian alkaline conifer-hardwood swamp[H]	The *conifer-hardwood acidic swamps* occur on mineral soils that are nutrient-poor; there may be an organic top soil horizon, but the substrate is generally not deep peat. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. Red maple, ash, red spruce (rarely Black spruce), and balsam fir are the most typical trees. The herbaceous and shrub layers tend to be fairly species-poor, and include catberry and ferns of the genus *Osmunda*. Northern white cedar is a diagnostic canopy species within the *alkaline conifer-hardwood swam*p. It may dominate the canopy or mixed with other conifers or deciduous trees, most commonly Red maple or Black ash. Red osier dogwood is a common shrub. The herb layer tends to be diverse, and small open areas fed by mineral rich waters may occur within the wetland (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Shrub Swamp and Floodplain Forest[5] - 54 acres		
American Woodcock[A, B, C]	Foraging habitat includes alder dominated wetlands in proximity to early successional forests, shrublands and herbaceous openings (Kelley et al. 2008, Sepik et al. 1994).	Chestnut-sided Warbler[A,B] Black Racer[I] Ruffed Grouse[A, I] Eastern Ribbon Snake[I, J] **Warbling Vireo** **Willow Flycatcher** **Wood Turtle**[I] American Redstart[A, J] Eastern Kingbird[J] Gray Catbird[J] Wood Duck[A, J] Veery[A,I]
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Woodlands (natural)[5] - 144 acres		
Central Applachian pine-oak rocky woodland[H] Central Appalachian alkaline glade and woodland[H]	*The pine-oak rocky woodland system* encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire. The *alkaline glade and woodland system* consists of woodlands and open glades on thin soil over limestone, dolostone or similar calcareous rock. In some cases, the woodlands grade into closed-canopy forests. Eastern red cedar is a common tree, and chinquapin oak is indicative of the limestone substrate. In the northern periphery of the range, northern white cedar may replace eastern red cedar. Prairie grasses are the dominant herbs; forb richness is often high. Fire is an important natural disturbance vector. (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Non-Forested Uplands and Wetlands[4]		
Rocky Outcrop[5] – 383 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	The Northern Appalachian-Acadian rocky heath outcrop system occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. Red oak and various conifers, including White pine and Red spruce, are characteristic trees. Low heath shrubs, including Sheep laurel, Low-bush blueberry, Black huckleberry, and Black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Freshwater Marshes[5] - 163 acres		
American Black Duck[A, B, C, G]	Breeding and migrating habitat includes herbaceous wetlands, and flooded meadows and shrub-swamps (Longcore et al. 2000, DeGraaf et al. 2001).	Canada Goose[J] Tapering Rush[I] Greene's Rush[J] Mallard[J] Northern Harrier[A,I,J] Clustered Sedge[I] Great Blue Heron[I] **American Bittern**[A,I] Grass Rush[I] Water Shrew[I] Arrowleaf[I] Wood Duck[J]
Northeastern Bulrush[B, D]	Inhabits herbaceous wetlands with seasonally fluctuating waterlevels (USFWS, 2006)	
Peatlands[5] – 1 acre		
Laurentian-Acadian acidic alkaline fen[H]	*Laurentian-Acadian acidic alkaline fens* are most abundant in areas of limestone bedrock, and widely scattered in areas where calcareous substrates are scarce. Shore fens, which are peatlands that are occasionally flooded along stream and lakeshores, are also included here because flooding tends to create moderately alkaline conditions. The vegetation may be grass-dominated, shrub-dominated, or a patchwork of the two; shrubby cinquefoil is a common diagnostic shrub. The herbaceous flora is usually species-rich and includes calcium loving grasses and forbs. Sphagnum dominates the substrate; star campylium moss is an indicator bryophyte. The edge of the basin may be shallow to deep peat over a sloping substrate, where seepage waters provide nutrients (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Pasture/Hay/Grassland[5] – 488 acres		
American Woodcock[A, B, C]	Roosting habitat includes old fields with scattered tall herbaceous vegetation and/or shrubs. Herbaceous openings such as log landings and pasture used for singing grounds (Kelley et al. 2008, Sepik et al. 1994).	Field Sparrow[J] Northern Harrier[A,I,J] Chestnut-sided Warbler[A,B] **Bobolink**[A,I] **Grasshopper Sparrow**[I] **Eastern Meadowlark**[I]

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Cliff and Talus[5] – 463 acres		
Laurentian-Acadian acidic cliff and talus[H] North-central Appalachian acidic cliff and talus[H] North-central Appalachian circumneutral cliff and talus[H] Laurentian-Acadian calcareous cliff and talus[H]	These cliff systems occur at low to mid elevations, well below treeline. The vegetation within the *Laurentian-Acadian acidic cliff and talus system* is patchy and often sparse, punctuated with patches of small trees such as birches and spruce species. Species that prefer calcium rich soils are absent. In north-facing or other sheltered settings where cold air accumulates at the bottom of slopes, a shrubland of heaths and reindeer lichens can develop. The *North Central Appalachian acidic cliff and talus system* comprises sparsely vegetated to partially wooded cliffs. Most of the substrate is dry and exposed, but small (occasionally large) areas of seepage are often present. Vegetation in seepage areas tends to be comparatively well-developed and different from the surrounding dry cliffs. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places. Eastern red cedar is a characteristic tree species, poison ivy a characteristic woody vine, and common polypody a characteristic fern. Substrates within the *circumneutral cliff and talus system* include limestone, dolomite, and other rocks. The vegetation varies from sparse to patches of small trees, in places forming woodland or even forest vegetation. Ash, basswood, and American bladdernut are woody indicators of the enriched setting. The herb layer includes at least some species that are indicators of enriched conditions, e.g., yellow jewelweed, purple cliffbrake, ebony spleenwort, or bluntlobe cliff fern. *The calcareous cliff and talus system* has more nutrient rich soils, and the vegetation is often sparse, but may include patches of small trees including northern white cedar, which may be the dominate species. Ash species and basswood are woody indicators of the enriched setting (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Inland Aquatic Habitats[4]		
Water[5] – 127 acres		
Brook Floater[E]	Inhabits creeks and small rivers, prefers the stable bank conditions afforded by gravel or sandy substrates, and good water quality (Nedeau et al. 2000).	Eastern Pearlshell[I] Wood Turtle[I] Boulder-beach Tiger Beetle[I] Riffle Snaketail[I] Brook Snaketail[I] Zebra Clubtail[I]
Atlantic Salmon[B, F, G]	Spawn in cold freshwater moving streams w/ coarse clean gravel and adequate food/cover. Migrate in large rivers (VTWAP 2005).	
Brook Trout[F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures, and stream flow (VTWAP 2005).	
American Shad[B, F, G]	Spawn when the water temperature is above 60° F in shoal area of river and lower reaches of larger tributaries (USFWS 1996).	
American Eel[F]	Migrating and feeding habitat includes lakes, streams and large rivers (USFWS 1996)	
Cobblestone Tigerbeetle[E]	Breeding and wintering habitat includes sparsely vegetated sandy cobble beaches on the banks or upstream side of islands in free-flowing rivers (Pyzikiewicz 2006).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 Vermont Wildlife Action Plan (Species of Greatest Conservation Need)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Objectives and Strategies for Refuge Lands in the West River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forests)
Improve the diversity of seral stages, (where and when possible) to restore historic composition and structure, and improve landscape connectivity of hardwood forests to facilitate climate change adaptation and support species of conservation concern. In particular, habitat management will provide breeding and foraging habitat for priority refuge resources of concern including wood thrush, Canada warbler, blackburnian warbler, chestnut-sided warbler American woodcock, and northern long-eared bat and tricolored bat (if appropriate).

Rationale:
We envision healthy forests within the West River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Vermont's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et. al 2011).

The watershed of the West River is almost entirely forested, contributing to the high quality of its terrestrial and aquatic systems: rivershore grasslands, riverside outcrops, submerged beds of aquatic plants—including the rare riverweed, cold headwater streams, floodplain forests, northern hardwood forests, hemlock swamps, vernal pools and beaver ponds/meadows in various stages of succession. To date, our review of West River's habitats and wildlife species—and their condition—has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history common to larger New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within West River comes exclusively from a reading of forest history in New England—a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983; Whitney 1996; Foster et al. 1997; Bellemare et al. 2002; Hall et al. 2002). Our sub-objective assumes the forests of West River are more homogeneous than those of three centuries earlier, and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Foster et al. 1998; Foster 2000; Goodburn and Lorimer 1998; Cogbill 2002; Bellemare et al. 2002; Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management; the application of silvicultural treatments designed to emulate gap dynamics; and the creation of early successional forests, will promote compositional and structural diversity, and broadly move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within West River will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests—a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature (Kelley et al. 2008, Sepik et al. 1994). Across the CFA, enhanced horizontal structure should support other species of conservation concern like chestnut-sided warbler, ruffed grouse, and—if wetlands and riparian areas are present—Canada warbler (Reitsma et al. 2008, Lambert et al. 2005, Chace et al. 2009).

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. West River's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. Patches of very dense native shrub and understory layers (0-5 feet in height) are of particular importance to species like Canada warbler. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush and blackburnian warbler. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils, and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region. Improving vertical diversity by preserving softwood inclusions during forest management may provide an important habitat component for blackburnian warblers, who dwell in the upper canopies of conifers, and are thought to be strongly associated with the hemlock forests within West River. Blackburnian warblers have been shown to decline in response to removal of hemlock by hemlock wooly adelgid (Tingley et al. 2002).

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (>75-80% closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated green warbler, and—when along rocky bottomed streams—Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for wildlife habitat and nutrient cycling. Structurally-sound, large-diameter trees are important nest sites for woodland raptors, such as the red-shouldered hawk. Standing trees that are dead and/or contain cavities will be present in all size classes for those species, like black bear, that require large logs or trees for their dens (Wynne and Sherburne 1984, Chapin et al. 1997, DeGraaf and Yamasaki 2001). Live, dead or dying trees that are $\geq$3 inches in dbh with crevices, cavities, cracks or exfoliating bark are used as summer roosting sites for the federally listed northern long-eared bat. These roosting habitats also provide maternity sites where females will raise their young (USFWS 2014). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:

Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Work with partners, including the State in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

- Identify forest stands where soils and species composition will support woodcock management.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices.

- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Where appropriate maintain larger diameter trees to provide future snags and downed coarse woody debris.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Conduct bat acoustic surveys to obtain baseline bat inventory data. Conduct additional surveys, if appropriate, to identify active bat roosting sites and hibernacula.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.
- Monitor habitats to ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.

Sub-objective 1.1b. (Hardwood Swamps)
Improve the diversity of seral stages, (where and when possible) restore historic composition and structure, and improve the natural hydrology to support natural and rare ecological communities. Management will provide breeding and foraging habitat for priority refuge resources of concern including Canada warbler.

Rationale:
Of the forest types within the West River Conservation Focus Area (CFA), hardwood swamps frequently have been altered and have potential for restoration. This habitat type in West River is found in small patches where soils have an impermeable or nearly impermeable clay layer that can create a shallow, perched water table. Saturation can vary, with ponding of water common during wetter seasons and drought during the summer or autumn months. The dynamic nature of the watertable drives complexes of forest upland and wetland species including pin oak, red maple, sweetgum, and black gum. Within the Connecticut River watershed, including the CFA, agricultural practices, and selective logging have largely removed this habitat from the landscape, or greatly simplified its historic species composition (Foster 1992; Foster 2000). Changes in hydrology, water pollution, invasive species introductions, and soil compaction remain as threats.

Successional trends in hardwood swamps are not well understood. One possibility is that these areas were once in softwoods such as hemlock, fir, cedar, or spruce. Heavy cutting and clearing for agriculture often eliminated softwood species. Our conservation efforts within West River will focus on promoting the ecological integrity of these stands through restoration of degraded floodplains, and (where and when possible) restoring composition and structure to accepted historical conditions. Where appropriate, restoration of the primary natural disturbance mechanism (seasonal flooding) will aide in the restoration of historical species mixtures.

Restoration of forest habitats and riparian areas will create high-quality habitat for neotropical migratory birds. Closed canopy deciduous forests that include pin oak and other hardwoods provide mast and other foraging sites. Hardwood swamp stands with large average stand diameters, a variety of tree conditions (including large-diameter dead stems, live trees with hollow stems and dead limbs, and small diameter suppressed and dying stems), and nearby water have a high habitat potential for cavity-dwelling wildlife species (DeGraaf et al. 2006).

Many species of conservation concern use forested swamps, including northern parula, willow flycatcher, white-eyed vireo, and rose-breasted grosbeak. Canada warbler, a priority refuge resource of concern, occupies this habitat type with high densities occurring in mixed forested swamps (Reitsma et al. 2008, Lambert et al. 2005, Chace et al. 2009). The wet soil conditions in swamps limit the canopy closure, and

frequent blow downs create canopy gaps. This provides a well developed shrub layer—an important habitat component for foraging and nest cover (Chace et al. 2009). Canada warbler shows area sensitivity in forests fragmented by suburban sprawl (Robbins et al. 1989). Hardwood swamps in the West River CFA are within a matrix of contiguous forest, where fragmentation is not a concern. Hardwood swamp patches of ten acres or greater are thought to provide suitable breeding habitat for Canada warbler in the West River CFA, and allow monitoring of population response to management actions (R. Dettmers personal communication 2013).

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood swamps at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate hydrologic regime to inform restoration efforts.
- Identify forest stands where management is necessary to improve species composition. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Work with partners, including the State of Vermont, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management.

Within 10 years of land acquisition and CCP approval:

- Implement identified forest management opportunities to improve species composition.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Map vernal pools and seeps.
- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1c. (Shrub Swamps and Floodplain Forest)
Manage shrub swamp and floodplain forest communities to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American woodcock and American black duck.

Rationale:
Shrub swamps are restricted to poorly drained areas, small seepage zones, and wide alluvial stretches of rivers and small streams. Shrubs tend to dominate the wetland, though grasses may be present. Typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush (Gawler 2008). These wetlands are also created through beaver activity, a natural and important disturbance process within the CFA. The landscape mosaic of flooded areas and ponds in various stages of succession provide a diversity of plant communities, and habitats for a variety of wildlife species, including American woodcock and American black duck, priority refuge resources of concern.

American woodcock are dependent on early-successional forests— a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like American woodcock, are declining as remaining patches of young forest mature. Woodcock require varying habitat conditions that are within close proximity of each other, including clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young deciduous forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Kelley et al. 2008, Sepik et al. 1994). Shrub swamps in the CFA may provide moist, rich soils for foraging and the dense shrubs provide cover from predators

Management of the shrub swamp communities may be required to maintain shrub dominance and stem densities. Tree species, such as red maple, tend to replace mature shrub species and established invasive plants compete for nutrients and space. These invading species require management in order to maintain the native shrub diversity of the community. A high shrub stem density is also important as it provides birds with cover from predators and more leaf surface area for gleaning. Cover for American woodcock, for example, is ideal in a 10-15 year old shrub swamp (USDA 2001). Shrub species, in particular alder, tend to die back as they reach maturity, and as a result stem density decreases. Periodic rejuvenation of shrubs is necessary to maintain required stem densities. Management priority will be given to shrub swamps that are part of a woodcock management area. Management of these shrub swamps will benefit other species that use these communities, including willow flycatcher, American redstart, chestnut-sided warbler, ruffed grouse, black racer, and eastern ribbon snake.

American black ducks also use shrub swamp communities, though black ducks prefer shrub swamps that are flooded or adjacent to open water habitats. Black ducks rely on these wetlands during the breeding season and as stopover habitat during migration. Adults and their broods forage on seeds, aquatic vegetation, and invertebrates in flooded shrub swamp communities, or adjacent open water habitats. Adults place well-concealed nests near foraging habitat in nearby uplands or dry hummocks in the wetland (Longcore et al. 2000, DeGraaf et al. 2001). American black duck is a species of concern in the North American Waterfowl Management Plan because of historic population declines, and is listed as highest priority for conservation in BCR 14. Protecting and managing these shrub wetland communities from potential threats, including invasive species introduction, altered hydrology, and fragmentation, will contribute to the conservation of this species.

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of shrub swamps at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Sub-objective 1.1d. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using

historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987; Hunter 1991; Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the West River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support natural and rare ecological communities, and provide potential breeding and foraging habitat for priority refuge resources of concern including American black duck, and maintain the natural water level variability in wetlands where the federally listed northeastern bulrush occurs.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams (Gawler 2008). These marshes are also maintained over time by beaver activity, an important natural disturbance process within the West River watershed.

Our coarse-scale habitat analysis of this CFA identifies these wetlands as scattered throughout the CFA with the largest freshwater marsh acreage occurring within a large wetland complex adjacent to the Townshend Reservoir. This particular wetland complex, adjacent to open water habitat, may provide important breeding and foraging habitat for American black duck, and other waterfowl species. Located within the Connecticut River watershed, an important migration corridor, this area may also be important as staging areas for migrating waterfowl. An evaluation of the wetlands in the CFA will be necessary to determine their potential as habitat for waterfowl species.

The northeastern bulrush, a wetland plant, occurs within various beaver wetlands in the CFA. This species is federally listed, and has adapted to seasonal water fluctuations. Habitat alterations that change the hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (USFWS 2006).

Implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife habitat inventory. Wildlife species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent habitat conditions and land uses within the CFA and associated landscape. Baseline information on the condition of freshwater marshes at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Encourage local landowners to use Vermont Best Management Practices within active agricultural fields that are located along the perimeter of marsh habitats.
- Explore and support research opportunities with academic partners to address information gaps for northeastern bulrush.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Survey wildlife use of existing wetlands.
- Map natural communities; protect rare or exemplary examples.
- Work with the State Natural Heritage Program to annually monitor the presence/absence of current northeastern bulrush populations in emergent wetlands.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) as part of a mosaic of habitat conditions required by American woodcock and other shrub-dependent conservation concern species such as chestnut-sided warbler. Also maintain large contiguous tracts of grassland habitat, if present and appropriate, for grassland birds and pollinators.

Rationale:
More than two percent of the West River CFA is typed as pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow. American woodcock, a refuge priority resource of concern, will use both habitat conditions when managed in conjunction with their other habitat needs.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline. However, large and contiguous grasslands are rare in the watershed, and large grassland habitat patches are important to high priority grassland species and overall biological diversity. We will maintain large grassland patches (e.g. 500 acres), or areas where a high proportion of grassland cover is present in the landscape (e.g., a mosaic of many medium to large patches).

Shrubland and grassland habitats will also be used by American woodcock, which require diverse structural habitat conditions within close proximity of each other: clearings for courtship, forest openings with sparse shrub or herbaceous cover for roosting, young hardwood forests of shade intolerant tree species for nesting and brood rearing, and functional foraging areas (Sepik et al. 1994, Kelley et al. 2008). Small clearings with minimal vegetation is required for courtship areas, and shrublands with clumps of tall vegetation or sparse shrubs will provide roosting habitat.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Large, contiguous grassland habitats are also important to a suite of priority grassland bird species. Current pasture, hay, and grassland acres can provide quality habitat, for these species, and American woodcock, if managed appropriately. Baseline information on the condition of these habitats and association with other landscape features will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Conduct an inventory of these habitats to determine their condition, size and location, which will inform and prioritize appropriate management strategies in the HMP.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
See rationale for objective 1.1d.

Habitats that occur within the West River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Specific Sub-objectives to apply on refuge lands for aquatic habitats:

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and unimpeded aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout, American shad, American eel, Atlantic salmon and brook floater, as well as other species of conservation concern such as sea lamprey. Maintain and protect the cobble shores of the West River, especially in areas that provide suitable habitat for the cobblestone tiger beetle.

Rationale:
The West River flows through the northern portion of the CFA, and along the eastern boundary as it enters and exits the Townshend Reservoir. The West River has been rated as having the highest abundance of high quality open water habitat as measured by a Vermont Index of Biotic Integrity, a measure of fish community health. It has a wide range of representative reaches extending from its headwaters to its mouth supporting diverse assemblages of fish species. The West River is also considered representative for assemblages of mussels and invertebrates in several locations, including Cobb Brook, which flows through the northern portion of the CFA.

The main stem and tributaries provide high quality cold water habitat for brook trout and Atlantic salmon. Brook trout and Atlantic salmon are sensitive to extreme temperature fluctuations, and require water temperatures between 40 to 70 degrees Fahrenheit for spawning, growth, and survival. The lower West River provides habitat

for warm water species as well as diadromous fish such as American shad and American eel. Other species that occur in the West River CFA include yellow perch, creek chub, white sucker, pumpkinseed, carp, slimy sculpin, and blacknose dace. These species are hosts for the earliest life stages of resident mussels.

Another species of conservation concern that utilize freshwater aquatic habitats in this CFA is sea lamprey. Sea lamprey enter the Connecticut River and tributaries to reproduce, and in the process provide important ecological benefits to aquatic systems. Adults transport nutrients between freshwater and saltwater systems, their nest construction restores and enhances streambed structure, abandoned nests are used by other riverine fish, and lamprey eggs and larvae provide food for a variety of species (Kircheis 2004). As with many riverine fish, sea lamprey movement is impeded by barriers on the main stem and tributaries.

There is potential habitat for cobblestone tiger beetle, a species that has been petitioned for federal listing, within the West River CFA. This tiger beetle prefers sparsely vegetated sandy cobble beaches (Pyzikiewicz 2006). The West River provides these habitat conditions, and the cobblestone tiger beetle has been found in the watershed. This tiger beetle is also listed as state-endangered. Other species of concern that occur in the West River Watershed (not necessarily in the CFA) include the State-threatened brook floater mussel and eastern pearlshell, eleven state rare plant species, as well as historic records of the federally listed dwarf wedgemussel.

The Townshend Reservoir is located in the northern portion of the CFA. This man-made lake is associated with the Townshend Dam, which was built on the West River in 1961 by the U.S. Army Corps of Engineers to prevent flooding along the Connecticut River. This lake is managed by Vermont Fish and Wildlife Department and the Army Corps of Engineers, and supports rainbow, brown and brook trout, yellow perch, largemouth bass and bullhead.

Management of water resources in the West River CFA will focus on rivers and streams that provide uninterrupted aquatic species passage to spawning and wintering habitat and provide structurally diverse in-stream habitat. Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Aquatic species survival and breeding success is dependent not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of open water habitat will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity, and health.
- Conduct stream assessments to identify man-made physical barriers (e.g., impassable road crossings, culverts, and dams) to the movement of fish and other aquatic organisms.
- Work with partners to monitor the West River for the cobblestone tiger beetle.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not Applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not Applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the West River CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the West River CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the West River CFA as an outdoor classroom

Rationale:
Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the West River CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the West River CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA-compliant trail anticipated for the site, the West River CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the West River CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate the CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the West River CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the West River CFA.
- Incorporate thematic statements, measureable objectives and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:
- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the West River CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the West River CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following state regulations, except as noted under Strategies below.

Rationale:
The West River CFA is a popular area to hunt white-tailed deer, Eastern wild turkey, black bear, and small game. Hunting will be allowed on a newly created division, consistent with the final approved compatibility determination. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Allow hunters access to the refuge outside of the normal division open hours (i.e., 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Vermont Fish and Wildlife Department to determine whether opportunities exist for state-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with Vermont Fish and Wildlife Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:
- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at West River CFA kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Vermont Fish and Wildlife Department to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access, and Infrastructure)
Provide quality fishing opportunities at the West River CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Vermont Fish and Wildlife Department regulations, and any CFA-specific conditions.

Rationale:
There are several streams in the CFA including the West River, Cobb Brook, Turkey Mountain Brook, Little Turkey Mountain Brook, Fair Brook, Negro Brook, Wardsboro Brook, Smith Brook, and Ranney Brook. A variety of game fish are found in these streams and fishing opportunities exist for several trout species. Fishing is a popular activity and will continue under Service ownership. Retaining fishing opportunities conforms to historic use within the CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk to post information on fishing seasons and other notices to visitors.
- The West River CFA will be open daily to all visitors, including anglers, from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters.

Within 5 years of acquiring land with fishable waters:
- Work with the Vermont Fish and Wildlife Department to inventory and assess fish populations on the CFA.
- Work with the Vermont Fish and Wildlife Department to evaluate potential fishing enhancements, as appropriate.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available at the refuge website, refuge offices, CFA kiosks, through friends groups, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. Local organizations such as Vermont Audubon chapters and others offer organized field trips to popular natural areas. A new division in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.
- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring sufficient land:

- Develop a public access strategy and required planning (e.g., NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring sufficient land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring sufficient land:

- Develop interpretive panels for kiosks and trails that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.

- Encourage local schools and groups such as a local chapter of Vermont Audubon and other environmental organizations to offer wildlife-centered trips to the refuge.

- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring sufficient land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the West River CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Where appropriate, we will work with these partners to promote and distribute information about these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that are part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the West River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional land-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as wildlife observation and photography. Examples include regional hiking trails and regional snowmobile trails part of the Vermont Association of Snow Travelers (VAST) system. When determined appropriate and compatible, we will work with these partners to promote and distribute information about these opportunities.

Within 1 year of acquiring sufficient land:

- On newly acquired land that contains an existing snowmobile trail that is part of the VAST system, determine if maintaining the trail on the refuge is appropriate and compatible. If found appropriate and compatible, work with VAST and the responsible local snowmobile club to manage snowmobile use under a special use permit.

Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Develop compatible opportunities on the West River CFA that support initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:
- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Work with users to delineate winter cross-country skiing trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of acquiring sufficient land:
- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

White River Conservation Focus Area

Stockbridge and Killington, Vermont

Conservation Focus Area (CFA)—Acreage Profile	Acres	Percentage of CFA
Total CFA Acres to be Conserved by Service	10,054	89%
■ *Existing Refuge Ownership in CFA*[1]	*0*	
■ *Additional Acres in CFA Approved for Refuge Acquisition*[2]	*10,054*	
Existing Acres in CFA Permanently Conserved by Others[2,3]	1,244	11 %
Total Acres in CFA[2, 4]	11,298	100 %

1 Acres from Service's Realty program (surveyed acres).

2 Acres calculated using GIS.

3 The Service does not plan to acquire existing conserved lands, except under extenuating circumstances (conserved acres from TNC 2014 data).

4 The Service will conserve up to this number of acres. The Service only acquires lands from willing sellers.

What specific criteria and/or considerations drove the selection of this CFA?

The White River CPA (map A.94) encompasses the White River CFA (map A.95). The White River is one of the best examples of its river type in Vermont for fish and macroinvertebrates (Langdon et al. 1998) and was identified by the State of Vermont as a high priority river corridor that provides habitat for many of the State species of greatest conservation concern (VFWD personal communication 2011). The White River, including several of its major tributaries, was a SFA in the 1995 Conte FEIS. The White River CFA is located within a large network of conserved lands, including the Green Mountain National Forest, Gifford Woods State Park, the White River Stream Bank and Les Newell Wildlife Management Areas, and extensive Vermont Land Trust conserved areas. In addition, most of the White River CFA overlaps terrestrial Tier 1 Core and Connector lands identified through the *Connect the Connecticut* landscape conservation design. Additional land protection by the Service in this area will help better connect these conserved lands. The area is also expected to be relatively resilient to climate change impacts in the future. The Appalachian Trail Corridor, which crosses the CFA, provides outstanding recreational opportunities.

What are the priority habitat types within the CFA? What percentage of the total CFA acreage do they represent?

- Hardwood Forest – 90%

See map A.96 and table A.53 for more detailed habitat information for the CFA.

What are the resources of conservation concern for the CFA?

As noted in table A.54 below, there are nine refuge Priority Refuge Resources of Concern (PRRC) terrestrial and aquatic species that may rely upon the diverse habitats in this CFA. There are also habitat types that are not being managed for a particular PRRC species, but are important for their contribution to Biological Integrity Diversity and Environmental Health (BIDEH) of the landscape. The refuge will seek to protect and restore (if necessary) these habitat types. Additionally, we recognize the value of this area to species that require large contiguous forest tracts including American black bear, bobcat, and forest interior dwelling bird species. These species and others are discussed further below.

1. **Federal Threatened and Endangered Species**
   This CFA is within the range of the federal endangered Indiana bat, the federal threatened northern long-eared bat, and tricolored bat, a species petitioned for listing under the ESA. During summer nights, these bats forage on insects within wetlands and forested habitats. Northern long-eared and Indiana bats roost under the bark or within cavities of large diameter trees during the day (USFWS 2014, USFWS 2007). Tricolored bats will also roost in trees, though they tend to roost in the foliage of live or dead trees within a mature stand (MADFW 2015). These roosting habitats also provide maternity sites where females will raise their young. In the winter, these bats will hibernate in underground caves or cave like structures, often within close proximity to their summer roosting and feeding areas. Areas within the CFA may contain important maternity and summer roosting sites, as well as foraging areas for these species.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The White River CFA not only provides important stopover habitat for migrating landbirds, but breeding habitat as well.

   The PRRC species for the White River CFA include wood thrush and chestnut-sided warbler. This CFA is located in their core breeding range, and the contiguous forests provide breeding habitat for these and other forest nesting birds, many of which are priority conservation concern species. Over 91% of the CFA is contiguous forest, interspersed with riparian, cliff and talus, and rocky outcrop communities. Peregrine falcon is another PRRC species, as well as a State Species of Greatest Conservation Need (SGCN). The cliff and talus systems in the CFA are used by nesting peregrine falcons, where the elevations can rise above 2,600 feet.

3. **Diadromous fish and other aquatic species**
   The PRRC species for the White River CFA include brook trout and Atlantic salmon. The White River is the longest free-flowing tributary to the Connecticut River, and flows through the White River CFA. The many brooks that flow into the White River, such as Fletcher Brook, Stony Brook, Taggart Brook, Broughton Brook and Boutwell Brook, provide high quality cold water habitat for these species. Within Vermont, the White River has been identified as a high-quality river that supports healthy, native populations of macroinvertebrates and fish (Langdon et al. 1998). Brook trout and salmon are also high conservation concern for the State and the Service's Northeast Region.

4. **Other**
   The White River CFA southern boundary is within 2 miles of the abandoned Bridgewater Mines, which were used by over a hundred hibernating little brown, tricolored, big brown and northern long-eared bat species. These mines are no longer being used by bats due to decimation by white-nose syndrome. The northern long-eared bat was recently listed as federally threatened. The habitats within the CFA may still provide current or future roosting, feeding and potential maternity sites.

   The rocky outcrops and forested habitats within the CFA provide denning sites for American black bear and bobcat, as well as a contiguous landscape for these wide ranging mammals to breed and disperse.

What habitat management activities will be a priority on refuge lands within the CFA?

We will conduct a comprehensive, multi-scale wildlife habitat inventory following acquisition. Baseline information on the condition of habitats (i.e., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down Habitat Management Plan. Once inventory has been completed, then management will focus on maintaining the following conditions:

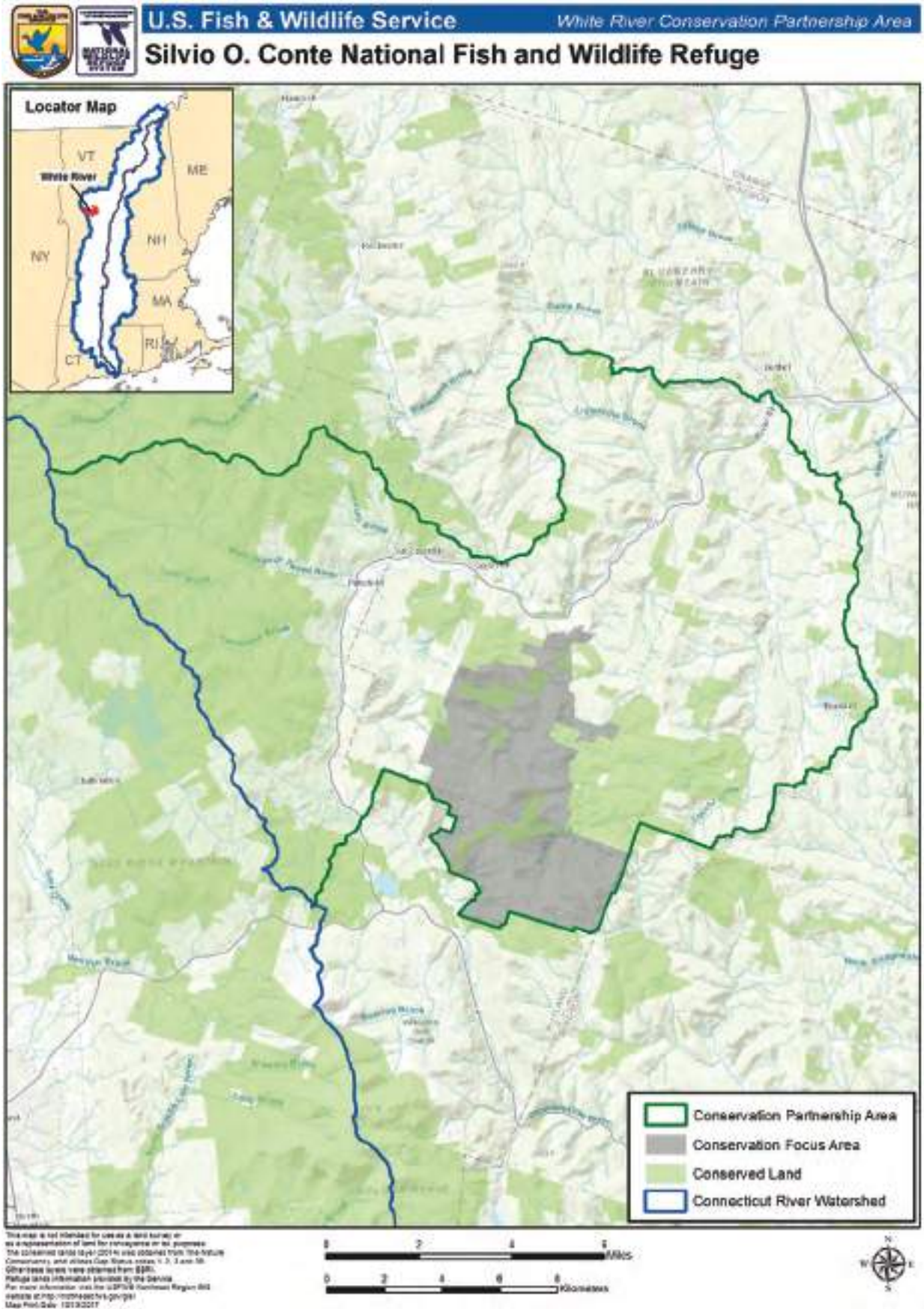
- Forest management activities will provide a diversity of seral stages including early successional and mature forested habitats. The forests in the CFA will be structurally diverse and appropriate for site conditions and location. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Open water (stream, rivers) will focus on maintaining forested stream buffers, a structurally diverse instream habitat, and clear aquatic species passage to spawning and wintering habitat.

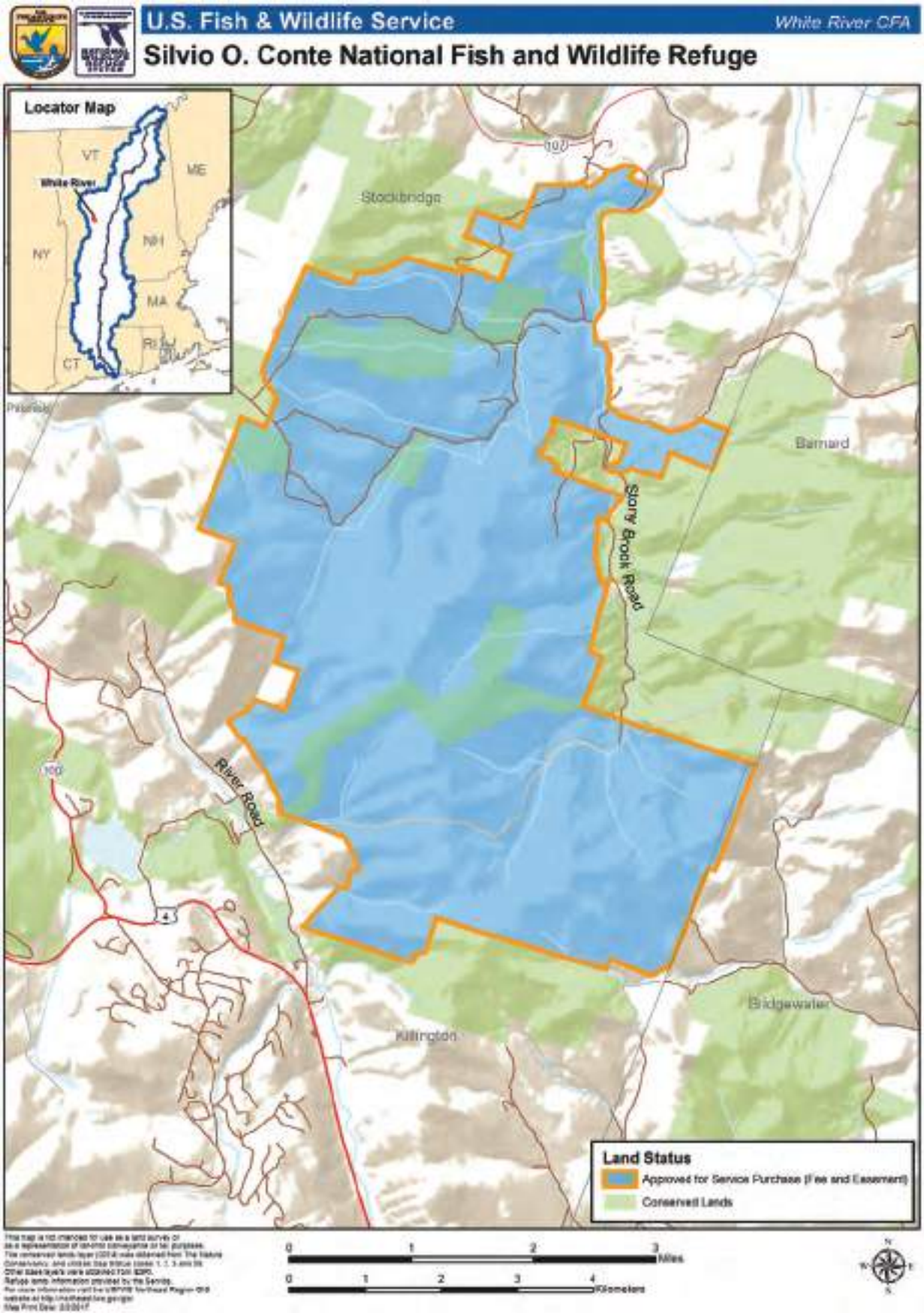
What public use opportunities will be a priority on refuge lands within the CFA?

The National Wildlife Refuge System Improvement Act of 1997 identified hunting, fishing, wildlife observation, photography, interpretation, and environmental education as priority, wildlife-dependent uses. As such, these uses will receive priority on refuge lands.

Map A.94. White River CPA.



Map A.95. White River CFA – Location.



Map A.96. White River CPA/CFA – Habitat Types.

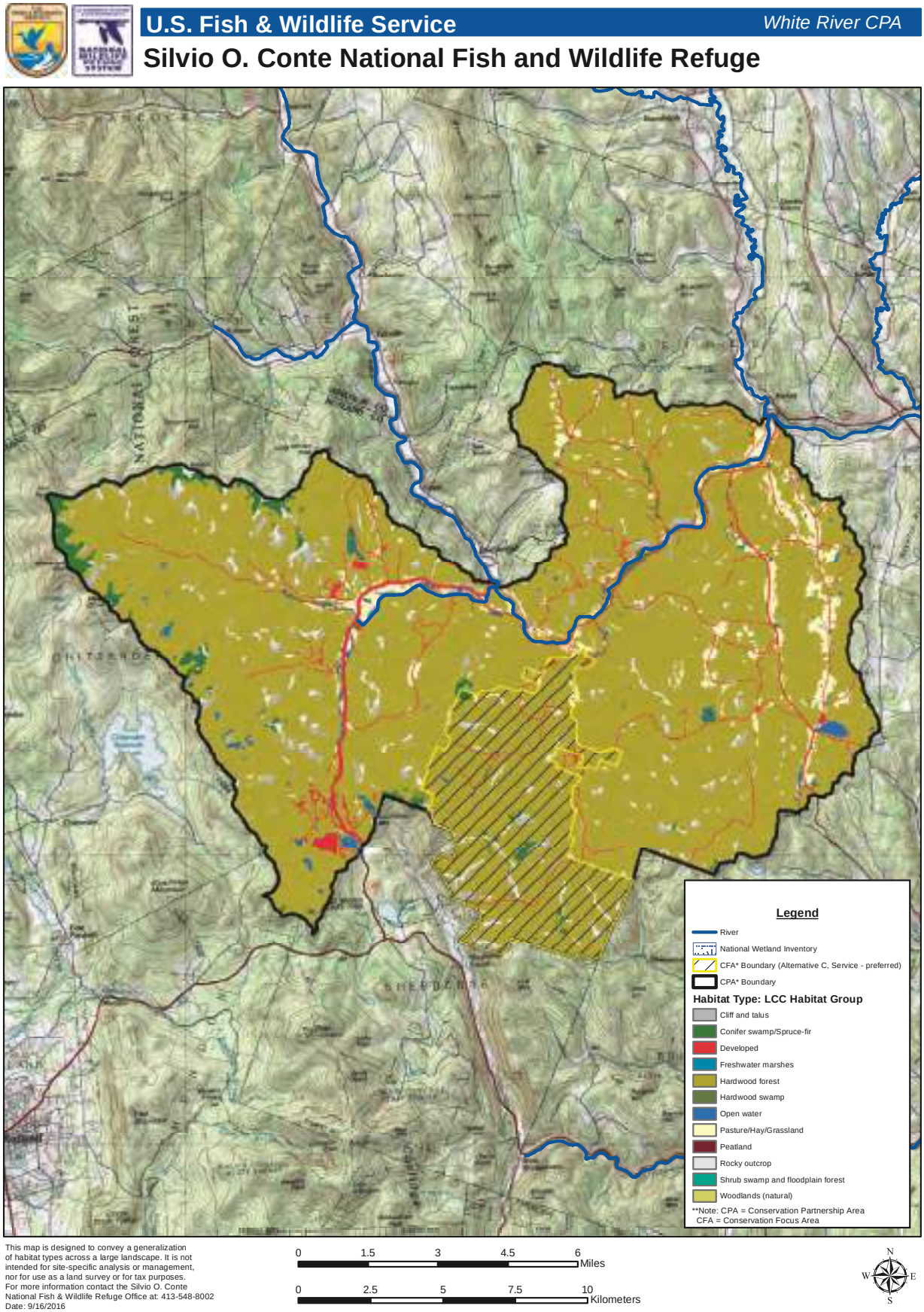


Table A.53. White River CPA/CFA – Habitat Types.

LCC General Habitat Type[1]	CPA[2]		CFA[3]				
	Total Acres	Percent of CPA[4]	Total Acres	Conserved by Others[5]	USFWS Owned[6]	Percent CFA[7]	Percent Habitat[8]
Forested Uplands and Wetlands[9]							
Conifer swamp/spruce-fir	1,798	2.2%	184	62	-	1.6%	10.2%
Hardwood forest	71,556	85.7%	10,160	1,062	-	90.0%	14.2%
Hardwood swamp	53	0.1%	-	-	-	0.0%	0.0%
Shrub swamp and floodplain forest	80	0.1%	1	-	-	0.0%	0.8%
Woodlands (natural)	48	0.1%	1	1	-	0.0%	1.4%
Forested uplands and wetlands subtotal	*73,536*	*88.1%*	*10,345*	*1,124*	-	*91.6%*	*14.1%*
Non-forested Uplands and Wetlands[9]							
Cliff and talus	1,301	1.6%	227	18	-	2.0%	17.4%
Freshwater marshes	104	0.1%	2	-	-	0.0%	1.5%
Pasture/hay/grassland	3,317	4.0%	64	9	-	0.6%	1.9%
Peatland	4	0.0%	3	-	-	0.0%	65.0%
Rocky outcrop	2,147	2.6%	497	79	-	4.4%	23.1%
Non-forested uplands and wetlands subtotal	*6,874*	*8.2%*	*792*	*106*	-	*7.0%*	*11.5%*
Inland aquatic habitats[9]							
Open Water	289	0.3%	-	-	-	0.0%	0.0%
Inland aquatic habitats subtotal	*289*	*0.3%*	-	-	-	*0.0%*	*0.0%*
Other							
Developed	2,791	3.3%	156	17	-	1.4%	5.6%
Other subtotal	*2,791*	*3.3%*	*156*	*17*	-	*1.4%*	*5.6%*
TOTAL[10]	**83,489**	**100.0%**	**11,293**	**1,247**	**-**	**100.0%**	**13.5%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 Conservation Partnership Area

3 Conservation Focus Area

4 Percentage of the CPA represented by the habitat type

5 Acres in the CFA currently conserved by others (TNC 2014)

6 Acres in the CFA currently owned by the Service

7 Percentage of the CFA represented by the habitat type

8 Percentage of a given habitat within the CPA protected within the CFA

9 CCP Objective from Conte Refuge CCP, Chapter 4, Management Goals, Objectives, and Strategies

10 Acreages in this table may differ slightly from the acreages presented in the Overview summary. This table's values were calculated using raster data (an array of pixels, as in a digital photo), while the values in the Overview, and used throughout the CCP were calculated using vector data (created from shapes). For the purposes of CFA analysis, the acreages presented in the Overview are more accurate because they better reflect boundaries like parcel lines.

Table A.54. White River CFA – Priority Resources of Concern.

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4]		
Hardwood Forest[5] - 10,334 acres		
Wood Thrush[A, B, C]	Breeding habitat includes contiguous mature forests (80+ years old) dominated by deciduous tree species, moist soils, a moderate to dense sub-canopy and shrub density, open forest floor and closed canopy (Roth et al. 1996, Rosenberg et al. 2003).	Baltimore Oriole[J] Black-and-white Warbler[J] Black-billed Cuckoo[A,I,J] Broad-winged hawk[J] Rose-breasted Grosbeak[A] Northern Flicker[A, J] Scarlet Tanager[J] Ruffed Grouse[A, I] Whip-poor-will[A, I, J] **Louisiana Waterthrush** Brown Thrasher[I] Blackburnian Warbler[A] **Ovenbird**[A] **Eastern Red Bat**[I] Little Brown Bat[I] Eastern Small-footed Bat[I] American Redstart[A, J] Eastern Wood-pewee[A, J] Red-shouldered Hawk[I, J] Black-throated Green Warbler[A] Black-throated Blue Warbler[A,I] Yellow-bellied Sapsucker[A,J] Bobcat[I] Long-tailed Weasel[I] Woodland Vole[I] Black Bear[I] Veery[A]
Chestnut-sided Warbler[A, B]	Early successional deciduous forested upland and wetland habitat (Dunn et al, 1997, Richardson et al, 1995)	
Northern Long-eared Bat[D] Tricolored Bat[E] Indiana Bat[D]	Winter habitat includes high humidity underground caves or cave like structures; summer habitat includes roost trees that are alive, dead or dying, exhibits exfoliating bark, cavities, crevices, or cracks and located within a variety of forest types interspersed with non-forested habitats (USFWS 2014, USFWS 2007, MADFW 2015).	
Conifer Swamp[5] - 10 acres		
Laurentian-Acadian conifer-hardwood acidic swamp[H]	The *conifer-hardwood acidic swamps* occur on mineral soils that are nutrient-poor; there may be an organic top soil horizon, but the substrate is generally not deep peat. These basin wetlands remain saturated for all or nearly all of the growing season, and may have standing water seasonally. There may be some seepage influence, especially near the periphery. Red maple, ash, red spruce (rarely Black spruce), and balsam fir are the most typical trees. The herbaceous and shrub layers tend to be fairly species-poor, and include catberry and ferns of the genus *Osmunda* (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Forested Uplands and Wetlands[4] (cont.)		
Shrub Swamp and Floodplain Forest[5] - 1 acre		
Laurentian-Acadian wet meadow-shrub swamp[H]	*Wet meadow-shrub-swamps* are often associated with lakes and ponds, but are also found along streams, where the water level does not fluctuate greatly. They are commonly flooded for part of the growing season but often do not have standing water throughout the season. The size of occurrences ranges from small pockets to extensive acreages. The system can have a patchwork of shrub and grass dominance; typical species include willow, silky dogwood, speckled alder, white meadowsweet, bluejoint, tall sedge, and common rush. Trees are generally absent and, if present, are scattered (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Woodlands (natural)[5] - 1 acre		
Central Appalachian pine-oak rocky woodland[H]	This system of the central Appalachians encompasses open or sparsely wooded hilltops and outcrops or rocky slopes. The substrate rock is granitic or of other acidic lithology. The vegetation is patchy, with woodland as well as open portions. Pine species are indicative and often are mixed with Oak species. Some areas have a fairly well-developed heath shrub layer, others a grass layer. Conditions are dry and nutrient-poor, and many, if not most, sites have a history of fire (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4]		
Cliff and Talus[5] - 228 acres		
Peregrine Falcon[C, G]	Nests on cliffs, ledges, and talus slopes near open habitats including rivers, lakes, and marshes, and lack of human disturbance (DeGraaf et al. 2001).	Uncommon plant community within the landscape that contributes to BIDEH*
Freshwater Marshes[5] - 2 acres		
Laurentian-Acadian freshwater marsh[H]	These freshwater emergent and/or submergent marshes are dominated by herbaceous vegetation. They occur in closed or open basins that are generally flat and shallow. They are associated with lakes, ponds, slow-moving streams, and/or impoundments or ditches. The herbaceous vegetation does not persist through the winter. Scattered shrubs are often present and usually total less than 25% cover. Trees are generally absent and, if present, are scattered. The substrate is typically muck over mineral soil. Vegetation includes common bulrush, narrow-leaf cattail, marsh fern, common jewelweed and sedges (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Pasture/Hay/Grassland[5] – 64 acres		
Where appropriate and supported by the local community, restore to forest habitat types	See species composition and structure above.	See species associated with forested habitat types above.
Peatland[5] – 3 acres		
Boreal-Laurentian-Acadian acidic basin fen[H]	These fens have developed in open or closed relatively shallow basins with nutrient-poor and acidic conditions. The substrate is sphagnum, and vegetation typically includes areas of dominance by grasses and dwarf-shrubs. Leatherleaf is usually present, and scattered stunted trees may occur. These fens often develop adjacent to open water (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*

Priority Refuge Resources of Concern[1]	Habitat Structure[2]	Associated Species[3]
Non-Forested Uplands and Wetlands[4] (cont.)		
Rocky Outcrop[5] – 497 acres		
Northern Appalachian-Acadian rocky heath outcrop[H]	The *Northern Appalachian-Acadian rocky heath outcrop* system occurs on ridges or summits of erosion-resistant acidic bedrock. The vegetation is patchy, often a mosaic of woodlands and open glades. red oak and various conifers, including white pine and red spruce, are characteristic trees. Low heath shrubs, including sheep laurel, low-bush blueberry, black huckleberry, and black chokeberry are typically present. Exposure and occasional fire are the major factors in keeping the vegetation relatively open (Gawler 2008).	Uncommon plant community within the landscape that contributes to BIDEH*
Inland Aquatic Habitats[4]		
Water[5] *(GIS data did not capture acreage due to dense forest cover along small stream and river corridors)*		
Brook Trout[F]	Spawning habitat includes clear, well oxygenated cold water lakes/ponds/ streams with silt-free rocky substrate, abundant cover, vegetated banks, stable temperatures, and stream flow (VTWAP 2005).	Blacknose Shiner[I] Riffle Snaketail[H] Brook Snaketail[H] Zebra Clubtail[H]
Atlantic Salmon[F, G]	Spawn in cold freshwater moving streams w/coarse clean gravel and adequate food/ cover. Migrate in large rivers (VTWAP 2005).	

Notes:

1 These species of conservation concern and associated habitats, as well as under-represented and sensitive ecological systems constitute the management focus for the CFA, and are recommended for the CPA. They were identified based on specific criteria, and are included in the following plans, databases and/or have Federal status.

A: 2008 Bird Conservation Region 14.

B: 2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan.

C: 2008 USFWS Birds of Conservation Concern.

D: Federal Threatened and Endangered status as of 2016, including Candidate Species

E: Federal Elevated Concern species or species petitioned for threatened and endangered listing as of 2016

F: 2009-2013 USFWS Northeast Region Fisheries Program Strategic Plan

G: Silvio O Conte Refuge Purpose Species.

H: 2008 North East Terrestrial Habitat Classification System.

2 This habitat structure will benefit the listed priority refuge resources of concern, and is based on the most recent literature.

3 These species are a compilation from the following plans, and are associated with the habitat type and/or will benefit from all or a portion of the habitat structure associated with the priority species. This is not a comprehensive list of species.

A: 2008 Bird Conservation Region 14.

I: 2015 Vermont Wildlife Action Plan (Species of Greatest Conservation Need)

J: 2012 Terrestrial and Wetland Representative Species of the North Atlantic: Species Selected, Considered, and Associated Habitats (Ecological Systems). These species were LCC candidate species and are represented by the selected LCC Representative Species.

4 CCP Objectives from Silvio O. Conte NFWR Comprehensive Conservation Plan, Chapter 4, Management Goals, Objectives, and Strategies.

5 These habitat types are based on the North Atlantic Landscape Conservation Cooperative (NALCC) habitat groupings for associated Representative Species, which were derived from The Northeastern Terrestrial Habitat Classification System (NETHCS). See table A.56 for a comparison of the NALCC habitat groupings and NETHCS.

BOLD–These species are LCC Representative Species, which is a species that, because of its habitat use, ecosystem function, or management response, typifies lifecycle or habitat requirements for a larger group of species.

* The Refuge Improvement Act directs the US Fish and Wildlife Service to maintain Biological Integrity, Diversity, and Environmental Health (BIDEH). Elements of BIDEH are represented by native fish, wildlife, plants and their habitats as well as those ecological processes that support them.

Goals, Objectives, and Strategies for Refuge Lands in the White River CFA

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1a. (Hardwood Forest)
Improve the diversity of seral stages and (where and when possible) restore historic composition and structure, and improve landscape connectivity of hardwood forest habitat to support species of conservation concern and aid in climate change adaptation. Management will provide breeding and foraging habitat for priority refuge resources of concern, including wood thrush, chestnut-sided warbler, and cave dwelling bats.

Rationale:
We envision healthy forests within the White River CFA where a diverse seral structure provides suitable breeding and post-breeding habitat conditions for a suite of Vermont's wildlife. Our long-term vision for the CFA includes hardwood forests characterized by complex horizontal and vertical structure, a generally closed canopy, large-diameter trees, dead woody material, snags and cavity trees, native species diversity, softwood inclusions, and a diversity of wildlife (Foster et al. 1996, Goodburn and Lorimer 1998, Keeton 2006, D'Amato et al. 2009, Curzon and Keeton 2010, Fraver et al. 2011).

The Upper White River watershed has been identified by Audubon Vermont as important breeding habitat for a number of responsibility birds that have a high proportion of their global population breeding in the region. To date, our review of White River's habitats and wildlife species — and their condition — has been limited to coarse-scale information: the careful analysis of spatially-explicit habitat data using GIS, the consultation of local, state, and regional species conservation plans, and an understanding of forest disturbance and land-use history in New England. This allowed identification of broad habitat types, and species of conservation concern known to utilize characteristics common to these habitats. Our understanding of the forest structure within White River comes exclusively from a reading of forest history in New England — a legacy of intensive past-use that altered the vegetation structure and composition, landscape patterns, and ongoing ecological dynamics (Cronon 1983, Whitney 1996, Foster et al. 1997, Bellemare et al. 2002, Hall et al. 2002). Our sub-objective assumes the forests of White River are more homogeneous than those of three centuries earlier, and they include more sprouting and shade-intolerant species and fewer long-lived mature forest tree species (Goodburn and Lorimer 1998, Foster et al. 1998, Foster 2000, Bellemare et al. 2002, Cogbill et al. 2002, Abrams 2003). Completing a comprehensive forest and habitat inventory post-acquisition will test these assumptions, and aid in identifying stands where a forest management approach that combines passive management and with the application of silvicultural treatments designed to emulate gap dynamics, will promote compositional and structural diversity, and move succession forward to emulate later seral stage characteristics.

For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, such as those that provide nest sites, food and foraging substrates, singing perches, and cover from predators. While our management goals may create a relatively old forest, hardwood forests within White River will contain a variety of patches in different age classes and developmental stages; it is not uniform throughout. This diversity of age classes provides a variety of bird species with a range of nesting and foraging opportunities. Further, finer-scale investigation of forest conditions may identify opportunities to improve age class diversity through the creation of early-successional forests — a habitat in decline in portions of the watershed. Species dependent upon disturbances that create early successional forested habitats, like North Atlantic LCC (NALCC) representative species the chestnut-sided warbler and others, are declining as remaining patches of young forest mature (Sepik et al. 1994, Kelley et al. 2008). Across the CFA, enhanced horizontal structure will provide foraging opportunities for bats, and support other species of conservation concern like ruffed grouse, black-throated blue warbler, American redstart, and black bear.

In a mature forest, many nesting bird species tend to remain within specific vegetation layers: on or near the ground, in the middle layer, or up in the canopy. White River's hardwood forests should have all forest layers present in moderate to high amounts distributed throughout a stand and across the landscape. Enhanced vertical structure will provide the greatest number of bird species with the greatest number of nesting and foraging opportunities. These habitat elements may have importance to declining mature forest-interior species identified in regional conservation plans like wood thrush. Wood thrush nest and feed at the ground level; a sub-canopy layer of shrubs, moist soils, and leaf litter are important habitat features (Roth et al. 1996, Rosenberg et al. 2003). And wood thrush has significance as a NALCC representative species for hardwood forests in the NALCC southern sub-region.

Our active forest management efforts will aim to create or maintain a canopy that is generally closed (greater than 75 to 80 percent closure) with small gap openings scattered throughout a stand and the CFA. These openings will be caused by or mimic small, single- to few-tree disturbances and create opportunities for regenerating intermediate- and shade-tolerant species. Regeneration in these openings will provide a continual supply of ephemeral nesting habitat for species like wood thrush. The distribution and concentration of these openings will vary, but interior forest conditions will be maintained on the whole. Close canopy conditions favor a suite of interior-nesting bird species that include: ovenbird, black-throated blue warbler, black-throated green warbler, and — when along rocky bottomed streams — Louisiana waterthrush.

Efforts to maintain or improve seral stage diversity within the CFA will include the retention of large-diameter (24 inches or greater in dbh) trees where appropriate. Such larger trees are either absent or are very few in younger forests, and that has implications for the habitat of wildlife species and for nutrient cycling. The White River CFA southern boundary is within 2 miles of the Bridgewater Mines, which were used by over a hundred hibernating little brown, tricolored, big brown and northern long-eared bat species (see sub-objective 1.2b for further discussion). These mines are no longer being used by bats due to decimation by white-nose syndrome. Northern long-eared bat was recently listed as threatened under the Endangered Species Act, and tricolored bat has been petitioned for federal listing. Upon emergence from the hibernacula, females will travel to their summer range to give birth to pups in maternity colonies, while male bats often remain within 5 miles of the hibernaculum throughout the summer (Darling, unpublished). Crevices behind peeling bark of large diameter trees or cavities in partially decayed trees are used for maternity colonies and summer day roosts (Caceres and Pybus 1997). This CFA is within the eastern boundary of the northeast Indiana bat Recovery Unit (RU). These RUs serve to protect summer roosting habitat for core and peripheral populations (USFWS 2007). The habitats within the CFA may provide current or future roosting, feeding and potential maternity sites for Indiana, northern long-eared, tricolored and other bat species. Structurally-sound, large-diameter trees are also important nest sites for woodland raptors, such as the red-shouldered hawk. Snags and cavity trees also provide important nesting and foraging sites for bird species such as nuthatches, owls, and woodpeckers, like the yellow-bellied sapsucker.

Implementation of refuge strategies will begin with a comprehensive, multi-scale forest and wildlife habitat inventory. Forest wildlife species survival and breeding success is dependent not only on the habitat at the stand level, but also the surrounding landscape, making it necessary to consider the proportions and sizes of stand types and successional stages within the CFA and the associated landscape. Baseline information on the condition of hardwood forests at the time of acquisition will further inform more detailed, stand-level habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Identify forest stands with late successional characteristics for passive management, and those where active management is necessary to improve forest structure. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.

- Identify sites appropriate for early successional management.

- Collaborate with partners within the Upper White River Cooperative Weed Management Association to strategically prevent and manage invasive plants.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Within 10 years of land acquisition and CCP approval:

- Implement identified active forest management opportunities using accepted silvicultural practices. Appendix J provides general forest management guidelines, including descriptions of forestry techniques and explanations about how we will determine where and how to conduct active management.
- Retain and recruit 3 to 6 large (16 inch DBH) live or dead trees such as silver maple, beech, green ash, yellow birch and sugar maple per acre within a 5-mile radius of bat hibernacula as bat roosting sites.
- Create small canopy openings to improve solar exposure of existing or potential roost trees.
- Maintain contiguous late successional forest cover within 2 to 3 miles of rock cliffs and ledges to protect potential roosting sites of eastern small-footed bats.
- Protect hard and soft mast producing species such as American beech inclusions, and apple and cherry trees, through the use of best management practices.
- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Explore research opportunities with academic partners to address efficacy of forest management in meeting wildlife objectives.

Inventory and Monitoring Strategies:

Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Map vernal pools and seeps.
- Work with VTFW to identify and protect active bat maternity colonies and summer roost sites. Assist with monitoring of nearby hibernacula.

Sub-objective 1.1b. (Biological Integrity, Biological Diversity, and Environmental Health)

Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:

Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach

seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the White River CFA where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats are most often small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and providing additional structural and species diversity to the matrix. Rocky outcrops and upland meadows, for instance, are anomalies in an otherwise forested landscape. They often have a special flora and fauna—providing sunny, dry sites for reptiles to bask, or nectar producing flowers for foraging butterflies. One could make the case that these outcrops are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context. This approach will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually (e.g., imagine species conservation plans for particular insects or liverworts). Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Collaborate with partners within the Upper White River Cooperative Weed Management Association to strategically prevent and manage invasive plants.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.

- Map natural communities; protect rare or exemplary examples.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Cliff and Talus)
Protect cliffs, ledges and talus slopes to maintain the biological integrity, health and diversity of associated natural and rare ecological communities. Emphasis will be on sites occupied by nesting peregrine falcons and roosting bats.

Rationale:
Cliff and talus systems within this CFA occur below treeline at low to mid elevations. The vegetation is patchy and often sparse, punctuated with patches of small trees that may form woodlands in places (Gawler 2008). The type of rock, microclimate, and soil availability from higher elevation sources directly and indirectly influence vegetation within these systems (Thompson and Sorenson 2000). Rock types may include limestone, dolmite, granite, schist, slate, or shale which breakdown differently in the environment providing varying levels of nutrients, moisture, ground stabilization, and soil availability. Sun exposure, aspect, elevation, and moisture provide different microclimate conditions impacting vegetation type and growth. These systems provide unique niches for rare and uncommon plants, and habitat for snakes, including the rare eastern timber rattlesnake, black rat snake, and eastern garter snake. Exposed cliffs provide nesting habitat for turkey vultures, ravens, porcupines, and peregrine falcons, a state species of greatest conservation need. Peregrine falcons are also a refuge purpose species. Vermont's breeding population has increased steadily since they were extirpated from the Eastern US in the mid to late 1960's due to indiscriminate use of DDT following World War II. Peregrines are nesting in White River CFA, and monitoring and management of Vermont's Peregrine population is being coordinated by Audubon Vermont.

Bats will use caves or mines within the cliff and talus systems for "hibernacula," where they hibernate, and rock crevices for summer roosting sites. This region hosted two bat hibernacula—two unused mines in Bridgewater. The Bridgewater mines were surveyed in the winter by the state between 2009 and 2013. Over a hundred bats were hibernating in each mine, including little brown bats, northern long-eared bats, tricolored bats, and big brown bats. These mines are no longer being used by bats due to decimation by white-nose syndrome. Although this hibernaculum is about two miles from the CFA boundary, and no longer used by bats at this time, the habitats within the CFA are still significant for roosting, feeding and for potential maternity sites (see sub-objective 1.1a for further discussion).

Management of cliff and talus systems in the White River CFA will begin with a comprehensive, multi-scale wildlife and habitat inventory. Wildlife species survival and breeding success is dependent on habitat at a fine scale and the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of cliff and talus systems at the time of acquisition will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Evaluate and manage human (e.g. recreational) influences, and conduct outreach and education as necessary.
- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct forest and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Identify historical, active, and potential peregrine falcon nesting sites.
- Coordinate with conservation organizations to conduct spring surveys of identified sites to determine occupancy.

- Work with partners to annually monitor active sites to determine occupancy status and reproductive outcome.

- Survey for and protect bat roosting sites.

Sub-objective 1.2b. (Pasture/Hay/Grassland)
Manage pasture, hay, and grasslands (where appropriate) for shrub-dependent conservation concern species such as chestnut-sided warbler.

Rationale:
Less than one percent of the White River CFA is typed as pasture, hay, and grassland habitat. These habitat types require active manipulation to inhibit the natural succession of converting to forest. The pasture, hay, and grassland habitats tend to be dominated by grasses. Depending on habitat patch size, continuity of patches and timing of manipulations, this habitat type will support grassland dependent species such as bobolink and grasshopper sparrow. If these habitats are left unmaintained (e.g. not mowed), they will convert to a mixture of shrubs and grasses providing "old field" habitat for shrub dependent species such as chestnut-sided warbler, prairie warbler and field sparrow.

Many shrubland bird breeding populations occur in high proportions in the northeast, and therefore, are species of conservation responsibility (Dettmers 2003). For example, over 12% of the chestnut-sided warbler population breeds in BCR 14 (Dettmers 2006). While there is evidence that southern New England supported a small but significant grassland bird community before European settlement, only a small proportion of grassland breeding bird populations occurs in the northeast (Dettmers and Rosenburg 2000). Maintaining high quality shrubland habitat in this CFA will provide habitat for a higher percentage of species in decline.

Shrubland dominated habitats in the northeast support many species of conservation concern, many of which are a high conservation responsibility for the region, indicating the importance of shrubland habitats to these species in the CFA. Current pasture, hay, and grassland acres can provide quality habitat for these species, if managed appropriately. In order to make an informed management decision, it will be necessary to conduct a comprehensive, multi-scale wildlife and habitat inventory. Baseline information on the condition of these habitats will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of land acquisition and CCP approval:

- Collaborate with partners within the Upper White River Cooperative Weed Management Association to strategically prevent and manage invasive plants.

- Work with partners to protect and promote farming practices (e.g. haying and pasture of animals) that benefit wildlife and protect water quality.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- As new pasture, hay, and/or grassland habitat is acquired, evaluate its ecological importance to determine if it should be maintained, managed as shrubland or restored to native forest through tree plantings or natural succession.

Sub-objective 1.2c. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can

be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

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The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity, and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the CFA is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Collaborate with partners within the Upper White River Cooperative Weed Management Association to strategically prevent and manage invasive plants.

- Work with partners, including the State, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.

Objective 1.3: Inland Aquatic Habitats

Sub-objective 1.3a. (Open Water)
In collaboration with partners, manage water resources and riparian areas to provide cold temperature regimes, substrate diversity, and clear aquatic species passage that benefit priority refuge resources of concern including Eastern brook trout and Atlantic salmon.

Rationale:
The White River is the longest free-flowing tributary to the Connecticut River, and is very important to Atlantic salmon restoration. The many brooks that flow into the White River, such as Fletcher Brook, Stony Brook, Taggart Brook, Broughton Brook, and Boutwell Brook, provide high quality cold water habitat for brook trout and Atlantic salmon. Brook trout and Atlantic salmon are sensitive to extreme temperature fluctuations, and require water temperatures between 40-70 degrees Fahrenheit for spawning, growth, and survival. Brook trout and salmon are a high priority for conservation by the State and the Service's Northeast Region. Other species that occur in the White River CFA include creek chub, white sucker, slimy sculpin, and blacknose dace.

Management of water resources in the White River CFA will focus on providing rivers and streams that provide clear aquatic species passage to spawning and wintering habitat and structurally diverse in-stream habitat. Due to our lack of knowledge regarding habitat conditions in the CFA, implementation of refuge strategies will begin with a comprehensive, multi-scale wildlife and habitat inventory. Aquatic species survival and breeding success is dependent on not only on the habitat at a fine scale, but also the surrounding landscape, making it necessary to look at the adjacent forest conditions and land uses within the CFA and associated landscape. Baseline information on the condition of open water habitat will further inform more detailed habitat prescriptions within a required step-down Habitat Management Plan.

Management Strategies:
Within 10 years of land acquisition and CCP approval:

- Work with partners to implement a remediation plan for identified obstacles to aquatic species passage.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:

- Work with partners to conduct stream assessments to evaluate the physical, chemical, and biological condition of the fish community structure, productivity, and health.
- Work with partners to conduct stream assessments to identify man-made physical barriers (e.g. impassable road crossings, culverts, and dams) to the movement of fish and other aquatic organisms.
- Collaborate with partners within the Upper White River Cooperative Weed Management Association to strategically prevent and manage invasive plants.

Objective 1.4: Coastal Non-forested Uplands (coastal beaches and rocky shores)

Not applicable

Objective 1.5: Coastal Wetlands and Aquatic Habitats (tidal salt marsh and estuary)

Not applicable

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the Silvio O. Conte National Fish and Wildlife Refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the White River CFA as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education. Environmental education is an important tool that can help refuge visitors and local residents, particularly students, appreciate the importance of this area to the larger watershed.

Because this CFA will be unstaffed, the majority of environmental education opportunities on this CFA will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the White River CFA as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the White River CFA as an outdoor classroom.

Rationale:
See rationale for sub-objective 2.1a.

Management Strategies:
Within 1 year of acquiring sufficient land:
- Encourage schools, scout groups, and summer camps to develop curricula that use the White River CFA as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the White River CFA. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. Interpretation is an important tool that can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With an ADA compliant trail planned for the site, the White River CFA will be well suited to support both self-guided, wildlife dependent interpretive experiences, as well as guided interpretive programs that convey messages about the refuge and about the White River CFA's habitats and cultural resources.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the White River CFA.
- Provide resources and trainings to Friends, and volunteers in support of interpretive programs.

Within 10 years of acquiring sufficient land:
- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, and printed media.
- Employ a variety of themed interpretive offerings (e.g., presentations, audio-visual programs, brochures, and exhibits) when creating programming for natural and cultural resource interpretation.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 5 years of acquiring sufficient land:
- Through partners, and Friends group, annually provide quality interpretive programs, exhibits, printed media at the White River CFA.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, e.g., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of acquiring sufficient land:
- Contribute refuge interpretive information for scenic byways and other state publications and signs.
- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the White River CFA will be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the White River CFA will be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access and Infrastructure)
Provide the opportunity for a quality hunting experience following state regulations, except as noted under Strategies below.

Rationale:
The White River CFA is a popular area to hunt white-tailed deer, Eastern wild turkey, black bear, and small game. Hunting will be allowed on a newly created division as long as it is found to be a compatible use. Hunting, if found to be a compatible use, will be allowed when the Service acquires land that can support hunt seasons. Retaining hunting opportunities on public lands will ensure this wildlife-dependent recreational activity continues and contribute to the state's population management objectives.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:

- Complete all administrative requirements to officially open to hunting consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.

- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

- Post newly acquired properties to ensure refuge boundary lines are clearly marked.

- Install an informational kiosk in a conspicuous location to post information on hunting seasons and other notices to visitors.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Vermont Fish and Wildlife Department to determine whether opportunities exist for State-recognized disabled hunters.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Work with Vermont Fish and Wildlife Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide hunter education classes access to the CFA and conduct directed outreach to ensure hunters are informed about regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, website pages, media releases, etc. to increase interest in hunting at the CFA.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the CFA with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land to support hunting seasons:
- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge Web site, at White River CFA kiosks, through a friends group, and in local businesses.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of acquiring sufficient land to support hunting seasons:
- Work with Vermont Fish and Wildlife Department to encourage youth hunting at the CFA as a means of introducing young people to this traditional recreation activity.

- Offer to host hunter education field courses.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

Sub-objective 3.2a. (Fishing Opportunities, Access and Infrastructure)
Provide quality fishing opportunities at the White River CFA after completing all administrative procedures to officially open refuge lands to fishing, based on Vermont Fish and Wildlife Department regulations, and any CFA-specific conditions.

Rationale:
There are many fishable streams in the CFA including the White River, Boutwell Brook, Broughton Brook, Dalton Brook, Little Stony Brook, Davis Hill Brook, Perkins Brook, Johnson Brook, Taggart Brook, Fletcher Brook, Windfall Brook, Basin Brook, Mink Brook, Quimby Brook, and Taylor Brook. The White River from Stockbridge to Bethel represents exceptional fishing opportunities for rainbow trout, brown trout, smallmouth bass, and walleye. Johnson and Fletcher Brooks possess quality fishing opportunities for wild rainbow and brook trout. A variety of game fish are found in the other streams of the CFA. Fishing is a popular activity throughout this area and will continue under Service ownership. Retaining fishing opportunities conforms to historic use on CFA and much of the surrounding land in the area.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Complete all administrative requirements to officially open to fishing consistent with State hunting regulations and, if necessary, additional refuge-specific regulations.
- Post newly acquired properties to ensure refuge boundary lines are clearly marked.
- Install an informational kiosk to post information on fishing seasons and other notices to visitors.
- The White River CFA will be open daily to all visitors, including anglers, from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters.

Within 5 years of acquiring land with fishable waters:
- Work with the Vermont Fish and Wildlife Department to inventory and assess fish populations on the CFA.
- Work with the Vermont Fish and Wildlife Department to evaluate potential fishing enhancements, especially to the White River, Little Stony Brook, Johnson Brook, and Fletcher Brook.

Inventory and Monitoring Strategies:
Within 5 years of land acquisition and CCP approval:
- Develop a system to monitor and evaluate the fishing program with anglers and other users to determine the objective is being met and to allow for adaptive management.

Sub-objective 3.2b. (Angler Education and Outreach)
Develop programs, including brochures, signage, website pages, media releases, etc. to inform visitors of fishing opportunities at the CFA.

Rationale:
Fishing is a priority public use and a traditional use in the CFA. If land is acquired, the refuge will make information readily available to interested anglers regarding opportunities to fish on Service-owned land, location of fishable waters, and the available game fish.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land with fishable waters:
- Produce a fishing brochure that includes information on regulations, angler ethics, safety considerations, etc. and make it available on the refuge website, at informational kiosks, and in local businesses. In all materials related to the fishing program, promote use of lead-free tackle.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography for people of all physical abilities.

Rationale:
Wildlife viewing and photography are priority public uses on national wildlife refuges and a popular recreational activity. Local organizations such as Vermont Audubon chapters and others offer organized field trips to popular natural areas. A new division in this area will offer people the chance to see and photograph wildlife and in their native habitats, while learning more about the Service, Refuge System, and the refuge.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring land:

- Allow public access from 30 minutes before sunrise to 30 minutes after sunset with the exception listed for hunters and anglers.
- Install an informational kiosk in a conspicuous location to post information on wildlife observation and photography opportunities, and other notices to visitors.

Within 5 years of acquiring sufficient land:

- Develop a public access strategy and required planning (i.e., NEPA, compatibility determination) that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Within 15 years of acquiring sufficient land:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with a friends group and other partners that host events designed to view wildlife on the CFA.

Rationale:
The entire CFA will be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow photography blinds that do not negatively impact wildlife behavior or conflict with other visitors. Blinds must be removed each day, unless arrangements have been made via a special use permit.

Within 5 years of acquiring sufficient land:

- Develop interpretive panels for kiosks and trails that describe typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups such as a local chapter of Vermont Audubon and other environmental organizations to offer wildlife-centered trips to the refuge.

- Produce a list of wildlife species and associated habitats and other conservation information on the CFA for distribution at informational kiosks, the refuge website, and other popular media.

Within 10 years of acquiring sufficient land:

- Develop a public access strategy and required NEPA documentation that includes consideration of developed trails, parking, kiosks, viewing platforms, blinds, interpretation, signage, etc.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the White River CFA that support regional water-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Regional water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as fishing, boating, and wildlife observation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any water trails (e.g., canoe/kayak trails) that part of a regional or State network for their compatibility.

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Develop compatible opportunities on the White River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
Land water-based trails give individuals opportunities to engage in outdoor recreational opportunities in the Connecticut River watershed, such as hiking, wildlife observation, and interpretation. Where appropriate, we will work with these partners to promote, and distribute information about, these opportunities.

Management Strategies:
Within 5 years of acquiring land:

- As lands are acquired, evaluate any existing trails (e.g., hiking trails, snowmobile trails, horseback riding trails) that part of an established regional or State network to determine if they are appropriate and compatible uses for the refuge.

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Develop compatible opportunities on the White River CFA that support regional land-based trail initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the CFA without detrimentally impacting the wildlife resource.

Management Strategies:
(These strategies are dependent on land acquisition from willing landowners.)

Within 1 year of acquiring sufficient land:

- Allow dispersed hiking, snowshoeing, and cross-country skiing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Work with users to delineate winter cross-country skiing trails and determine whether a special use permit to manage winter trails is warranted.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of acquiring sufficient land:

- Work with Friends groups and partners to design and market a virtual geocache course at the division. The course should integrate orienteering with refuge interpretive messages that include linking this division to other refuge divisions and units.

Putney Mountain Unit (Existing Refuge Unit)

Brookline and Putney, Vermont

Total Unit Acres[1]	285

1 Actual surveyed acres.

What are the priority habitat types within the unit?

- Hardwood forest - 99.5%

For more detailed information about the unit's location and habitats, see map A.97, map A.98, and table A.55.

What are the Federal trust and other natural resource values in the unit?

1. **Endangered Species**
   The wetlands of the Putney Mountain Unit are home to a population of northeastern bulrush, a federally endangered wetland plant known to colonize areas with variable water levels. In the case of Putney Mountain, the population occurs along the periphery of beaver-influenced wetlands.

2. **Migratory Birds**
   The Connecticut River watershed is a major migration corridor. The lower portion of the watershed (CT and MA), and habitats along the main stem, receives higher use by migrating landbirds. As birds move north, they disperse beyond the Connecticut River main stem, becoming more evenly distributed in habitats across the watershed (Smith College 2006). The forests in the Putney Mountain Unit are important stopover habitat for landbirds.

3. **Wetlands**
   The beaver-influenced wetlands at Putney Mountain create habitat conditions necessary for the federally endangered northeastern bulrush to persist.

What habitat management activities will be a priority on refuge lands within this unit?

We will conduct a comprehensive, multi-scale wildlife habitat inventory. Baseline information on the condition of habitats (e.g., forested, non-forested, and open water habitats) will further inform more detailed, habitat prescriptions within a required step-down habitat management plan (HMP). Once inventory has been completed, then management will focus on the following:

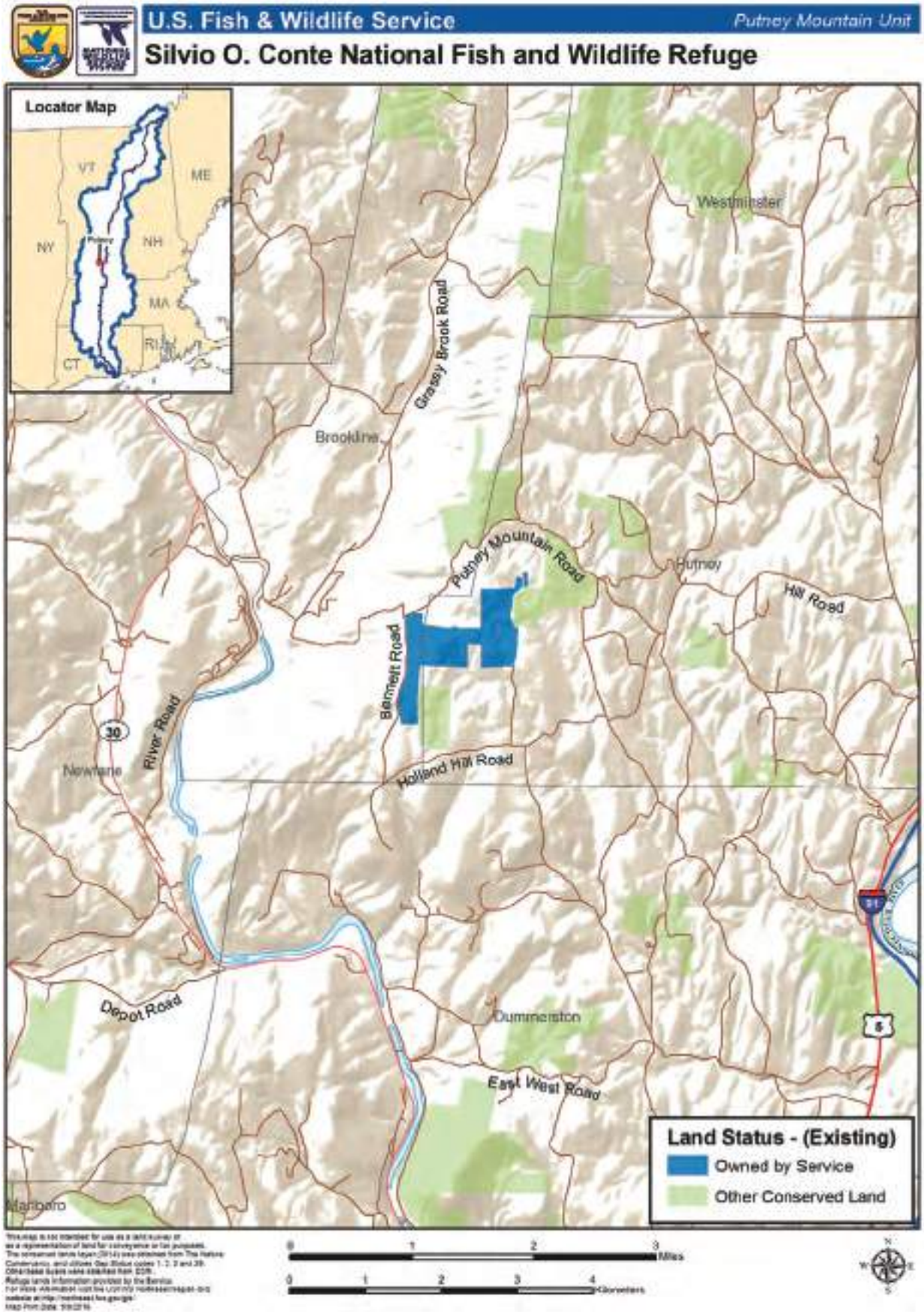
- Manage freshwater marsh habitats to support the northeastern bulrush.
- Manage invasive plants to maintain native diversity.

What public use opportunities will be a priority on refuge lands within the unit?

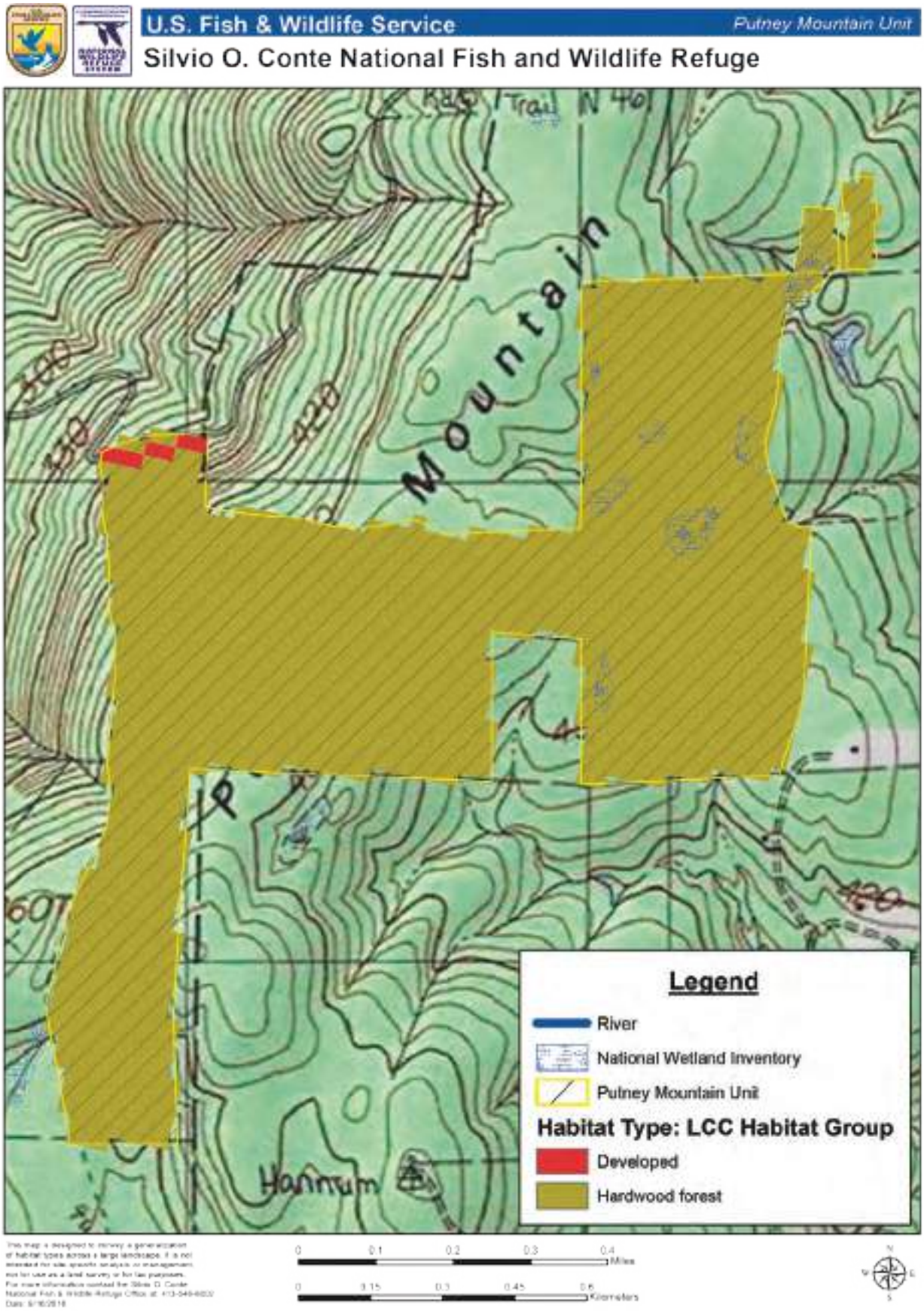
The National Wildlife Refuge System Improvement Act of 1997 identified hunting, fishing, wildlife observation, photography, interpretation, and environmental education as priority, wildlife-dependent uses. As such, these uses would receive priority on refuge lands.

We plan to construct additional trails to enhance public use opportunities on the unit. See map A.99 for the planned public use trails and other infrastructure for the unit.

Map A.97. Putney Mountain Unit – Location.



Map A.98. Putney Mountain Unit – Habitat Types.



Map A.99. Putney Mountain Unit – Pedestrian Trails.

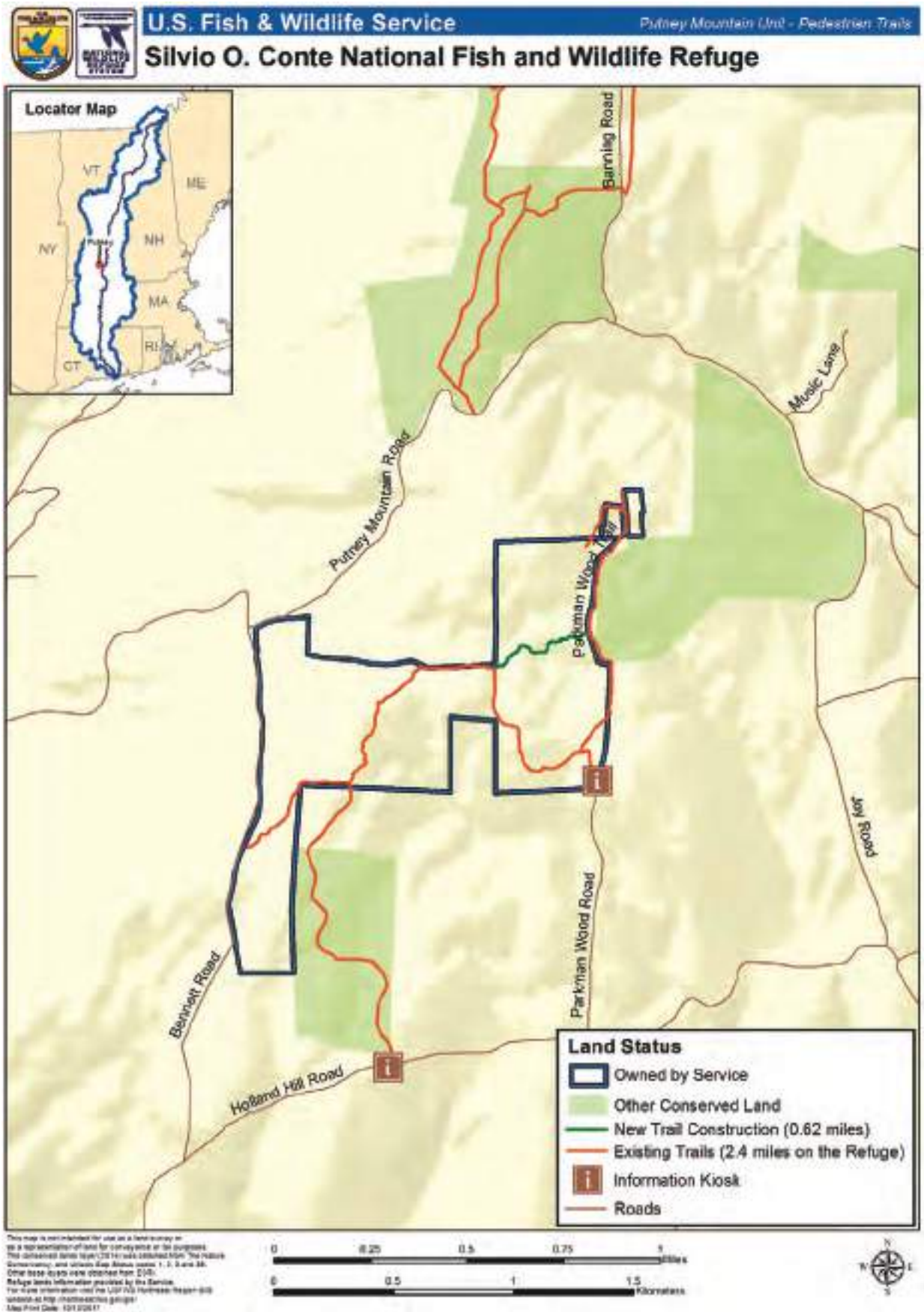


Table A.55. Putney Mountain Unit – Habitat Types.

LCC General Habitat Type[1]	Unit	
	Total Acres	Percent Unit
Forested Uplands and Wetlands[2]		
Hardwood forest	283	99.5%
Forested uplands and wetlands subtotal	*283*	*99.5%*
Other		
Developed	2	0.5%
Other subtotal	*2*	*0.5%*
TOTAL	**285**	**100.0%**

Notes:

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS). See table A.56 at the end of this appendix for a comparison of these generalized habitat types with the more specific The Nature Conservancy's Northeastern Terrestrial Habitat Classification System. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

2 CCP Objective from Silvio O. Conte NFWR CCP, Chapter 4, Management Goals, Objectives, and Strategies

**All acreages are based upon GIS analysis and should be considered estimates

Goals, Objectives, and Strategies for the Putney Mountain Unit

Goal 1: Wildlife and Habitat Conservation: Promote the biological diversity, integrity, and resiliency of terrestrial and aquatic ecosystems within the Connecticut River watershed in an amount and distribution that sustains ecological function and supports healthy populations of native fish, wildlife, and plants, especially Federal trust species of conservation concern, in anticipation of the effects of climate, land use, and demographic changes.

Objective 1.1: Forested Uplands and Wetlands

Sub-objective 1.1b. (Biological Integrity, Biological Diversity, and Environmental Health)
Where and when appropriate, protect, or restore habitats absent an identified species of conservation concern, recognizing the importance of all habitats in contributing to the biological integrity, diversity, and environmental health of refuge lands and the Watershed.

Rationale:
Achieving the refuge purposes and the Refuge System mission are the paramount considerations for refuge management. Additionally, the Service has policy for maintaining and restoring, where appropriate, refuges' "biological integrity, diversity, and environmental health" (601 FW 3). This policy provides refuge managers with a process to analyze their refuge and recommend the best management direction to prevent further degradation of environmental conditions; and where appropriate, restore lost or severely degraded components. The policy suggests using historic conditions as a reference for comparing the ecosystem's current composition, structure, and functioning to what it was prior to substantial human related changes to the landscape. This comparison can be used to direct management to maintain or restore those natural conditions, to the extent practicable, without jeopardizing refuge purposes. For example, we consider the natural timing and frequency of disturbances, such as fires and flooding, and mimic those processes. In other words, the policy is intended to induce management for native fish, wildlife, and plants and their habitats in natural conditions, and with natural processes, using historic conditions to help identify such conditions and processes (Paveglio et al. 2010). However, we recognize that it is not always possible or desirable to try to mimic historic conditions, particularly in the face of predicted climate and land use changes and other landscape-scale considerations. Historic conditions are only one of many considerations when making decisions about how to manage refuge resources.

Conservationists often use the metaphor of coarse filters and fine filters to convey two complementary strategies for maintaining biological diversity, biological integrity, and environmental health: the first focuses on conserving ecosystems and the second focuses on species (Noss 1987, Hunter 1991, Groves 2003). The coarse-filter approach seeks to protect a representative array of natural ecosystems and their constituent processes, structures, and species (the refuge); however, some species fall through its pores, and coarse filters must be complemented by fine filter strategies tailored to fit particular species (priority species of concern). Sub-objectives throughout this plan generally represent a fine-filter approach—identifying species and their habitats that the USFWS has identified as priorities based upon our establishing legislation, refuge system mission, regional and national conservation plans, and conversations with conservation partners. In contrast, this sub-objective outlines CFA management that will benefit many of its species, the majority of which will not receive the special, tailored attention of fine-filter conservation. The BIDEH policy guidance complements coarse-filter conservation in ways that fine-filter conservation misses.

The key idea of BIDEH conservation is that most ecosystems contain certain features that are critical to the welfare of many species; thus, conserving those features can have a positive effect on a large suite of species (biological diversity). Logs in a forest, hedgerows in an agricultural landscape, and streams and pools in many terrestrial ecosystems are all examples of ecosystem features that support far more species than one would predict based on their size alone. The importance of conserving these features is widely recognized, but in an ad hoc, idiosyncratic fashion that often does not recognize the commonality between maintaining a hedgerow, a rock outcrop, and an herbaceous wetland. BIDEH conservation overlaps with many aspects of matrix management and ecosystem management (Lindenmayer and Franklin 2002). A key difference is its specific focus on ecosystem elements, which explicitly complements coarse-filter and fine-filter conservation.

Habitats that occur within the Putney Mountain Unit where species-specific management guidelines are not identified will be managed under the umbrella BIDEH policy. These habitats, by virtue of refuge land ownership, represent small or isolated occurrences, but are important in maintaining connectivity within the larger forested matrix, and provide additional structural and species diversity to the matrix. A rich wetland environment or a rock outcrop, for instance, is an anomaly in an otherwise forested landscape. They often have a special flora and fauna—beaver influenced water depths that create habitat for particular plants, or rhyolite bedrock that support rare lichen. One could make the case that these beaver-influenced wetlands are small, independent ecosystems, but they are really too small to be candidates for a classic coarse-filter strategy and thus best considered in a BIDEH context.

Some habitats within the unit will be managed under a more classic coarse-filter approach—primarily those areas where the federally listed northeastern bulrush has been documented. USFWS policy requires species-specific management efforts in the case of rare, threatened, or endangered species. New trail development on the unit has the potential to negatively impact bulrush populations. Refuge staff will continue to monitor the known bulrush populations (see sub-objective 1.2a).

Combining coarse and fine-scale conservation efforts under the rubric of BIDEH will allow the conservation of large numbers of species, the majority of which are too poorly known to be conserved individually, and more targeted strategies for those rare, threatened, or endangered species like the northeastern bulrush. Together, the multiple strategies are reasonably comprehensive because all species and habitats known to be in jeopardy will receive needed attention.

The negative consequences of habitat loss and fragmentation to aspects of biological integrity, diversity and health have been shown by a large number of theoretical and empirical studies, in different environments, and for a large array of taxa (Fahrig 2003). Our understanding of the current condition of all the habitats considered under this sub-objective and their contribution to the BIDEH of the Unit is poor. A comprehensive forest and wildlife habitat inventory will be necessary to inform more detailed management strategies that provide the full range of natural processes.

Management Strategies:
Within 5 years of CCP approval:

- Ensure a diversity of native species is present and non-native species are excluded or managed to keep population levels as low as possible.
- Control invasive species, with priority given to carefully controlling reed canary grass and glossy buckthorn.
- Work with partners, including the State of Vermont, in support of the State Wildlife Action Plan, to ensure management on Service lands complement adjacent land management objectives.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Conduct habitat and wildlife inventories.
- Map natural communities; protect rare or exemplary examples.
- Monitor impacts to sensitive habitats from the introduction of trail users.
- Monitor known northeastern bulrush populations.

Objective 1.2: Non-forested Uplands and Wetlands

Sub-objective 1.2a. (Freshwater Marsh)
Manage freshwater marshes to support the federally listed northeastern bulrush, and wetland associated natural and rare ecological communities.

Rationale:
Freshwater marshes are often dominated by emergent and submergent herbaceous vegetation. Scattered shrubs are often present, and trees are generally absent. Herbaceous vegetation typically includes common bulrush, jewelweed, marsh fern, water lily, and narrow-leaved cattail. This habitat is associated with lakes, ponds, impoundments, and slow-moving rivers and streams (Gawler 2008). These marshes are also maintained over time by beaver activity, an important natural disturbance process within the Putney Mountain Unit.

The northeastern bulrush, a wetland plant, occurs in various beaver wetlands within the unit. Large beaver flowages are the primary habitat for the bulrush. This species is federally listed, and has adapted to seasonal water fluctuations. Habitat alterations that change the natural hydrology of a wetland to be consistently wet or dry may have negative consequences for this species. Light availability is known to influence plant growth, reproduction and distribution. Managing forest habitats that often surround beaver wetlands to minimize shade on areas where bulrush populations occur would be an effective management strategy. Biologists are currently monitoring known populations, but more information is needed on the habitat requirements, reproductive strategy, and genetic variability (U.S. Fish and Wildlife Service 2006).

The Putney Mountain Unit population has fluctuated in the number of plants over the past few years likely due to water fluctuations and competition from other plant species. Continued monitoring of this population will help determine trends and assess threats impacting the species. The refuge will maintain beaver activity and the natural hydrology of wetlands within the Unit, as well as manage adjacent forested habitats to ensure shading does not impact bulrush populations.

Implementation of refuge strategies will begin with a comprehensive, multi-scale habitat inventory. Plant surveys of freshwater marsh habitats will inventory all species present, but will focus on northeastern bulrush occurrences. This baseline information will further inform more detailed habitat prescriptions within a required step-down HMP.

Management Strategies:
Within 5 years of CCP approval:

- Minimize refuge activities that disturb wetland communities.
- Carefully control reed canary grass and glossy buckthorn, which are beginning to invade northern bulrush habitat.
- Explore and support research opportunities with academic partners to address information gaps for northeastern bulrush.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Inventory wetland plant communities, and evaluate wetland hydrology for potential impacts to the natural flow regimes.
- Survey wildlife use of existing wetlands.
- Map natural communities; protect rare or exemplary examples.
- Work with the State Natural Heritage Program to annually monitor the presence/absence of current northeastern bulrush populations in emergent wetlands.
- Monitor forest habitats surrounding wetlands, and manage as needed to ensure encroaching trees do not shade bulrush sites.

Goal 2: Education, Interpretation, and Outreach: Inspire residents and visitors to actively participate in the conservation and stewardship of the exceptional natural and cultural resources in the Connecticut River watershed, and promote a greater understanding and appreciation of the role of the refuge in conserving those resources.

Objective 2.1: Environmental Education

In collaboration with public and private educators from all four states in the watershed, lead or facilitate the implementation of structured natural and cultural resource curricula, with a focus on guiding educators and students to develop an awareness of, and concern about, natural and cultural resources and associated challenges; appreciate our conservation history; make informed decisions and work individually or collectively toward solutions; and model responsible environmental stewardship in their everyday lives.

Sub-objective 2.1a. (Environmental Education Planning and Training)
Encourage schools, scout groups, and summer camps to develop curricula that use the Putney Mountain Unit as an outdoor classroom.

Rationale:
See environmental education rationale in chapter 4 detailing the importance of environmental education for the Service. Environmental education is one of the six priority, wildlife-dependent recreational uses of the Refuge System. Environmental education is particularly important at Conte Refuge because one of its founding purposes is to provide opportunities for environmental education.

Management Strategies:
Within 1 year of CCP approval:
- Encourage schools, scout groups, and summer camps to develop curricula that use the Putney Mountain Unit as an outdoor classroom.

Sub-objective 2.1b. (Environmental Education Delivery)
Encourage schools, scout groups, and summer camps to use the Putney Mountain Unit as an outdoor classroom.

Rationale:
Because this unit will be unstaffed, the majority of environmental education opportunities on this unit will be led by partners, volunteers, and local school groups and other educational groups (e.g., scout groups and summer camps).

Management Strategies:
Within 1 year of CCP approval:
- Encourage schools, scout groups, and summer camps to use the Putney Mountain Unit as an outdoor classroom.

Objective 2.2: Interpretation

Develop, lead, and facilitate interpretive programs that emotionally and intellectually connect the audience to natural and cultural resources in the watershed.

Sub-objective 2.2a. (Natural and Cultural Resource Interpretive Planning and Training)
With Friends groups, public and non-profit organizations, and volunteers, offer quality interpretive programming at the Putney Mountain Unit. The development of highly trained interpreters will be encouraged by offering interpretive training to Friends' members, partners, and volunteers on a regular basis.

Rationale:
See the rationale in chapter 4 detailing the importance of interpretation for the Service. At the Putney Mount Unit interpretation can help refuge visitors and local residents appreciate the importance of this area to the larger watershed. With several trails and a kiosk, the unit is primarily a place for self-guided, wildlife dependent interpretive experiences. Other groups, such as the Putney Mountain Association, may also occasionally present interpretive programs that convey messages about the refuge and about the Putney Mountain Unit's habitats and cultural resources.

Management Strategies:
Within 5 years of CCP approval:

- Inventory and evaluate each CFA to determine the appropriate interpretive materials to employ.
- Create meaningful, consistent, thematic statements to be used in the delivery of programming at the Putney Mountain Unit.
- Provide resources and trainings to Friends and volunteers in support of interpretive programs.

Within 10 years of CCP approval:

- Develop standardized self-guided interpretive services, such as interpretive trails and kiosks, exhibits, and printed media.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Build an evaluation process that includes formal and informal evaluation to assess the effectiveness of all interpretation programs.

Sub-objective 2.2b. (Natural and Cultural Resource Interpretive Program Delivery)
Collaborate with Friends group, partners, and volunteers to deliver quality natural and cultural resource interpretive programs.

Rationale:
See rationale for sub-objective 2.2a.

Management Strategies:
Within 5 years of CCP approval:

- Through partners, and Friends group, annually provide quality interpretive programs and printed media at the Putney Mountain Unit.
- Incorporate thematic statements, measureable objectives, and evaluation measures into all interpretation efforts.
- Publicize interpretive programs through traditional media, on the refuge web site, and digital social media conduits.
- Maintain a supply of print interpretive brochures, i.e., general brochure and bird checklist that incorporate refuge interpretive messages and themes.
- Work with partners to create issue-oriented experiential activities and programs for use at their facilities.

Within 10 years of CCP approval:

- Develop self -guided interpretive messages and use state of the art as well as traditional media (e.g., brochures).

Objective 2.3: Public and Community Outreach

Support, promote, and coordinate a wide range of outreach tools and activities to facilitate and improve communications and relationships with the American public, especially communities, adjacent landowners, and elected officials in the Connecticut River watershed, and to empower citizens to recognize and resolve local natural resource issues and promote conservation and the responsible use of natural resources.

Because the Putney Mountain Unit would be unstaffed and does not have refuge facilities, public and community outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Objective 2.4: Science and Technical Outreach

Facilitate the collection and exchange of information that increases the knowledge and understanding of natural and cultural resources, addresses climate change and other conservation issues, and provides land managers with better information to make management decisions affecting resources.

Because the Putney Mountain Unit would be unstaffed and does not have refuge facilities, science and technical outreach for this site will occur through regular outreach activities at the headquarters and will not specifically occur at this site.

Goal 3: Recreation: Promote high-quality, public recreational opportunities in the Connecticut River watershed that are complementary between ownerships and which provide regional linkages with emphasis on promoting wildlife-dependent activities that connect people with nature.

Objective 3.1: Hunting

Support quality public hunting opportunities in the Connecticut River watershed to promote a unique understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in America's natural heritage and conservation history.

Sub-objective 3.1a. (Hunting Opportunity, Access, and Infrastructure)
Provide the opportunity for a quality hunting experience following state regulations, except as noted under Strategies below.

Rationale:
Hunting is allowed on national wildlife refuges, as long as it is found to be a compatible use. Because of its array of habitats, the unit is a desirable location for hunting white-tailed deer, wild turkey, and small game species. This area and the surrounding lands have been used for hunting for many years.

Management Strategies:
Continue to:

- Allow hunting based on regulations which correspond to the State of Vermont regulations with the following exceptions:

  (a) The building or use of permanent tree stands or ground blinds is prohibited.

  (b) Temporary blinds are permitted, but must have the owner's name and address visible on the blind and the blind must be removed at the end of the hunting season.

  (c) The use or possession of alcoholic beverages while hunting is prohibited.

- Allow hunters access to the refuge outside of the normal division open hours (i.e. 30 minutes before sunrise and 30 minutes after sunset) as long as they are engaged in lawful hunting activities.

Within 1 year of CCP approval:

- Retain current unit hunting regulations which correspond to the State of Vermont regulations with the following exceptions:

  (a) We allow the use of retrieving, flushing, pointing, and pursuit dogs; however dogs must be under control as is reasonable and customary for that activity, such as voice command or remote telemetry.

  (b) Nighttime raccoon hunting with dogs requires a special use permit.

- Request that the VFWD promote hunting by featuring refuge opportunities in their annual hunting and fishing digest; also use the digest to describe any refuge-specific regulations.

Within 5 years of CCP approval:

- Work with the Vermont Fish and Wildlife Department to determine whether opportunities exist for State-recognized disabled hunters, and if so, identify potentially new infrastructure.

Inventory and Monitoring Strategies:
Within 5 years of CCP approval:

- Work with Vermont Fish and Wildlife Department to evaluate the effectiveness and success of the refuge hunt program in contributing to state population objectives.

Sub-objective 3.1b. (Hunter Education and Outreach)
Provide state-sponsored hunter education classes access to the unit. Conduct directed outreach to ensure hunters are informed about refuge-specific regulations, hunter ethics, and safety considerations. Develop programs, including brochures, signage, web pages, media releases, etc.

Rationale:
Hunting is a priority public use that also serves as a population management tool. Providing hunter education instructors the opportunity to use the unit with their classes will strengthen connections to the hunting community and student understanding of the role hunting plays in wildlife management. Making relevant information readily available to hunters through a variety of media will improve the quality of the hunting experience. The unit's visitor contact station and its surrounding grounds provide an ideal setting for this type of instruction. In addition, the meeting space and grounds can also be used for onsite archery programs, directed by volunteers, with staff support.

Management Strategies:
Within 1 year of CCP approval:

- Produce a hunt brochure that includes a hunt map and information on regulations, hunter ethics, safety considerations, etc. and make it available on the refuge website and at Putney Mountain Unit informational kiosks.

- Provide visitors with general information on the hunting program and refuge-specific and State regulations through the refuge website, information signs, and a hunting brochure. In all materials related to the hunting program, promote and encourage the use of lead-free ammunition.

- Work with the State to identify and evaluate the impacts associated with requiring the use of non-toxic ammunition for hunting on refuge lands.

Within 5 years of CCP approval:

- Develop a system to monitor and evaluate the hunting program with hunters and other users to determine if the objective is being met and to allow for adaptive management.

Objective 3.2: Fishing

Support quality, public fishing opportunities in the Connecticut River watershed to promote an understanding and appreciation of natural resources and their management on lands and waters, while also protecting a traditional outdoor pastime deeply rooted in the America's natural heritage and conservation history.

This objective is not applicable because the Putney Mountain Unit does not have any waterbodies suitable for fishing.

Objective 3.3: Wildlife Observation and Photography

Support quality, public opportunities to observe and photograph wildlife in the Connecticut River watershed in a variety of natural habitats to connect a broad spectrum of people with nature.

Sub-objective 3.3a. (Infrastructure and Access for Wildlife Observation and Photography)
Provide quality opportunities for wildlife observation and photography at the Putney Mountain Unit.

Rationale:
Wildlife viewing and photography is a priority public use on national wildlife refuges and a popular recreational activity in this area, in particular during the fall hawk migration. Currently, infrastructure is limited to several informal hiking trails that bisect the unit and connect to a larger network of conserved lands. Fostering wildlife observation and photography is in keeping with the other conservation landowners along the Putney Mountain ridgeline.

Management Strategies:
Within 1 year of CCP approval:

- Allow wildlife observation and photography at the Putney Mountain Unit.
- Allow public access for uses other than hunting, at the unit daily from 30 minutes before sunrise to 30 minutes after sunset.
- Add information on the unit to the refuge website.
- Work with the Putney Mountain Association to install informational kiosk(s) on refuge and/or partner lands in order to orient visitors and provide information about the general area.

Within 5 years of CCP approval:

- Work within the Putney Mountain Association, Windmill Ridge Association, and other partners to develop a public access strategy that responds to the demand for access across all ownerships, provides safe trailhead parking, a well-defined trail network, informational kiosk(s), etc.

Within 10 years of CCP approval:

- Implement the visitor use enhancements identified in the public access strategy and the refuge Visitor Services Plan.

Sub-objective 3.3b. (Wildlife Observation and Photography Aids)
Offer viewing and photography aids that enhance the visitor experience. Use a variety of methods to reach a broad spectrum of people. Work closely with the friends group and other partners who host events designed to view wildlife on the unit.

Rationale:
The entire unit would be available for wildlife observation and photography; however, there are steps the refuge can take to enhance the visitor experience. By providing new visitors a quality experience they are more likely to return and share their experiences with others. One way to accomplish this is to offer sufficient information to attract a variety of visitors through a variety of media.

Management Strategies:
Within 5 years of CCP approval:

- Develop interpretive panels describing typical wildlife on the refuge, bird migration patterns, and other messages we want to convey to visitors.
- Sponsor wildlife observation events such as International Migratory Bird Day, the Big Sit, etc.
- Encourage local schools and groups and environmental organizations to offer wildlife-centered trips to the unit.
- Produce a list of wildlife species and associated habitats, optimum viewing times and locations, and other conservation information on the unit for distribution at informational kiosks, the refuge website, and other popular media.

Sub-objective 3.3c. (Watershed-based Partner Initiatives)
Not applicable

Objective 3.4: Other Recreational Activities

In order to reach a broader demographic, support non-priority outdoor recreational opportunities and public access to quality, nature-based experiences throughout the Connecticut River watershed that facilitate and improve community relationships, raise awareness and an appreciation for conserving natural resources, and garner support for the National Wildlife Refuge System.

Sub-objective 3.4a. (Regional Water-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4b. (Regional Land-based Trail Initiatives and Opportunities Including Refuge Lands)
Not applicable

Sub-objective 3.4c. (Other Appropriate and Compatible Recreational Opportunities That Enhance Visitor Use and Enjoyment of Refuge Lands)
Develop compatible opportunities on the Putney Mountain Unit that support initiatives to connect people with nature, raise the visibility of the Service and the Refuge System, make the refuge more relevant to the local community, and to promote economic activity in the local area.

Rationale:
In addition to the priority public uses, there are other wildlife-dependent, appropriate and compatible recreational activities that can broaden the visitor base, giving people alternative ways to enjoy the natural resources at the unit without detrimentally impacting the wildlife resource.

Management Strategies:
Within 1 year of CCP approval:

- Allow dispersed hiking and snowshoeing.
- Allow pet walking. In order to minimize conflicts with wildlife and other visitors, pets must be on leashes not longer than 10 feet in length.
- Allow recreational gathering of blueberries, blackberries, strawberries, raspberries, mushrooms, fiddleheads, and antler sheds.
- When compatible, allow commercial guiding in support of priority public uses by special use permit.

Within 5 years of CCP approval:

- Work with partners to determine whether a virtual geocache course at the unit is acceptable on the conserved property. The course should integrate orienteering with refuge interpretive messages that include linking this unit to other refuge divisions and units.

Table A.56

James Weliver/USFWS

Canada lynx kittens

Table A.56. Comparison of North Atlantic Landscape Conservation Cooperative (LCC)'s General Habitat Types and The Nature Conservancy's Northeastern Terrestrial Habitat Classification

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North Atlantic LCC General Habitat Type[1]	The Nature Conservancy's Northeastern Terrestrial Habitat Classification[2]	CES Code[3]
Forested Uplands and Wetlands		
Conifer swamp/Spruce-fir	Acadian sub-boreal spruce flat	201.562
	Laurentian-Acadian conifer-hardwood acidic swamp: bigger river floodplain	201.574
	Laurentian-Acadian conifer-hardwood acidic swamp: isolated	201.574
	Laurentian-Acadian conifer-hardwood acidic swamp: pond/lake	201.574
	Laurentian-Acadian conifer-hardwood acidic swamp: stream/river riparian	201.574
	Laurentian-Acadian alkaline conifer-hardwood swamp: bigger river floodplain	201.575
	Laurentian-Acadian alkaline conifer-hardwood swamp: isolated	201.575
	Laurentian-Acadian alkaline conifer-hardwood swamp: pond/lake	201.575
	Laurentian-Acadian alkaline conifer-hardwood swamp: stream/river riparian	201.575
	Acadian low elevation spruce-fir-hardwood forest	201.565
	Acadian-Appalachian montane spruce-fir-hardwood forest	201.566
Hardwood forest	Appalachian (hemlock)-northern hardwood forest: drier	202.593
	Appalachian (hemlock)-northern hardwood forest: moist-cool	202.593
	Appalachian (hemlock)-northern hardwood forest: typic	202.593
	Central Appalachian dry oak-pine forest	202.591
	Laurentian-Acadian northern hardwood forest: high conifer	201.564
	Laurentian-Acadian northern hardwood forest: moist-cool	201.564
	Laurentian-Acadian northern hardwood forest: red oak-northern hardwood forest	201.564
	Laurentian-Acadian northern hardwood forest: typic	201.564
	Laurentian-Acadian pine-hemlock-hardwood forest: moist-cool	201.563
	Laurentian-Acadian pine-hemlock-hardwood forest: typic	201.563
	North Atlantic coastal plain dry hardwood forest	203.475
	Northeast coastal and interior pine-oak forest	203.999
	Northeastern interior dry-mesic oak forest: moist/cool	202.592
	Northeastern interior dry-mesic oak forest: typic	202.592

North Atlantic LCC General Habitat Type[1]	The Nature Conservancy's Northeastern Terrestrial Habitat Classification[2]	CES Code[3]
Forested Uplands and Wetlands (cont.)		
Hardwood swamp	Atlantic coastal plain northern basin peat swamp	203.522
	North-Central Appalachian acidic swamp: bigger river floodplain	202.604
	North-Central Appalachian acidic swamp: isolated	202.604
	North-Central Appalachian acidic swamp: pond/lake	202.604
	North-Central Appalachian acidic swamp: stream/river riparian	202.604
	North-Central Interior and Appalachian rich swamp: bigger river floodplain	202.605
	North-Central Interior and Appalachian rich swamp: isolated	202.605
	North-Central Interior and Appalachian rich swamp: pond/lake	202.605
	North-Central Interior and Appalachian rich swamp: stream/river riparian	202.605
	North-central interior wet flatwoods: bigger river floodplain	202.700
	North-central interior wet flatwoods: isolated	202.700
	North-central interior wet flatwoods: stream/river riparian	202.700
Pine barrens and maritime forest	North Atlantic coastal plain maritime forest	203.302
	North-Central Appalachian pine barrens	202.590
Shrub swamp and floodplain forest	Laurentian-Acadian floodplain forest	201.587
	Laurentian-Acadian wet meadow-shrub swamp: bigger river floodplain	201.582
	Laurentian-Acadian wet meadow-shrub swamp: isolated	201.582
	Laurentian-Acadian wet meadow-shrub swamp: pond/lake	201.582
	Laurentian-Acadian wet meadow-shrub swamp: stream/river riparian	201.582
Woodlands (natural)	Central Appalachian alkaline glade and woodland	202.602
	Central Appalachian pine-oak rocky woodland	202.600
Non-forested Uplands and Wetlands		
Alpine tundra and krummholz	Acadian-Appalachian alpine barrens	201.567
Cliff and Talus	Laurentian-Acadian acidic cliff and talus	201.569
	Laurentian-Acadian calcareous cliff and talus	201.570
	North-central Appalachian acidic cliff and talus	202.601
	North-central Appalachian circumneutral cliff and talus	202.603

North Atlantic LCC General Habitat Type[1]	The Nature Conservancy's Northeastern Terrestrial Habitat Classification[2]	CES Code[3]
Non-forested Uplands and Wetlands (cont.)		
Freshwater marshes	Laurentian-Acadian freshwater marsh: bigger river floodplain	201.594
	Laurentian-Acadian freshwater marsh: isolated	201.594
	Laurentian-Acadian freshwater marsh: pond/lake	201.594
	Laurentian-Acadian freshwater marsh: stream/river riparian	201.594
Old fields and shrubland	Open shrublands/grasslands	n/a
Pasture/Hay/Grassland	Agriculture	n/a
Peatland	Boreal-Laurentian bog – Saco heath	103.581
	Boreal-Laurentian-Acadian acidic basin fen	201.583
	Boreal-Laurentian-Acadian acidic basin fen: isolated	201.583
	Boreal-Laurentian-Acadian acidic basin fen: stream/river riparian	201.583
	Laurentian-Acadian acidic alkaline fen: isolated	201.585
	Laurentian-Acadian acidic alkaline fen: stream/river riparian	201.585
	North-central interior and Appalachian acidic peatland: isolated	202.606
Rocky outcrop	Northern Appalachian-Acadian rocky heath outcrop	201.571
	Laurentian-Acadian calcareous rocky outcrop	201.572
Inland Aquatic Habitats		
Open water	Water	n/a
Coastal Non-forested Uplands		
Dunes and maritime grasslands	Atlantic coastal plain northern dune and maritime grassland	203.264
	Northern Atlantic coastal plain heathland and grassland	203.895
Rocky coast and islands	Acadian-North Atlantic rocky coast	201.573
Coastal Wetlands and Aquatic Habitats		
Salt marsh	Northern Atlantic coastal plain tidal salt marsh	203.519
Other		
Developed	Developed	n/a

1 North Atlantic Landscape Conservation Collaborative general habitat types for USFWS representative species; linked to the National Vegetation Classification System (NVCS)

2 Habitat description derived from The Nature Conservancy's (TNC) Northeastern Terrestrial Habitat Classification. More detailed habitat tables that include the Northeastern Terrestrial Habitat Classification System habitat types are available for each CFA and refuge unit online at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html*.

3 Community Element Type: derived from TNC's Northeastern Terrestrial Habitat Classification originated from NatureServe's U.S Terrestrial Classification System codes; linked to NVCS

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