Appendix C

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Land Protection Plan

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I. Introduction

Overview

This final Land Protection Plan (LPP) provides detailed information regarding a proposal by the United States (U.S.) Fish and Wildlife Service (Service; we, our) to expand land protection acreage authority within the legislative boundary of the Silvio O. Conte National Fish and Wildlife Refuge (Conte Refuge; refuge). The legislative boundary of the refuge encompasses the 7.2 million acre Connecticut River Watershed (watershed; excluding Maine and Canada portions) in Connecticut, Massachusetts, New Hampshire, and Vermont (map C.1). Current refuge-owned lands include 37,000 acres as of February 2016[1]. There are 10 established refuge divisions and 11 refuge units depicted on map C.1. Refuge divisions are larger and consist of many individual acquired parcels; units are smaller and typically include only one or two acquired parcels.

Our proposal is to expand our acreage authority to protect land for Conte Refuge, from 97,830 acres (current authority) up to 197,337 acres total. This represents an increase in acreage authority of 99,507 acres. Ninety percent (90%) of the lands targeted for acquisition are identified within discrete Conservation Focus Areas (CFAs), with the remaining ten percent (10%) acreage target within surrounding designated Conservation Partnership Areas (CPAs; see definition under "Project Design" below). This 90/10 split recognizes that, on average, the Service is likely to only acquire about 90% of lands within CFAs due to land use conversions, protection by others, and our agency's willing-seller only acquisition policy. The remaining 10% acreage target would be used to acquire lands that facilitate connectivity of conserved lands within the CPA in support of Federal trust resources and to support implementation of the *Connect the Connecticut* Landscape Conservation Design. Since we have not identified discrete, definable boundaries for this 10% balance, if opportunities arise from a willing seller, we will also coordinate with state agencies, local town officials, and adjacent landowners before taking any action. Attachment I includes maps of each of the CPAs and their respective CFAs.

Over the duration of this project, we propose that 65 percent (65%; 128,269 acres) of the entire 197,337-acre project area be acquired by the Service in fee title from willing sellers. The remaining 35 percent (35%; 69,068 acres) would involve less than fee title acquisition, such as conservation easements. However, the actual split between fee and easement will be heavily influenced by the preferences of the landowners. This proposal to expand the refuge is part of the Service-preferred alternative (alternative C) in the final comprehensive conservation plan and environmental impact statement (CCP/EIS) for Conte Refuge. This LPP is included in the final CCP/EIS as appendix C. The Service's Director will make a decision to approve or disapprove this administrative increase in acquisition authority based on the information in this plan.

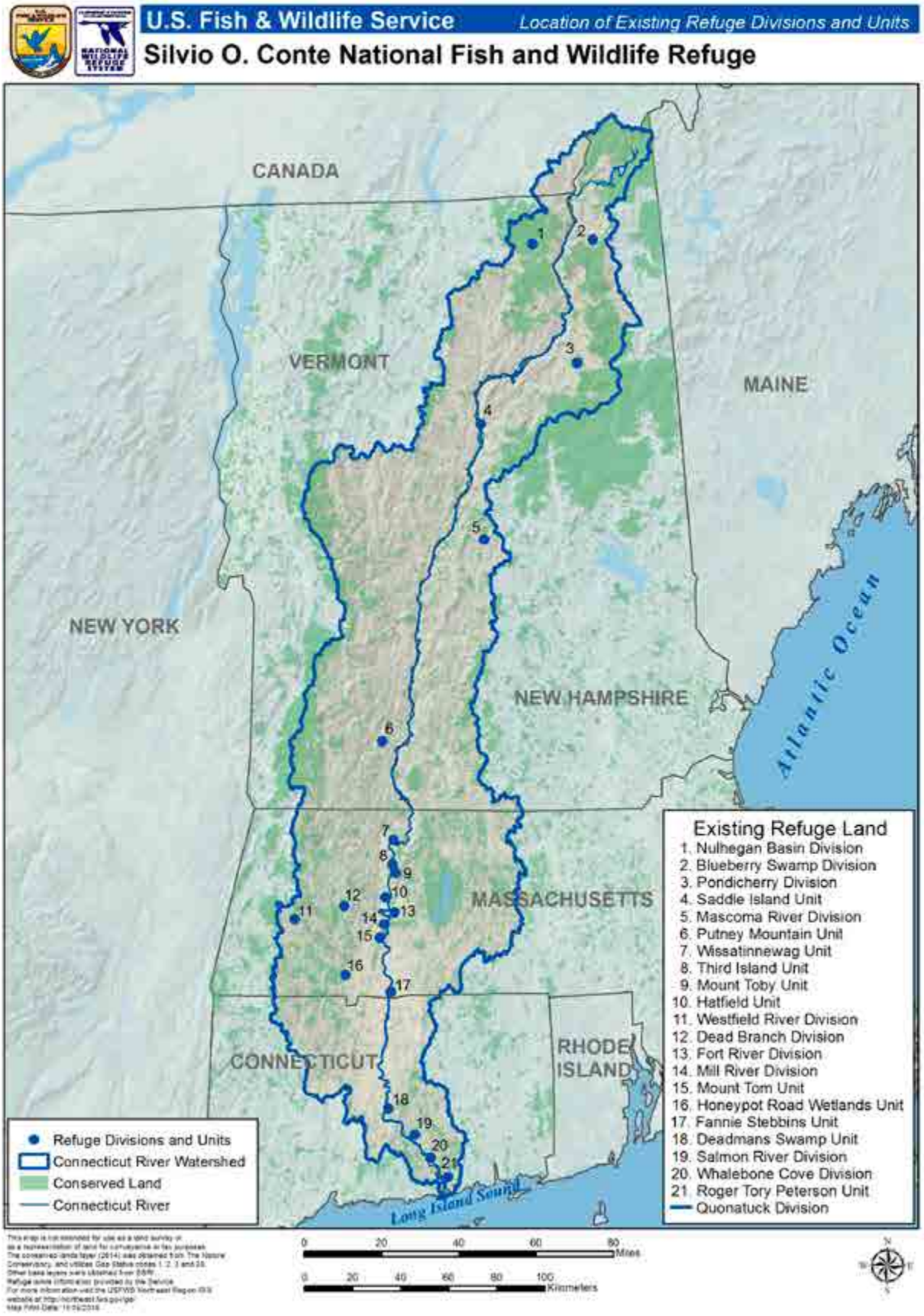
The overarching goal of this LPP is to strategically and permanently protect areas of significance to Federal trust resources while also working with our partners to ensure that diversity and connectivity in area (size), latitude, elevation, aspect, process, and landform is represented and appropriately connected in the conserved lands network in the watershed. Collaborating with our partners to achieve such a network will sustain representation, redundancy, and resiliency of species, habitats, and ecosystems within the watershed, and thereby promote a landscape that can afford priority species the opportunity to better adapt despite anticipated future climate and land use changes.

In this document, we incorporate the information required by Service policy for a refuge expansion proposal, as well as additional information on how the proposal meets other Service initiatives and directives. Specifically, we detail how the project proposal:

- Adheres to all four principles of Strategic Habitat Conservation (SHC) (*http://www.fws.gov/landscape-conservation/shc.html*; accessed October 2016).
- Benefits the conservation targets identified in the Service's Strategic Growth Policy for the National Wildlife Refuge System (Refuge System); specifically, federally listed threatened and endangered species, migratory birds, and waterfowl (*http://www.fws.gov/policy/602fw5.html*; accessed October 2016).
- Supports *Connect the Connecticut*; a collaborative landscape conservation design project involving over 30 conservation partners in the watershed to identify strategic areas for conserving wildlife and habitats (*http://connecttheconnecticut.org/*; accessed June 2016).

[1]The acreage figure we are using is current as of February 2016.

Map C.1. Existing Refuge Lands and Other Conserved Lands in the Connecticut River Watershed (as of October 2013)



- Uses representative (also referred to as "surrogate") species to identify specific contributions to conserving other important habitat and species of conservation concern in the watershed (*http://www.fws.gov/landscape-conservation/selecting-species.html*; accessed October 2016).

- Addresses anticipated climate change and land use impacts and supports the Services' strategic plan for addressing climate change using adaptation, mitigation, and engagement strategies (*http://www.fws.gov/home/climatechange/strategy.html*; accessed October 2016).

- Supports the Service's Urban Refuge Initiative (*http://www.fws.gov/urban/index.php*; accessed October 2016).

- Complements and reinforces conservation partners' land protection actions and conservation priorities in the watershed; including supporting State Wildlife Action Plans (State WAPs), Audubon Important Bird Areas, and federally designated Wild and Scenic Rivers and National Natural and Historic Landmarks.

- Complements the recently approved Great Thicket National Wildlife Refuge, which will be dedicated to conserving shrubland-dependent species on a landscape scale in the Northeast.

- Helps meet public interest in increasing compatible, wildlife-dependent recreational and educational opportunities in the hundreds of communities in the watershed.

General Description of the Connecticut River Watershed

The watershed is a microcosm of the Northeast Region. It is home to about 2.4 million people in 396 communities spanning rural, sparsely populated areas in the north, to more developed areas in the south. Map C.2 depicts urban areas in the watershed. The area has a rich cultural history, steeped in traditions from a working landscape based on forestry, agriculture, and manufacturing.

As the Connecticut River (river) traverses its 410-mile length from the Canadian border to Long Island Sound, it encounters dramatic changes in elevation, gradient, and vegetation. The watershed descends from the highest alpine elevation in New England to sea level where the river meets the Long Island Sound. The river predominantly travels from north to south, dropping about 2,600 feet in elevation along its length. Near its tributaries in the Northeast Kingdom of Vermont, the Connecticut Lakes area of New Hampshire, and Canada, the watershed includes mountains with elevations exceeding 6,000 feet. In these northern environs, the river is a narrow, swift, cold water stream that falls some 900 feet in 30 miles, the sharpest drop within its profile. At its confluence with Long Island Sound, the river's tidal influences provide habitat for a completely different complement of flora and fauna. Here, the river offers significant opportunities within the refuge boundary to prepare for sea level rise, allowing for climate change adaptation; namely, the landward migration of tidal (salt, brackish, and fresh) wetlands and other coastal habitats.

The watershed is approximately 80 percent (80%) forested, 12 percent (12%) agricultural, 3 percent (3%) developed, 3 percent (3%) wetland, and 2 percent (2%) water. Diverse habitats in the watershed include:

- Floodplain forests and other riparian habitats valuable to migrating songbirds, waterfowl, and many other species of plants and animals.

- Sandplains, old field grasslands, shrublands, and agricultural fields valuable to grassland-nesting birds and other early successional species of conservation concern.

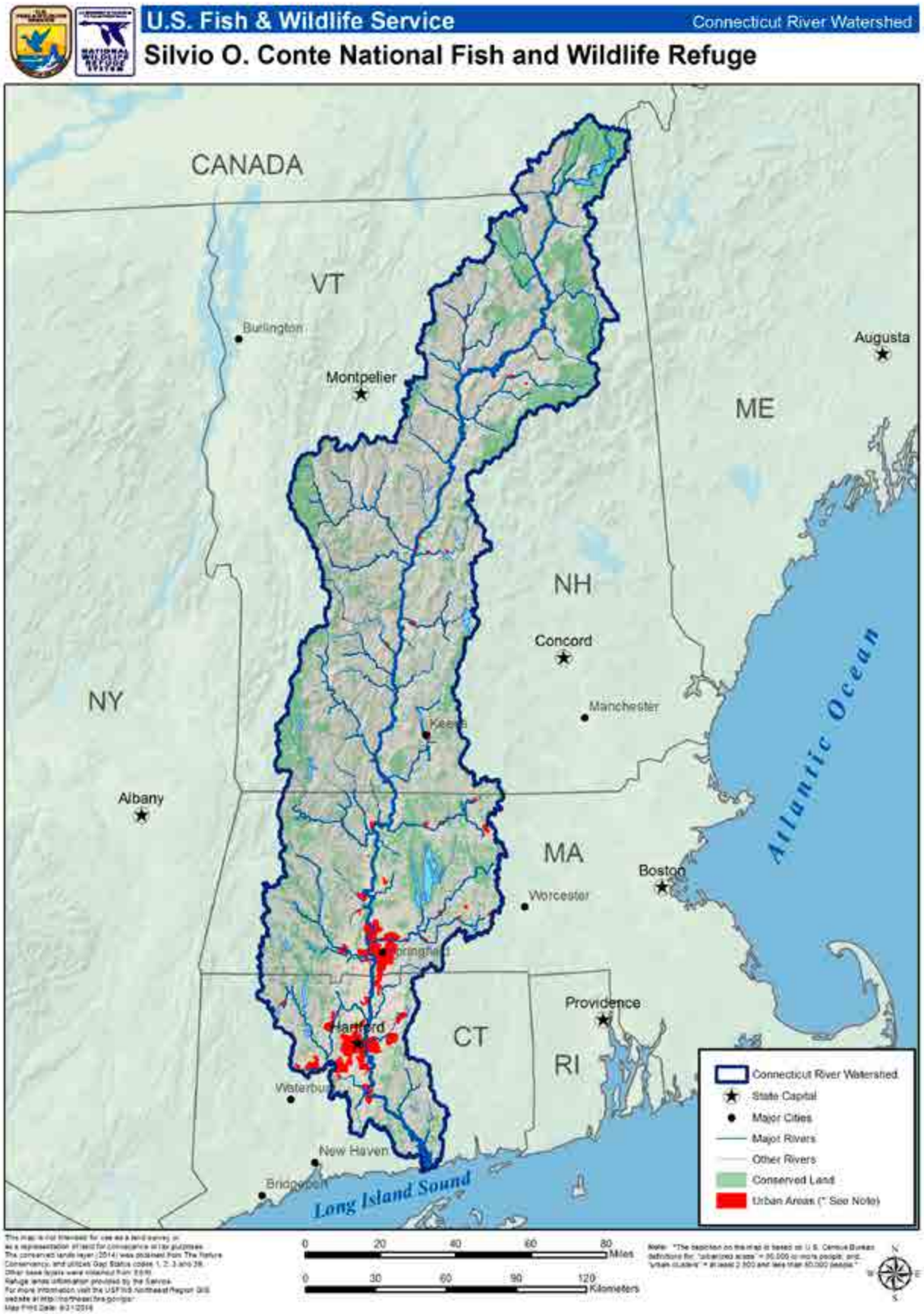
- A variety of forest types, including large areas of relatively unfragmented northern hardwood and conifer forest types, valuable to nesting migrant birds and many other plant and animal species.

- Riverine habitats valuable to migratory fish, other native resident fish, freshwater mussels, and other aquatic species.

- Internationally important (e.g. Ramsar-designated) tidal wetlands.

- Regionally significant migratory bird habitat (e.g. Audubon Important Bird Areas).

Map C.2. Urban Areas in the Connecticut River Watershed



The most common forests are hardwood dominant maple-beech-birch to the north and oak-hickory to the south, with a transitional forest consisting of a blend of the two types found in between. These forests often cloak the gently sloping rich organic soils along hills and mid-elevation ranges of mountain sides. Softwood-dominated forests generally occur in high elevations, low wet depressions, and well-drained sandy soils, with spruce-fir abundant in the north, and eastern hemlock, and red and white pine more common to the south.

The watershed contains a diverse mix of wetlands. Conifer wetlands and bogs are most common in the north. Beaver flowages are the most widespread wetlands, occurring throughout the watershed. Dams and other river barriers interrupt natural flow regimes, creating impounded aquatic habitats in once free flowing rivers and fragmenting access to fish spawning grounds that once extended to tributaries throughout the watershed. However, there are no barriers to aquatic species passage and migration on the mainstem river until Holyoke, Massachusetts, which is well above the head of tide in the vicinity of Hartford, Connecticut.

Historically, shrubs and grasslands were abundant, but have diminished substantially following the abandonment of farms during the 20th century. Today, open habitats are typically associated with old beaver flowages, hay fields, pasture, croplands, and other agricultural enterprises.

Urbanization in the watershed has been most pronounced in Massachusetts and Connecticut, although communities dot the river along its entire course. Approximately 3 percent (3%) of the watershed has been developed for residential, municipal, commercial, or other purposes.

The watershed supports a rich array of wildlife. Fifty-nine species of mammals live within the watershed year-round, including the federally listed lynx and northern long eared bat, as well as bobcat, black bear, white-tailed deer, moose, coyote, fisher, other forest bats, rabbits and hare, and a variety of other small mammals. Twenty-seven species of ducks, geese, and swans, 15 species of shorebirds, and 24 other water-dependent bird species such as rails, grebes, and herons, use the watershed for breeding, wintering, or migration. The watershed is also host to 181 passerine and raptor species. Of these, 88 are neotropical migrants using the watershed for breeding; 77 breed in the area and 16 are winter residents that migrate to the watershed from the north. Reptiles include 9 species of turtles and 16 snakes. Amphibians include 12 species of salamander, and 7 species of toads and frogs. Unique and rare invertebrates occur in the watershed as well, including the federally listed Puritan tiger beetle.

The watershed also supports a wide diversity of aquatic species. Included are 33 native or indigenous freshwater species; 35 nonindigenous freshwater fish; 11 anadromous fish; 1 catadromous fish; 15 amphidromous fish; and, 48 saltwater fish. The northern reaches of the river, in the Connecticut Lakes region, provide habitat for lake and brook trout and land-locked salmon. American shad have impressive runs in the river, as do sea lamprey and American eel. Shortnose sturgeon, a federally listed species, occurs in the river up to the Turner's Falls Dam in Massachusetts. Striped bass are in abundance below the Holyoke Dam, but are also known to pass upstream of Vernon Dam in much smaller numbers. The mid-section of the river also supports pickerel, largemouth and smallmouth bass, northern and walleye pike, and a variety of panfish. Summer flounder are found at the mouth of the river. Carp, suckers, and catfish are also present in many areas. The federally listed dwarf wedgemussel and other rare mussels also occur in the watershed.

Conte Refuge Establishment History

The refuge was named in honor of the late U.S. Congressman Silvio O. Conte of Massachusetts, who dreamed of conserving the rich natural resources in the watershed, in part, by creating a new national wildlife refuge. He also envisioned Federal, State, and non-governmental conservation organizations working collaboratively to protect threatened and endangered species and conserve the broad diversity of fish, wildlife, and plants throughout the watershed. He was a strong advocate of using sound science to inform and promote conservation action, while also supporting environmental education, outdoor recreation, and traditional natural resource-based economic endeavors within this large and integrated working landscape.

Congress passed the Silvio O. Conte National Fish and Wildlife Refuge Act (Conte Refuge Act) in 1991 to help make Congressman Conte's dream a reality. Reflecting his foresight and vision, the Conte Refuge Act emphasizes collaborative, landscape-scale conservation within the watershed, as well as developing science centers, urban partnerships, and promoting environmental education, outdoor recreation, forestry, and farming.

The Conte Refuge Act legislated a refuge boundary that encompasses the entire 7.2 million-acre watershed and spans the entire length of the 410-mile river (map C.1). Conte Refuge was authorized by a final EIS (FEIS)

and Record of Decision (ROD) produced by the Service in 1995. The refuge was established on October 3, 1997 through a donation to the Service of the 3.8-acre Third Island, located in Deerfield, Massachusetts, by the Connecticut River Watershed Council. The 1995 FEIS/ROD, and subsequent National Environmental Policy Act (NEPA) compliant amendments to the refuge acquisition program, authorized acquisition of 97,830 acres allocated within 65 Special Focus Areas (SFAs) distributed throughout the watershed. As of February 2016, approximately 37,000 of those acres are under Service stewardship and managed as part of the refuge and the larger conservation lands mosaic (map C.1). In total, approximately 1.8 million acres within the watershed is in some form of fee or easement conservation (map C.1).

Refuge Purposes, Mission, Vision, and Goals

The refuge purposes were legislatively mandated. The refuge mission and vision statements, and the refuge goals, were developed as part of the CCP/EIS planning process. The refuge purposes, mission, vision, and goals are presented below.

Legislated Purposes

The Conte Refuge Act of 1991 (Public Law 102-212) authorizes the following refuge purposes:

- Conserve, protect, and enhance the Connecticut River Watershed populations of Atlantic salmon, American shad, river herring, shortnose sturgeon, bald eagles, peregrine falcons, osprey, black ducks, and other native species of plants, fish, and wildlife.
- Protect species listed as endangered or threatened, or identified as candidates for listing, pursuant to the Endangered Species Act of 1973, as amended.
- Conserve, protect, and enhance the natural diversity and abundance of plant, fish, and wildlife species and the ecosystems upon which these species depend within the refuge.
- Restore and maintain the chemical, physical, and biological integrity of wetlands and other waters within the refuge.
- Fulfill the international treaty obligations of the U.S. relating to fish and wildlife and wetlands.
- Provide opportunities for scientific research, environmental education, and fish and wildlife-oriented recreation and access to the extent compatible with the other refuge purposes.

Vision Statement

The Connecticut River is treasured by all for its majesty and significance in supporting diverse aquatic and terrestrial plant and animal life along its winding 410-mile passage through urban and rural communities in New Hampshire, Vermont, Massachusetts, and Connecticut. Working with our partners, we are inspired to protect and enhance the natural and cultural richness throughout the watershed, especially on lands and waters entrusted to our agency as the Silvio O. Conte National Fish and Wildlife Refuge.

Together with our partners, we design, support, and implement strategic conservation actions across the watershed, and communicate conservation needs and successes through extensive outreach and education programs. On refuge lands, and in our conservation partnership areas, we offer visitor programs and activities that promote an appreciation of the Connecticut River watershed as an intact, interconnected, and healthy ecosystem. Visitors respond to this greater awareness by becoming active stewards of the watershed's natural and cultural resources. Through our Urban Partnership Program, we are promoting the relevancy of conservation to healthy communities. Our actions exemplify the Service's vital role in conserving the Connecticut River watershed and the refuge's important contribution to the mission of the National Wildlife Refuge System.

Mission Statement

"Work in partnership with others to inspire stewardship, magnify achievements, and celebrate shared successes that enhance, nurture, and voluntarily and collaboratively protect the natural, cultural, and sustainable economic richness of the Connecticut River and its watershed as a New England working landscape composed of public and private land."

Refuge Goals

Four refuge goals were collaboratively developed with partners during the CCP planning process to help achieve the vision, mission, and legislated purposes for the refuge:

Habitat and Species 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, 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.

Education, Outreach, and Interpretation

- 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.

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 in the outdoors

Partnerships

- Enhance the conservation, protection, and stewardship of natural and cultural resources, and promote wildlife-dependent recreation, throughout the Connecticut River Watershed by initiating, supporting, and promoting partnerships with other Federal, State, and local governments, Tribal governments, and private organizations.

II. Project Planning and Design

Project Planning Overview

In 2006, we initiated public and partner scoping as part of the Service's planning process to develop a CCP (*https://www.fws.gov/refuge/silvio_o_conte/what_we_do/conservation.html;* accessed October 2016). During scoping, we received significant public and partner support for a refuge expansion. Some of that feedback included maps and data depicting recommendations for areas to consider. Over 750,000 acres were identified by our partners. With preliminary information regarding benefits to Federal trust resources, we requested authority from our Director to further evaluate some of these recommendations. In November 2011, the Service's Director approved a Preliminary Project Proposal to allow us to pursue detailed planning for a potential increase in refuge acquisition authority of up to 200,000 acres total in the watershed, approximately twice the size of our existing authority.

We began detailed planning by evaluating the effectiveness of the 1995 FEIS refuge land acquisition strategies where 65, often small SFAs, primarily tied to federally listed species, wetlands, and rare plant communities, were identified for acquisition. Many of the parcels comprising units acquired to date contain breeding habitat for federally listed or rare species and, thereby, offer an important, immediate, and direct level of protection for those site specific individual populations; however, over the long term, the distribution of small, scattered parcels does not consider other important factors. For example, this strategy does not consider species' travel or movement corridors. Nor does it necessarily provide for important habitats used by the species outside of breeding season. It also does not adequately resolve threats posed on adjacent or nearby lands that impact the resiliency of protected lands, or support opportunities to restore habitats on a meaningful scale or in a sustainable way. Finally, this strategy does not address the potential impacts from climate or land use changes. Each of these considerations is important to address when considering the long-term viability of species populations and habitats in the watershed.

Administratively, we have found that managing small, scattered parcels is also financially and operationally inefficient when considering resource investments and cost per acre. The resources expended to get staff and equipment to these sites to manage small units (e.g., post boundaries, brush vegetation, mow fields, conduct surveys, maintain trails and facilities, resolve encroachments, and conduct law enforcement) is much less efficient on a cost per acre basis compared to larger, more contiguous and resilient parcels where more acres

can be treated on a single trip. We also believe this acquisition strategy will not be effective in protecting species and crucial habitats over the long term, and unnecessarily limits our ability to fulfil the refuge's six purposes and practice strategic habitat conservation on a landscape scale in collaboration with our partners.

Our current project proposal adjusts the 1995 FEIS's land protection objectives and no longer pursues a "checkerboard pattern of ownership", including the SFAs with "many small scattered sites" (1995 FEIS, Appendix 2-1 Land Protection Plan). We redirected our focus to strive for larger, more contiguous a-nd resilient areas to protect a broader array of Federal trust resources affording more flexibility and capability to adapt to climate and land use changes on the landscape. Many of the former SFAs are "nested" within CFAs.

In our judgment, due to the biological, ecological, and administrative concerns we raise above, the SFA strategy for refuge land acquisition is not in the best interest of the American public because taxpayer's monies can be used more efficiently and effectively under our new proposal. Furthermore, the "SFA approach" restricts our flexibility in addressing other factors necessary for conserving Federal trust species on a larger landscape and regional basis.

Throughout the planning process, relevant new information frequently became available to us, which created both challenges and opportunities. Forward momentum was often intentionally slowed as new data was considered. We spent 2012 and 2013 evaluating the best available information and working with partners to refine our refuge proposal. Between 2014 and 2016, we also participated in a collaborative partnership planning process to develop a landscape conservation design for the watershed. We describe that effort in more detail below under "Relationship of Project to *Connect the Connecticut* LCD." The results of that planning effort, including the principle product of a strategic core-connector network design, also informed and reinforced our project proposal, approach, and understanding of the refuge's value and role within the larger conservation landscape context.

The following LPP project goals were developed to provide a framework for our analysis:

Conserve Priority Conservation Targets
To this end, we collaborated with a diversity of public and private stakeholders, including the four State natural resources agencies in the watershed and our Federal agency partners, to identify priority species and habitats of conservation concern. These entities helped us compile known information on Federal trust resource occurrences and associated important habitat areas. In particular, we targeted habitats supporting federally listed species, migratory birds in decline, and waterfowl, as directed by the Refuge System's Strategic Growth policy. In addition, we matched identified priority resources of concern with the 2016 Partners in Flight Landbird Conservation Plan Watch List (Rosenberg et al. 2016). That list identifies 86 species of highest conservation concern at the continental (range-wide) scale. Six of those species are priority species of concern and present within the watershed (see Table C.1). Each of the States, and several conservation organizations, identified priority focal areas for additional conservation, and we discussed with them ways to complement their land protection and management efforts throughout our process of developing and refining our areas of consideration. We used the *Connect the Connecticut* Landscape Conservation Design (LCD) and its strategic core-connector land conservation network in assessing our final proposal. Attachment IV provides an example of how several of our proposed CFAs overlap with the final LCD core-connector network. A shared priority among our partnership is to maintain a well-distributed diversity of habitat types in the watershed to support healthy populations of native fish and wildlife that will be resilient to anticipated changes in climate and land uses.

Provide Habitat Connections
We worked with our partners to identify key habitat connections for Federal trust species and other respective State species of concern within the existing and potential conservation landscape. Collectively, we considered habitat diversity and connectivity in area (size), elevation, latitude, aspect, process, and landform. In addition, we also identified areas that would serve as important connections for protecting biological integrity and ecosystem health, and contribute to ecosystem services (e.g. water quality and quantity, and carbon sequestration). The *Connect the Connecticut* LCD core-connector network design became a valuable tool for evaluating and verifying our consistency with this goal in our proposal.

Incorporate Adaptation Strategies for Predicted Climate and Land Use Changes
We also considered how connections to other existing conserved lands would promote representation, redundancy, and overall resiliency within the watershed. These factors will help provide flexibility in the landscape for species and habitats to adapt to impacts from land use, demographic shifts, and climate changes.

We sought the best available science to evaluate opportunities to address climate change. In addition to the *Connect the Connecticut* LCD core-connector network product, we compared that project's spatially-explicit modeling results depicting indices of ecological integrity, climate persistence, and urban growth across the watershed (*http://www.umass.edu/landeco/research/dsl/dsl.html*; accessed October 2016). We also considered The Nature Conservancy (TNC) resiliency mapping (*http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/Pages/default.aspx*; accessed October 2016), a considerable amount of digitally available species and ecosystem data from the four watershed States' natural resource agencies, and other sources of resource data that are publically available.

We also considered how existing and proposed refuge lands could benefit the near- and long-term desirable outcomes for species migration, emigration, and potential adaptation opportunities under predicted land use and climate changes. For example, the barrier-free segment of the river, from its mouth into central Massachusetts, presents a potential opportunity for the landward migration of the coastal wetland complex from the Long Island Sound, which can be enhanced through the strategic placement of protected land in this reach of the river.

Project Design

Conservation Partnership Areas (CPAs)

We collaborated with State, Federal, and non-governmental partners to define and delineate CPAs within the watershed. In response to their input, we delineated 19 CPAs that comprise approximately 1.5 million acres, or about 21 percent (21%) of the entire watershed (map C.3). CPAs are generally defined along a subwatershed boundary that includes one or more 12-digit U.S. Geological Survey (USGS) hydrologic units (HUCs) (*http://nh.water.usgs.gov/projects/ct_atlas/water_wsheds_huc.htm*; accessed October 2016). Watershed boundaries are used because of their familiarity to our partners, their significance to both aquatic and terrestrial ecological systems, and because they are a relevant context for describing ecosystem services important to watershed communities.

CPAs are essentially large areas of mixed ownership where concentrations of Federal trust and other resources of conservation concern occur. They may include important working forests and farms, or provide key connections between protected areas of high conservation, socio-economic, and outdoor recreational value. CPAs are areas where our partnership agreed that refuge staff should focus leadership, resource expenditures and expertise, and support conservation efforts by our partners.

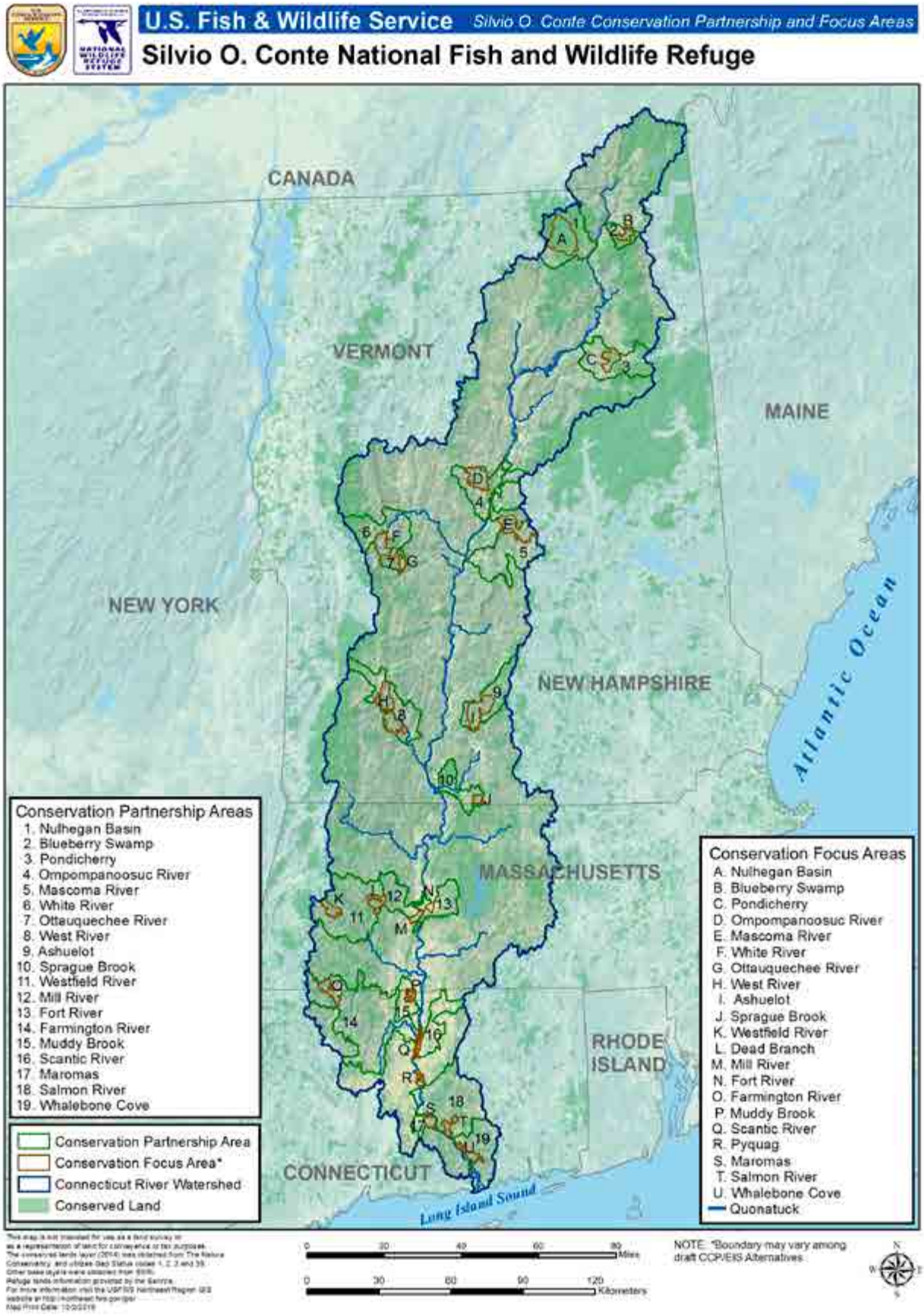
Specifically, CPAs identify where our refuge staff would plan to focus their resource expenditures (e.g. staff, funds, equipment) and facilitate the work of our partners, consistent with our goals and objectives for the watershed and refuge purposes. In many instances, refuge and other Service staff would serve a supporting role in partner-led efforts on other ownerships. It is not assumed that refuge staff would take the lead role in all conservation activities in CPAs. Grants, private lands programs and coordination, technical forums and information exchanges, shared equipment, cooperative management agreements, leases, and support for various conservation easements and fee title acquisition by others, are all actions to consider as we work in partnership with others. In particular, we would facilitate landowner enrollment in State and Federal voluntary and incentive based conservation programs that protect and improve wildlife habitat, protect working farms and forests, support public access for outdoor recreation, provide related and sustainable economic opportunities, and support other land uses that would benefit conservation. The *Connect the Connecticut* LCD core-connector network design will be especially helpful in our strategic partnership approach within the CPAs, as well as elsewhere within the watershed.

Conservation Focus Areas (CFAs)

We also worked with our partners to delineate 22 CFAs, of which all but two (e.g. Quonatuck and Pyquag CFAs) are embedded in CPAs (map C.3). The CFAs range in size from 2,274 acres (Fort River CFA, Massachusetts) to 33,132 acres (Nulhegan Basin CFA, Vermont). CFAs are areas where the Service would focus land acquisition efforts for Conte Refuge (fee title and easement) to make important contributions to the priority conservation targets established by the Refuge System's Strategic Growth Policy and to help achieve other Service goals and objectives.

We believe that concentrating refuge ownership into 22 biologically intact and ecologically resilient CFAs is significantly more effective than the 65 scattered, small SFAs proposed in the 1995 FEIS. Nevertheless, most of the CFAs proposed in this LPP include many of the original SFAs, or accomplish much of the intended outcomes of those SFAs that were omitted. To date, ten of the 1995 SFAs were the basis for establishing

Map C.3. Proposed Conservation Partnership Areas and Conservation Focus Areas



existing refuge divisions. Seven additional SFAs are identified in the 1995 FEIS and are expanded as CFAs in our proposal. These seven CFAs do not currently exist as refuge divisions since no first parcel has been acquired. Once land is acquired for the refuge within a CFA, we would administratively refer to it as an established refuge division. The remaining 5 CFAs in our proposal were not originally identified as SFAs in the 1995 FEIS, but their contribution to conserving Federal trust resources warranted their inclusion. Lands already in permanent conservation ownership, and/or which are highly productive agricultural lands, are not targeted for acquisition.

As noted in our "Introduction" to this LPP, we expect that, on average, the Service would only acquire approximately 90 percent (90%) of the area within CFAs; and the remaining 10 percent (10%) of our proposal would come from the surrounding CPA. The following five criteria were used to delineate and refine CFAs and would be used to guide the 10 percent (10%) land acquisition authority that would lie outside of delineated CFAs, but within CPAs. The criteria are designed to support the Service's Strategic Growth policy (602 FW 5), Conte Refuge's legislative purposes, facilitate implementation of the *Connect the Connecticut* LCD, and complement our conservation partners' priorities:

- Contributes to the recovery of federally listed species, including the protection of critical, occupied, or historic habitat for those species.
- Contributes to sustaining populations of migratory birds in decline by protecting breeding, migration, and wintering habitat.
- Contributes to sustaining populations of waterfowl identified as priority species in the North American Waterfowl Management Plan (NAWMP) and Atlantic Coast Joint Venture (ACJV) Implementation Plan.
- Contributes toward the refuge purposes legislated by Congress in the Conte Refuge Act of 1991.
- Facilitates the implementation of the *Connect the Connecticut* LCD project, including the protection of core areas or their connectors within the existing 1.8 million-acre conservation mosaic.

Other criteria used to delineate and refine CFAs were:

- Protects and enhances habitat connections (including size, latitude, elevation, and aspect) for terrestrial and aquatic species to provide vital habitat, and effective areas for movement, migration, and natural processes to promote potential emigration that could complement other wildlife adaptation strategies to offset the expected effects of climate and land use changes.
- Contributes to clean water, clean air, floodplain protection, and maintaining biodiversity and ecosystem health, and addresses threats to those ecosystem services.
- Contributes to the protection and restoration of species and habitat types considered rare, imperiled, or exemplary.
- Contributes to conserving our Federal trust resources by strategically protecting important aquatic and upland habitats in an amount and distribution that promotes habitat representation, resiliency, and redundancy.
- Facilitates the implementation of priority actions of the North Atlantic LCC, State WAPs, and other high priority plans and initiatives.
- Complements and anticipates partners' planned contributions to the current and future conserved lands network.
- Incorporates administrative efficiencies**.** While lands targeted for acquisition are primarily based on the ecological criteria and considerations above; the final proposed boundaries include refinements or adjustments to establish a more accessible and operationally efficient "administrative line" that follows prominent features within the landscape to provide ancillary benefits such as secured 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. We would generally avoid acquiring properties, or portions of properties, with existing improvements.

- Assumes Service acquisition from willing sellers within these CFAs over time as lands become available, there is an agreement in terms and price, and land acquisition funding is available.

In general, each CFA includes a core biological area that is based on the needs of identified priority resources of conservation concern using current data obtained from States and other organizations. For each individual CFA, we identify the priority resources of concern that would guide future management under Service ownership (re: appendix A in the final CCP/EIS). We also used the analysis and results of the *Connect the Connecticut* LCD core-connector network to further evaluate and affirm whether areas we identified are strategic and sustainable for conserving priority species, their habitats, and diverse ecosystems across the watershed. Table C.1 summarizes the priority wildlife and fish species that occur in the watershed that will benefit from our proposal. Attachment IV provides an example of how the *Connect the Connecticut* LCD core-connector network aligned with our CFAs.

Table C.1. Priority Species of Concern Occurring in the Connecticut River Watershed Benefiting from the Conte Refuge Proposed Land Protection Plan and their status in referenced plans.

Priority Species of Concern Occurring in the Watershed	NALCC[1] (*NALCC representative species are in bold)	BCC (BCR 30)[2]	BCC (BCR 14)[2]	Federally Threatened or Endangered Species	Proposed or Petitioned for Federal Listing[3]	Listed in Service's Northeast Region Fisheries Strategic Plan	Listed in Refuge Purposes	BCR 30[4]/PIF Plan[5]	BCR 14[4]/PIF Plan[5]
Alewife	x					x	x		
American bittern		x	x					M	M
American black duck	x	x	x				x	HH	HH
American eel						x			
American oystercatcher	x	x						HH	M
American redstart									HR
American shad	x					x	x		
American woodcock	x	x	x					HH	HH
Atlantic Salmon	x					x	x		
Atlantic sturgeon			x	x		x			
Bald eagle		x	x				x	M	M
Baltimore oriole								HR	
Bicknell's thrush	x		x		x			H	HH, R
Black-and-white warbler								HR	
Black-billed cuckoo									HR
Blackburnian warbler									HR

Priority Species of Concern Occurring in the Watershed	**NALCC[1] (*NALCC representative species are in bold)**	**BCC (BCR 30)[2]**	**BCC (BCR 14)[2]**	**Federally Threatened or Endangered Species**	**Proposed or Petitioned for Federal Listing[3]**	**Listed in Service's Northeast Region Fisheries Strategic Plan**	**Listed in Refuge Purposes**	**BCR 30[4]/PIF Plan[5]**	**BCR 14[4]/PIF Plan[5]**
Black-throated blue warbler									HR
Black-throated green warbler									HR
Blueback herring						x	x		
Blue-winged warbler	x	x	x					HH	H
Boreal chickadee									HR
Broad-winged hawk								HR	
Brook floater					x				
Brook trout	x					x			
Brown thrasher								HR	
Bufflehead		x						H	
Canada goose, Atlantic	x	x						HH	
Canada goose, north Atlantic		x	x					H	H
Canada Lynx				x					
Canada warbler	x		x					M	HH, Y
Chestnut-sided warbler									HR
Chimney swift								HR	
Cobblestone tigerbeetle					x				
Dwarf wedgemussel	x			x		x			
Eastern kingbird								HR	
Eastern towhee								HR	
Field sparrow								HR	
Gray catbird								HR	
Great crested flycatcher								HR	
Indiana bat				x					
Jesup's milk-vetch	x			x					
Least tern		x						H	
Lesser yellowlegs		x	x					M	

Priority Species of Concern Occurring in the Watershed	NALCC[1] (*NALCC representative species are in bold)	BCC (BCR 30)[2]	BCC (BCR 14)[2]	Federally Threatened or Endangered Species	Proposed or Petitioned for Federal Listing[3]	Listed in Service's Northeast Region Fisheries Strategic Plan	Listed in Refuge Purposes	BCR 30[4]/PIF Plan[5]	BCR 14[4]/PIF Plan[5]
Louisiana waterthrush								HR	
Mallard		x						H	
Marsh wren								HR	
Monarch butterfly					x				
New England cottontail rabbit	x								
Northeastern bulrush	x			x					
Northern flicker								HR	
Northern bog turtle				x					
Northern long-eared bat				x					
Northern parula									HR
Olive-sided flycatcher			x						H
Osprey							x		
Peregrine falcon		x	x				x		M
Pied-billed grebe		x	x						
Piping Plover	x			x				HH	HH
Prairie warbler	x	x						HH, Y	Y
Puritan tiger beetle	x			x					
Purple finch									HR
Red knot				x					
Regal fritillary					x				
Roseate tern				x				HH	
Rose-breasted grosbeak									HR
Ruffed grouse									HR
Rusty blackbird		x	x					H	H
Saltmarsh sparrow	x	x	x					HH, R	R
Scarlet tanager								HR	
Seaside sparrow	x	x						M, Y	
Semipalmated sandpiper	x	x	x					H	HH
Short-billed dowitcher		x						H	H

Priority Species of Concern Occurring in the Watershed	NALCC[1] (*NALCC representative species are in bold)	BCC (BCR 30)[2]	BCC (BCR 14)[2]	Federally Threatened or Endangered Species	Proposed or Petitioned for Federal Listing[3]	Listed in Service's Northeast Region Fisheries Strategic Plan	Listed in Refuge Purposes	BCR 30[4]/PIF Plan[5]	BCR 14[4]/PIF Plan[5]
Shortnose sturgeon	x			x		x	x		
Small-whorled pogonia	x			x					
Snowy egret		x	x					M	
Solitary sandpiper		x	x					H	
Tri-colored bat					x				
Veery									HR
Whip-poor-will		x						H	M
Willow flycatcher								HR	
Wood duck			x					M	M
Wood thrush	x	x	x					HH, Y	HH, Y
Wood turtle					x				
Worm-eating warbler		x						H	
Yellow banded bumble bee					x				
Yellow-bellied sapsucker									HR
Yellow-throated vireo								HR	

[1] *LCC–2009 North Atlantic Landscape Conservation Cooperative Development and Operations Plan; species of concern*

[2] *BCC (BCR 30, 14)-2008 USFWS Birds of Conservation Concern for Bird Conservation Regions 30 and 14.* Note: *The resident game species and waterfowl were added to this list from the Land Acquisition Priority System.*

[3] *Species petitioned to be federally listed as threatened or endangered as of 2016*

[4] *BCR–Bird Conservation Region Plans–Rankings: HH–highest; H–high; M–medium; HR–high BCR responsibility*

[5] *Species of Continental Concern from 2016 Partners in Flight Landbird Conservation Plan. R (red)=species with extremely high vulnerability due to small population, range, threats, and rangewide declines. Y (yellow) = species not declining but vulnerable due to small range or population and moderate threats, or species in decline due and moderate to high threats (Rosenberg, et al, 2016).*

Also, in section III below, under "Relationship of Project to Refuge System Policy on Strategic Growth," we describe in more detail how the following priority species of conservation concern meet the criteria cited in policy and would benefit from this proposal:

- Eleven federally listed wildlife and fish species.
- Three federally listed plant species.
- Seven species proposed for Federal listing.

- Fifty-nine migratory landbirds of conservation concern (from Regional BCC 2014 list, and BCR 30 and 14 plans).
- Six waterfowl species of conservation concern (from Regional BCC 2014 list, BCR 30 and 14 plans, and ACJV.
- Twenty-eight representative (e.g. surrogate) terrestrial species (with some overlap in bulleted listings above), which in turn, represent over 100 benefitting species.
- Six representative (e.g. surrogate) aquatic species (list of benefitting species not determined yet).

External boundaries of CFAs are delineated to encompass the core biological area, but may have been extended further during planning to establish an effective administrative boundary, avoid redefining (dividing) ownership parcel lines, or to make a critical connection to other conserved lands.

One CFA is an exception to our presentation of discrete individual CFA boundaries. The Quonatuck CFA is conceived as 8,000 acres of priority habitat to be protected along the river's mainstem and its major tributaries (map C.3). The CFA's boundary approximates the 100-year floodplain for the mainstem and thirteen tributaries, as defined by the Federal Emergency Management Agency (FEMA; *https://msc.fema.gov/portal/search?AddressQuery=Connecticut%20River%20*; accessed October 2016). The 8,000 acres targeted for the Quonatuck CFA is in addition to the acreage identified for 6 other delineated CFAs, and existing refuge units, that lie within, or partly within, the 100-year floodplain of the Connecticut River and its major tributaries.

Our priority in the Quonatuck CFA would be conserving any aquatic and terrestrial areas with occupied or potential habitat for federally listed or candidate species, as well as protecting functioning or restorable floodplain forests, and tidal (salt, brackish, and freshwater) wetlands. We would seek to protect these habitats where they currently occur, where they can be restored, and/or where they are projected to migrate to in the future due to climate change and anticipated increases in sea level. We would also focus on conserving ownerships that include river frontage in these key areas. Areas of particular interest are depicted on map C.4. These highlighted areas were mapped by TNC to include existing, functioning floodplain forest, or areas of high potential for restoration, where geomorphic characteristics favor the development of floodplain forest. Generally, we are assuming that this CFA would represent approximately 1,500 acres of tidally influenced wetlands and floodplain habitat along the mouth and lower extent of the river in Connecticut, approximately 1,500 acres of floodplain forest along the river in Massachusetts, and approximately 5,000 acres of floodplain forest along the upper portion of the river and distributed evenly between New Hampshire and Vermont.

The location and juxtaposition of all the CFAs within the larger existing conservation landscape would serve a critical role in connecting to an existing robust and very diverse conservation lands partnership. This contribution would also add value to the Service's investment in Conte Refuge. Protection of these areas in perpetuity would ensure that habitats remain intact and structurally and functionally sound to support species of conservation concern, and promote a more sustainable and resilient working landscape into the future as enumerated earlier.

III. Project Relationship to Service Directives and Initiatives

Relationship of Project to Strategic Habitat Conservation (SHC)

The Service adopted SHC as a science-based framework for making decisions about where and how to deliver conservation efficiently to achieve specific biological outcomes (*http://www.fws.gov/landscape-conservation/shc.html;* accessed October 2016). In collaboration with our partners, the public, and landowners, SHC is a way of thinking and doing business that requires us to set specific biological goals, allows us to make strategic decisions about our work, and encourages us to constantly reassess and improve our actions. The SHC framework integrates planning, design, delivery, and evaluation through an adaptive management approach.

Four principles guide SHC implementation:

- Start with ecologically meaningful scales.
- Work in partnership to maximize effectiveness and efficiency.
- Implement through an adaptive management framework.
- Use science and tools consistent with results.

Map C.4. Priority Floodplain Forests Identified by The Nature Conservancy in the Connecticut River Watershed

This project proposal embraces the concepts and all four principles of SHC. For example, we broadened our scope beyond existing refuge lands to make a concerted effort to integrate, complement, and magnify the accomplishments of our partners within the watershed. The final plan is proactive in confronting the challenges posed by climate change, invasive species, and habitat fragmentation due to changes in land use. Planning for an entire watershed of this size ensures a meaningful scale where results can be measured and monitored. Refuge goals, objectives, and strategies, as outlined in the final CCP/EIS and this LPP, integrate refuge planning, management, and other related actions into the larger watershed landscape context and support the strategic collaborative *Connect the Connecticut* LCD project described below.

In support of the SHC framework, our proposal is consistent with and incorporates the best available science and strategies, responds to current and anticipated future conditions, encourages collaboration and leveraging with partners, and inspires action that makes effective and efficient use of available resources. All combined, these actions magnify and enhance the beneficial impacts of past and will guide future accomplishments within the landscape. Our proposal offers a spatially explicit strategy and depiction of desired future conditions, and helps provide a shared and adaptable strategy for achieving those conditions.

Together with management direction detailed in the final CCP/EIS, we define clear priorities for wildlife and habitat conservation, and propose to implement these larger-scale conservation actions with multiple, and perhaps a few unconventional, partners. We would also continue our concerted efforts to promote communication and collaboration with the conservation, education, recreation, and economic stakeholders in the watershed. And, we would continue to actively work towards a healthy, integrated, and sustainable working landscape in the watershed.

SHC is by definition an adaptive process. There is tremendous interest in the watershed by a variety of partnerships to continue to collaborate and implement priority conservation actions within the framework of SHC. Our longstanding partnerships with Federal and state agencies, and non-governmental organizations, will continue to support implementation of ecoregional and State WAPS. Furthermore, we will continue to integrate our priorities with the North Atlantic Landscape Conservation Cooperative partners (NALCC; see below), an organization which was formed, in part, to implement SHC. As we move forward with implementation of existing and near-term strategies, we would continue to collaborate with others in seeking out new information and monitoring our actions in order to strengthen the scientific basis of our work.

Relationship of Project to Refuge System Policy on Strategic Growth

In June 2014, the Service issued final policy on strategic growth of the Refuge System (*http://www.fws.gov/policy/602fw5.html*; accessed October 2016). This policy lists three priority conservation targets for all future Refuge System land acquisition: (1) recovery of federally listed threatened and endangered species; (2) conserving waterfowl by implementing the NAWMP and its Joint Venture implementation plans; and/or, (3) conserving migratory birds in decline identified in Birds of Conservation Concern (BCC) or Bird Conservation Region (BCR) ecoregional plans. This project proposal addresses all three of these conservation targets as described below.

Federally Listed Threatened and Endangered Species

The watershed hosts fourteen federally listed threatened and endangered species, and seven species proposed or petitioned for federal listing. All of these species could potentially benefit directly from land protection outlined in this proposal, although not all of these species' recovery plans specifically call for refuge land protection. Some recovery plans are over 20 years old, are in need of updating, and were developed at times where proposing additional Federal land protection was not a preferred option. Therefore, land protection was not considered in some of these recovery plans as a potential alternative or recovery strategy.

Below we highlight four federally endangered or threatened species present in the watershed that would benefit directly from this LPP proposal, and which have recovery plans or 5-year review plans that specifically mention the need for land protection to ensure recovery of the species.

> Dwarf wedgemussel—Endangered
>
> The recovery plan for this species was completed in 1993. This mussel occurs within the Connecticut River mainstem and tributaries. No critical habitat has been designated for this species. The primary threats to the species include habitat loss, habitat fragmentation, altered natural river processes, and industrial and agricultural pollution. Where feasible, land acquisition was considered the most effective protection for the species and its habitat (USFWS 1993a).

Jesup's milk-vetch—Endangered
The recovery plan for the Jesup's milk-vetch was issued in 1989. This species is confined to river shores and islands on the Connecticut River. Habitat alteration and botanical collecting are major impacts to this plant, as well as human recreational activities and invasive plants (USFWS 1989). The permanent protection of this plant's habitat is a high priority in the recovery plan, and is emphasized in the 2008 5-year review (USFWS 2008b) and the 2009 Spotlight Species Action Plan (USFWS 2009b). The Action Plan specifically mentions land acquisition by the refuge as part of the Service's role and responsibility in the species' protection and recovery. Protection measures listed included conservation easements, direct land acquisition, or other agreements with landowners (USFWS 1989, USFWS 2008b, USFWS 2009b).

Northeastern bulrush—Endangered
The recovery plan for northeastern bulrush was issued in 1993. This plant occurs within alluvial meadows, beaver wetlands, and small ponds characterized by seasonally variable water levels. No critical habitat has been designated for this species. Threats include habitat alterations, such as roads and invasive species, agricultural runoff, off-road vehicle use, and unauthorized collection (USFWS 2006). Conservation efforts include land acquisition and conservation easements (USFWS 1993c), as well as conducting population surveys and implementing management tools to reduce threats (USFWS 2008).

Puritan tiger beetle—Threatened
The recovery plan for the puritan tiger beetle was issued in 1993. This species is an inhabitant of sandy riverine beaches along the Connecticut River mainstem. The puritan tiger beetle has declined along the river due to inundation and disturbance of its shoreline habitat from dam construction, riverbank stabilization, and human recreational activities. In addition, the flood control projects designed to control the river flows have impacted habitat suitability (USFWS 1993b). Conservations efforts include land acquisition, human recreational management and introductions of additional metapopulations with the goal of protecting a minimum of three metapopulations along the species historic range (USFWS 1993b, USFWS 2008).

In addition to the four species above, there are ten other federally listed species in the watershed that will benefit from our proposed LPP; however, respective species recovery plans did not specifically identify land protection as a strategy. As noted above, many of these recovery plans are dated to a time when proposing land protection was not considered to be a preferred or viable option, or no recovery plan has been developed yet. However, as is the case with other priority species of conservation concern, where habitat loss or degradation is impacting population levels, Service protection of additional key habitat areas in the watershed will help temper those losses.

Shortnose sturgeon—Endangered
The shortnose sturgeon was first listed as endangered in 1967. The National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries) published a shortnose sturgeon recovery plan in 1998. This species inhabits the Connecticut River from Turners Falls, Massachusetts to Long Island Sound. The Holyoke Dam in Massachusetts separates the Connecticut River population into two populations. Recent evidence indicates that no successful reproduction occurs in the population below the Holyoke Dam. This downstream population is sustained by the influx of out-migrating sturgeon from the upstream group. The primary impediment to sturgeon recovery is the presence of dams that obstruct migration and modify the historic flow regimes that cued the fish to spawn at appropriate times and places. The land acquisition proposed in this LPP would benefit shortnose sturgeon by contributing to water quality protection through the conservation of lands adjacent to the river's mainstem.

Atlantic Sturgeon—Endangered
NOAA Fisheries listed four Atlantic sturgeon distinct population segments (DPS) as endangered under the Endangered Species Act (ESA) in 2012. One of these distinct populations, the New York Bight DPS, includes habitat in the Connecticut River.

Atlantic sturgeon are managed under a Fishery Management Plan administered by the Atlantic States Marine Fisheries Commission (ASMFC). The plan includes measures for habitat conservation, restoration and improvement, monitoring of bycatch and stock recovery, and breeding/stocking protocols. There is also a State and Federal coast-wide moratorium on harvest of Atlantic Sturgeon (NOAA 2014).

Except for the occasional migrating individual, Atlantic sturgeon are rare in the river. In 2014, juvenile Atlantic sturgeon were found in the lower portion of the river. This documentation provides increased chances for recovery of this species in the river. The Quonatuck CFA and many of the CFAs in Connecticut proposed in this LPP could benefit Atlantic sturgeon by contributing to water quality protection from land conservation along the river mainstem.

Roseate Tern—Endangered
The recovery plan for the northeastern population of roseate terns was updated in 1998. These terns occupy sandy beaches and tidal mudflats at the mouth of the Connecticut River during migration. Loss of nest habitat and predation are threats to this species. Protection of migration habitat will provide undisturbed stop-over areas.

Indiana Bat—Endangered
The Indiana bat recovery plan was drafted in 2007. Human disturbance and vandalism pose significant threats during hibernation, and loss and degradation of forested habitat impact summer roost sites. Permanent protection of hibernacula, conservation and management of summer habitat and public outreach are recovery criteria for this species. The western boundaries of two CFAs in Vermont are located within the Northeast Indiana Bat Recovery Unit (RU). The RUs serve to protect summer habitats, and aid in the conservation of natural variation across populations (USFWS 2007). Permanent protection through land acquisition, and management of potential summer roost and maternity sites within these CFAs will aid in the recovery of this species.

Red Knot—Threatened
In December 2014, the Service listed the *rufa* red knot as federally threatened (79 FR 73706-73748). There is currently no recovery plan for the species. Red knot have been recorded during migration along the coasts of Connecticut, Massachusetts, and New Hampshire. Major threats to the subspecies include loss of breeding and nonbreeding habitat, predation during breeding, reduced prey availability, and mismatches in the time of the species migrations and the availability of food and favorable weather conditions. The Quonatuck CFA provides migrating habitat, while two other proposed CFAs may provide migrating habitat for red knots in the future: Whalebone Cove and Salmon River CFAs.

Piping Plover—Threatened
Piping plovers were listed as threatened in 1985. The 2015 recovery plan lists habitat loss and degradation, sea level rise and human disturbance as threats to its survival. Piping plovers use sandy beaches located at the mouth of the Connecticut River for breeding and migration. These areas are located within the Quonatuck CFA, and are currently protected and managed by The Nature Conservancy.

Canada Lynx—Threatened
Canada lynx were listed as threatened in 2000. Lynx occur in boreal and montane landscapes dominated by coniferous or mixed forest with thick undergrowth and young forests that support their principal prey, snowshoe hare. There is currently no recovery plan for the Canada lynx, however, the Service completed a recovery outline for this species. This document serves as an interim strategy to guide recovery efforts and inform the critical habitat designation process in the U.S until a Recovery Plan is completed (USFWS 2005). The 2005 outline describes core, secondary, and peripheral habitats important to the Canada lynx. The outline also lists preliminary actions needed for the species' recovery including retaining adequate habitat and management commitments in core and secondary areas, identifying and maintaining landscape connectivity between Canada and the contiguous U.S., and between core areas, identifying habitat and population limiting factors, and developing a post-delisting monitoring plan. In the recovery outline, the Upper Connecticut River Valley is included as a peripheral recovery area for the Canada lynx. However, since the recovery outline was drafted, recent sightings and data (2012-2013) show that Canada lynx are successfully reproducing on the refuge's existing Nulhegan Basin Division. Lynx have also been confirmed at the refuge's existing Pondicherry Division. Land acquisition or conservation easements within and in the vicinity of the Nulhegan Basin CFA and Pondicherry CFA to help protect core and connecting habitats may help benefit Canada lynx.

In 2014, the Service published a final rule that revised a previous designation of critical habitat in the U.S population (*https://www.gpo.gov/fdsys/pkg/FR-2014-09-12/pdf/2014-21013.pdf*; accessed November 2016). The rule extended ESA protections to lynx "where found" in the contiguous U.S.

Northern long-eared bat—Threatened
The northern long-eared bat was listed in April 2015 (80 FR 17974). As such, the species does not yet have a recovery plan and no critical habitat has been designate for the species. Additional land protection is not expressly identified as a recovery conservation strategy at the time of listing; however, several measures are identified to protect hibernacula and summer breeding and maternity colonies from disturbance. Potential habitat for the species exists throughout the watershed. The species has been documented occurring in at least three of the proposed CPAs/CFAs: Ompompanoosuc River, Ottauquechee River, and White River CFAs.

Northern Bog Turtle—Threatened
The northern population of the bog turtle was listed as a threatened species on November 4, 1997. These turtles prefer open-canopy wetlands, such as herbaceous sedge meadows and fens, which periodically flood and often bordered by wooded areas. Threats to its survival include the loss, degradation, and fragmentation of its habitat, compounded by the take of long-lived adult animals from wild populations for illegal wildlife trade. The protection of known bog turtle populations and their habitats, as well as the management of these habitats to maintain suitability (U.S. Fish and Wildlife Service 2001) are a few of the recovery actions which the refuge could undertake for this species. At this time, the bog turtle occurs in the Farmington River CPA.

Small whorled Pogonia—Threatened
Small whorled pogonia was listed as endangered in 1982, and reclassified as threatened in 1994. This plant inhabits upland sites in maturing stands of deciduous or mixed deciduous and coniferous forests with sparseto-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. Populations are threatened by habitat loss and degradation (USFWS 1992). The 1992 Recovery Plan and the 2008 5-Year Review specifically mention land acquisition and conservation easements as criteria to ensure permanent protection of known populations and essential habitat (U.S. Fish and Wildlife Service 2008). This species occurs within five CPAs and the Quonatuck CFA.

In addition to the fourteen federally listed species above, there are seven species proposed or petitioned for Federal listing.

Brook floater
The brook floater is a mussel species that occurs in rivers in the eastern part of the U.S. Significant declines have been noted in Massachusetts, New York, Pennsylvania, New Jersey, Rhode Island, Virginia, North Carolina, and South Carolina. Few known sites remain that hold healthy, viable populations. Species experts have determined that the brook floater occupies less than 50% of its historic range, primarily due to habitat destruction and land use practices that impact water quality. Populations are known to occur in Vermont and New Hampshire. Permanent conservation of lands adjacent to rivers with known occurrences of brook floater would protect and potentially improve water quality at these sites.

Cobblestone tiger beetle
The cobblestone tiger beetle is restricted to the open, cobbled, and sparsely vegetated areas of river islands and banks of free-flowing rivers (Allen and Acciavatti, 2002). Threats to this species include hydrologic alterations that impact habitat suitability, invasive plants, water pollution and river bank stabilization projects. This tiger beetle occurs in the Quonatuck CFA and West River CPA. The refuge can support this species by permanently protecting known populations and their habitats, as well as adjacent lands, to improve water quality and provide suitable habitat through management efforts.

Tri-colored bat
Tri-colored bat was once the most common bat species found in eastern forests. This species hibernates in caves during the winter, and roosts within forested habitats during the summer. Potential habitat for the species exists throughout the watershed. The species has been documented occurring in at least three of the proposed CPAs/CFAs: Ompompanoosuc River, Ottauquechee River, and White River CFAs. Permanent protection of winter and summer habitats, as well as the management of roosting areas will benefit this species.

Monarch butterfly

The monarch butterfly was petitioned for federal listing in 2014. This species is widely distributed across North America and is categorized into geographically distinct populations based on migration patterns. The monarch requires habitat that provides milkweed as host plants for breeding and flowering plants for foraging. This species has experienced dramatic declines which may be contributed to habitat loss, pesticide use and impacts from climate change. The refuge can support this species by protecting, creating and restoring high quality habitat.

Regal fritillary butterfly

Regal fritillary is a rare butterfly that may be extirpated from much of the Northeast. This species requires habitat that provides various species of violets as host plants for breeding and flowering plants for foraging. Habitat loss, fragmentation, and degradation, and pesticide use are listed as threats to the survival of this species. The refuge can support this butterfly by protecting and creating suitable open habitat.

Yellow banded bumble bee

Yellow banded bumble bee was petitioned for federal protection in 2015. According to recent studies, this species has declined by over 30% in range and persistence over its entire range; in some areas this species has been extirpated. This species forages on a diversity of plants within a wide variety of habitats including woodlands, farmlands, meadows, grasslands and wetlands. Threats to this important pollinator include disease, pesticide use and habitat loss (Hatfield et al. 2015). The refuge can support this species by protecting, creating and restoring high quality habitat for extant populations

Wood Turtle

Wood turtle was petitioned for federal protection in 2012. Wood turtles require riparian habitats, using aquatic and terrestrial habitats at different times of the year. This species is long lived, and thought to be experiencing population declines exceeding 50% over the past 100 years. Much of this decline is due to habitat degradation, fragmentation and destruction (van Dijk and Harding, J. 2016). Wood turtle occur in the Fort River, Quonatuck and Nulhegan Basin CFAs. Protection and management of riparian habitats will benefit populations.

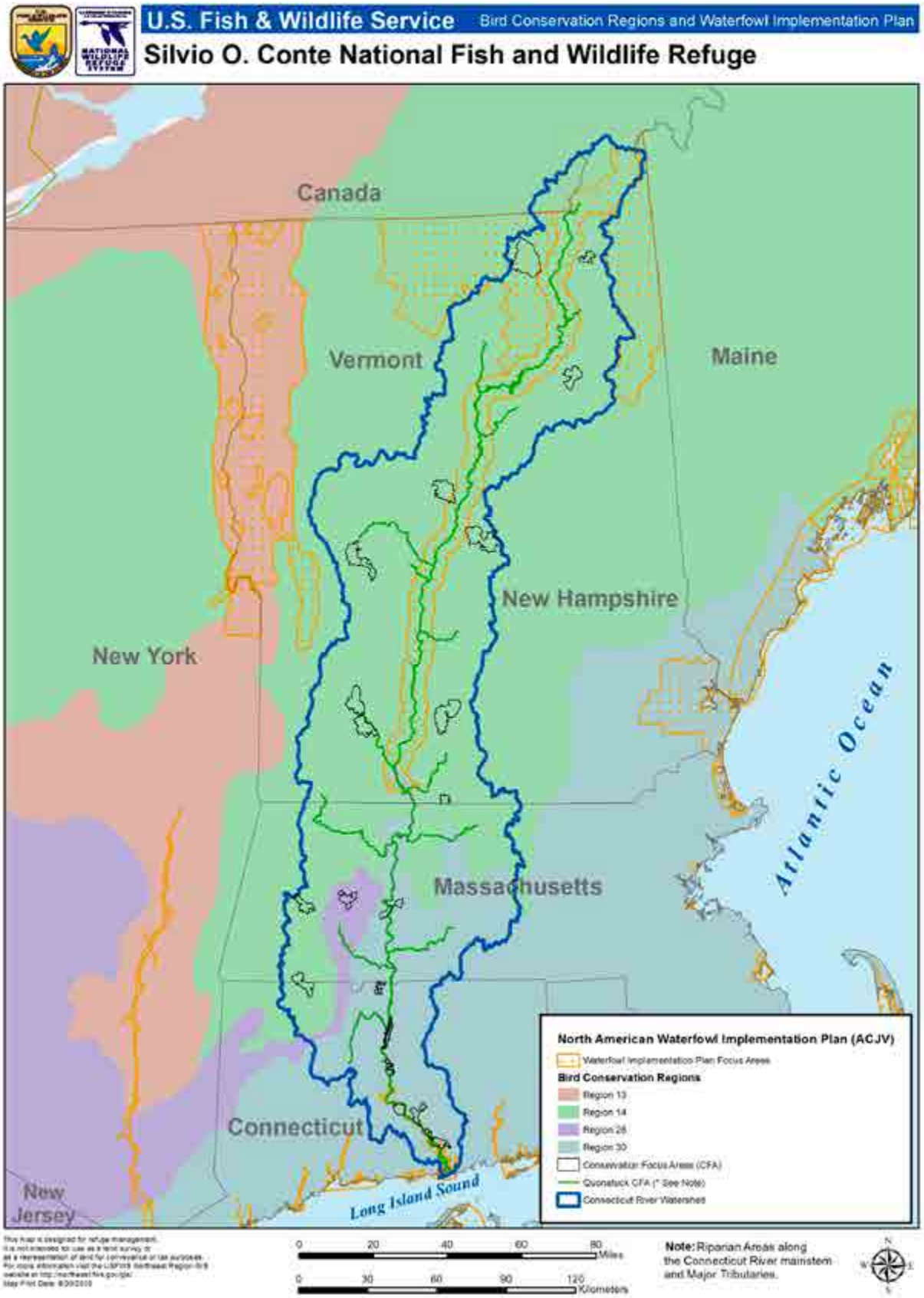
Waterfowl

Twenty-seven species of ducks, geese, and swans rely on habitat within the watershed. The lower section of the river supports waterfowl year-round and has some of the highest and most significant concentrations of black duck in the Northeastern U.S. (Dreyer and Caplis 2001). The freshwater and tidal wetlands along the river, particularly in the lower portion of the watershed, provide important stopover habitat during both spring and fall migrations of waterfowl, including the American black duck. The habitats most important to black duck are the tidal wetlands along the mainstem, 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 ducks, Canada geese, green-winged teals, gadwalls, and common merganser.

Further north in the watershed, many migrating ducks use flooded agricultural fields, floodplains, emergent wetlands, shrub swamps, and backwater areas along the river for stopover habitat. 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 and scattered small wetlands within the watershed provide prime breeding habitat for American black duck, wood duck, mallard, common merganser, and Canada geese. Other species nest along the river and elsewhere within the watershed, but are less common. Wood ducks are ubiquitous nesters in the watershed requiring large tree cavities which are associated with freshwater forested or shrub wetlands. They especially favor beaver ponds with heavy forest cover. Black ducks are a species of special management concern as previously described and are specifically mentioned in the Conte Refuge Act.

The ACJV's 2005 Revised Waterfowl Implementation Plan, a step-down plan from the NAWMP, identified three waterfowl focus areas in the watershed: (1) the Connecticut River and Tidal Wetlands Complex Focus Area; (2) the Connecticut River Focus Area; and, (3) the Lake Memphremagog Focus Area (map C.5) (*http://www.acjv.org;* accessed November 2016). These focus areas highlight the importance of the watershed to breeding, migrating, and wintering waterfowl. For each of these focus areas, the ACJV established habitat objectives to help conserve waterfowl populations. These same three focus areas coincide with target areas identified for American black ducks in the Conservation Action Plan for the American Black Duck (USFWS

Map C.5. North American Waterfowl Management Plan/Atlantic Coast Joint Venture Waterfowl Focus Areas and Proximity to Proposed Refuge Conservation Focus Areas



and Black Duck Joint Venture 2011). The Conservation Action Plan provided conservation recommendations for each target area to help conserve black duck habitats and populations. Below we describe the three ACJV waterfowl focus areas, their importance to waterfowl, the species that use these areas, habitat acreage targets, conservation recommendations, and the seven CFAs that are strategically located within their boundaries.

Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area, Connecticut

This area contains some of the most extensive and highest quality fresh and brackish tidal wetland systems in the Northeast and was designated a Ramsar wetland of international importance in 1994. The freshwater coves and tidal saltmarshes at the river mouth contain some of the most important areas for migrating and wintering waterfowl in the state. The remaining wild rice marshes in the focus area provide excellent foraging habitat for breeding, staging, and wintering waterfowl. In addition, large concentrations of American black duck, green-winged teal, mallard, and American wigeon use the wetland complex at the mouth of the river. Significant numbers of greater scaup, canvasback, ruddy duck, and Atlantic brant winter within the waterfowl focus area. This focus area encompasses four important bird areas. The area is important to black ducks throughout their annual cycle, providing nesting, stopover, and overwintering habitat.

The ACJV's habitat objective for this waterfowl focus area is 1,157 acres of wetland habitat. The Conservation Action Plan for the American black duck has the following conservation recommendations for this area:

- Cooperative management and conservation agreements to coordinate efforts across a mosaic of ownerships.
- Aggressive management of invasive species, including *Phragmites,* to restore habitats and prevent further degradation.
- Restoration of tidal marshes.
- Land acquisition, particularly of upland areas adjacent to wetland to provide buffers to maintain wetland structure and function.

The Quonatuck, Whalebone Cove, Salmon River, and Maromas CFAs are located in this focus area and land acquisition and protection in this CFA will help meet waterfowl habitat needs and benefit waterfowl populations as indicated below in table C.2.

Table C.2. Waterfowl Species Using the Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area, Connecticut

Species	Breeding	Migrating	Wintering
American black duck	✓	✓	✓
Green-winged teal	✓	✓	✓
Mallard	✓	✓	✓
American wigeon		✓	✓
Greater scaup		✓	✓
Canvasback		✓	✓
Ruddy duck		✓	✓
Atlantic brant		✓	✓

Connecticut River Waterfowl Focus Area, New Hampshire and Vermont

The river serves as an important migratory corridor for many species of waterfowl during the spring and fall migrations. Along both sides of the river there are numerous and extensive wetlands areas, such as oxbows, emergent wetlands, floodplain forests, and other forested wetlands, that provide waterfowl stopover, breeding, nesting, and wintering habitat. This area also contains prime breeding habitat for wood duck, black duck, mallards, and Canada goose. These habitats are important to black ducks throughout their annual cycle, providing nesting, stopover, and overwintering habitat.

The ACJV's habitat objective for this focus area is 3,450 acres of wetland habitat. The Conservation Action Plan for the American black duck has the following conservation recommendations for this area:

- Land acquisition by the Service (specifically the Conte Refuge) and other partners to protect important habitats.
- Managing and regulating public uses to limit disturbance.
- Controlling exotic species and removing dams to improve native habitats.

The Quonatuck, Ompompanoosuc River, and Mascoma River CFAs are located in this focus area and land acquisition and protection in this CFA will help meet waterfowl habitat needs and benefit waterfowl populations as indicated below in table C.3.

Table C.3. Waterfowl Species Using the Connecticut River Waterfowl Focus Area, New Hampshire and Vermont

Species	Breeding	Migrating	Wintering
American black duck	✓	✓	✓
Mallard	✓	✓	✓
Hooded merganser	✓	✓	✓
Common merganser	✓	✓	✓
Canada goose	✓	✓	✓
Wood duck	✓	✓	
Blue-winged teal	✓	✓	
Green-winged teal	✓	✓	
Ring-necked duck	✓	✓	✓
Common goldeneye		✓	✓
Greater snow goose		✓	
Atlantic brant		✓	

Lake Memphremagog Waterfowl Focus Area, Vermont

The 775,452-acre Lake Memphremagog Waterfowl Focus Area encompasses all of Orleans County, Vermont, and parts of Essex County, Vermont. The area's many remote wetlands have high value for breeding and migrating black ducks and other waterfowl. The area also has several relatively large wetlands and lakes, which provide important deepwater habitat for species such as common loons.

The ACJV's habitat objective for this focus area is 5,101 acres of wetland habitat. This focus area's many, scattered, remote wetlands have high-value for breeding and migrating American black ducks. The Conservation Action Plan for the American black duck has the following conservation recommendations for this area:

- Minimizing disturbance to remote wetlands and waterbodies to protect nesting waterfowl by following buffer zones and best management practices during timber harvesting.
- Acquiring additional lands (fee or easement) to protect high-quality habitat, limit shoreline development along ponds and lakes, and prevent disturbance to other wetlands.

The Nulhegan Basin CFA is located in this focus area and land acquisition and protection in this CFA will help meet waterfowl habitat needs and benefit waterfowl populations as indicated below in table C.4.

Table C.4. Waterfowl Species Using Lake Memphremagog Waterfowl Focus Area, Vermont

Species	Breeding	Migrating	Wintering
American black duck	✓	✓	
Wood duck	✓	✓	
Blue-winged teal	✓	✓	
Green-wing teal	✓	✓	
Hooded merganser	✓	✓	
Common merganser	✓	✓	
Ring-necked duck	✓	✓	
Canada goose	✓	✓	
Mallard	✓	✓	
Common goldeneye	✓	✓	
Bufflehead	✓	✓	
Lesser scaup	✓	✓	
Greater scaup	✓	✓	

Overall, our land acquisition proposal would make a major contribution toward waterfowl habitat and population objectives in the NAWMP and the ACJV. The ACJV's Connecticut River Focus Area, Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area, and the Lake Memphremagog Waterfowl Focus Area (attachment II) all overlap CFAs where acquisition and protection of wetlands and adjacent uplands is a priority.

The wood duck is identified as a high priority species for the Atlantic Flyway Council and as a continentally high priority species for the NAWMP and the ACJV. BCR 14 is recognized by the NAWMP as a high priority region for breeding wood duck. BCR 30 is considered a moderate priority region for breeding wood duck. While no regional population objectives have been established for wood duck, the regional priority rankings suggest that the watershed can make significant contributions to sustaining the Atlantic Flyway population at or above target levels for harvest management purposes. Above, in the ACJV focus area descriptions, we note the important breeding habitat provided for American black duck in the watershed. Our assessment of habitat estimates that implementation of this LPP would provide breeding habitat to support approximately 950 breeding pairs of black duck and 4,100 breeding pairs of wood duck (attachment II).

Migratory Birds

The watershed serves as one of the major "north-south" migration corridors within the expansive Atlantic Flyway, flanked by the Atlantic coastal corridor to the east and the Champlain Valley corridor to the west. Hundreds of species of migratory and resident birds inhabit the watershed. These species encompass 17 taxonomic orders and 46 families of birds ranging from the well-known Canada goose and American robin to the rare golden-winged warbler and boreal owl (DeGraaf and Yamasaki 2001). Fifteen species of shorebirds, and 24 other water-dependent species such as rails, grebes, and herons, use the watershed for breeding, wintering, and/or migration. The refuge is also host to 157 passerine species and 24 raptor species; of these, 88 are neotropical migrants that breed in the watershed, 77 are residents that breed and winter here, and 16 are winter residents that migrate to the watershed from the north. Certain species such as mourning dove, American robin, red-tailed hawk, American crow, cedar waxwing, and American goldfinch have both migratory and resident populations (DeGraaf and Yamasaki 2001). The watershed supports 60 bird species that have been listed by one or more bird conservation plans or initiatives as species of concern.

The contribution to migratory birds and their habitat was an important consideration in delineating CFAs for refuge acquisition. For the purposes of relating those contributions quantitatively, in attachment II to this LPP,

we detail the potential number of breeding migratory birds that could be supported within the proposed CFAs, and the acres of potentially suitable habitat.

We compare our estimates for the CFAs and conserved lands to population and habitat objectives that have been established at the BCR and State scales as reported in BCR 14 and BCR 30 conservation plans. Examining the benefits provided by existing conserved lands provides perspective on what additional migratory bird benefits would be provided to the conservation estate by acquiring the proposed CFAs. We profile six neotropical migrant species that are identified as Priority Refuge Resources of Concern (PRRC), are priority species within BCR plans, and which represent the range of upland and wetland habitat types within the proposed CFAs. Those species are:

- Wood thrush.
- Canada warbler.
- Blackburnian warbler.
- Black-throated blue warbler.
- American woodcock.
- Bobolink.

In addition, four of the six species profiled (e.g. wood thrush, blackburnian warbler, American woodcock, and bobolink) are identified as representative (also referred to as "surrogate") species by the NALCC. We also present contributions to neotropical migrant stopover habitat (attachment II).

We summarize the results of our analysis in the table C.5 below.

Table C.5. Contribution of All Proposed CFAs to BCR Population Objectives for Select Migratory Bird Species*

Species	Percent (%) of total BCR 14 population objective supported by all CFAs	Percent (%) of total BCR 30 population objective supported by all CFAs
Wood thrush†	1.8%	0.6%
Blackburnian warbler	3.1%	6.4%
American woodcock	2.2%	2.0%
Bobolink†	<0.1%	1.2%
Black-throated blue warbler	4.3%	17.0%
Canada warbler†	1.6%	11.0%

* *The total proposed CFA acreage (197,337 acres) represents 0.2 percent of total BCR 14 acreage, and 0.1 percent of total BCR 30 acreage.*

† *Species on draft BCC 2014 list; both U.S. breeding and migration habitat limited.*

In summary, this LPP would make important contributions toward Regional and State-level breeding population objectives for several neotropical migrant species of conservation concern. In addition, three studies highlight the significance of the watershed during both spring and fall migration. Attachment II summarizes these study results in section H, Migratory Stopover Habitat.

In table C.6 below, we provide a summary of how our proposed individual CFAs support the three Strategic Growth policy conservation targets.

Table C.6. Summary Relationship of Proposed CPAs and CFAs to the Service's Strategic Growth Policy Conservation Targets.

Proposed Conservation Partnership (CPA) and Conservation Focus Area (CFA)	Strategic Growth Policy Targets		
	Federally listed species[1]	**Waterfowl (NAWMP/ACJV Focus Area Objectives)**	**Migratory Birds (BCC 2014 species whose migration and breeding habitat are limited)**
Ashuelot River	Dwarf wedgemussel, **northeastern bulrush,** northern long-eared bat, tri-colored bat		*Breeding habitat for*: Canada warbler Eastern whippoorwill Wood thrush
Blueberry Swamp	Canada lynx, northern long-eared bat, tri-colored bat, monarch butterfly, yellow banded bumble bee		*Breeding habitat for*: Canada warbler Eastern whippoorwill Olive-sided flycatcher
Westfield River (includes Dead Branch CFA)	Northern long-eared bat, tri-colored bat		*Breeding habitat for*: Black-billed cuckoo Canada warbler Eastern whippoorwill Wood thrush
Farmington River	**Dwarf wedgemussel**, northern long-eared bat, small whorled pogonia, tri-colored bat		*Breeding habitat for*: Canada warbler Wood thrush
Fort River	**Dwarf wedgemussel**, **Puritan tiger beetle** northern long-eared bat, small whorled pogonia, tri-colored bat, monarch butterfly, yellow banded bumble bee		*Breeding habitat for*: Bobolink Migration habitat for: Canada warbler Wood thrush Olive-sided flycatcher Bobolink
Maromas	Northern long-eared bat, shortnose sturgeon, tri-colored bat	ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area	*Breeding habitat for*: Cerulean warbler Wood thrush
Mascoma River	**Dwarf wedgemussel**, northern long-eared bat, tri-colored bat	ACJV Connecticut River-Vermont and New Hampshire Waterfowl Focus Area	*Breeding habitat for*: Bobolink Canada warbler Wood thrush
Mill River	**Dwarf wedgemussel, Puritan tiger beetle,** northern long-eared bat, tri-colored bat, small whorled pogonia, shortnose sturgeon, monarch butterfly, yellow banded bumble bee		*Migration habitat* for: Canada warbler Wood thrush
Muddy Brook	**Dwarf wedgemussel,** northern long-eared bat, small whorled pogonia, tri-colored bat, monarch butterfly, yellow banded bumble bee		*Breeding habitat* for: Bobolink Migration habitat for: Canada warbler Wood thrush
Nulhegan Basin	Canada lynx, northern long-eared bat, tri-colored bat	ACJV Lake Memphremagog Waterfowl Focus Area	*Breeding habitat for:* Canada warbler Eastern whippoorwill Olive-sided flycatcher

Proposed Conservation Partnership (CPA) and Conservation Focus Area (CFA)	Strategic Growth Policy Targets		
	Federally listed species[1]	**Waterfowl (NAWMP/ACJV Focus Area Objectives)**	**Migratory Birds (BCC 2014 species whose migration and breeding habitat are limited)**
Ompompanoosuc	**Dwarf wedgemussel**, northern long-eared bat, tri-colored bat	ACJV Connecticut River-Vermont and New Hampshire Waterfowl Focus Area	*Breeding habitat for*: Canada warbler Eastern whippoorwill Wood thrush
Ottauquechee River	Northern long-eared bat, Indiana bat, tri-colored bat		*Breeding habitat for*: Eastern whippoorwill Wood thrush
Pondicherry	**Dwarf wedgemussel**, northern long-eared bat, Canada lynx, tri-colored bat		*Breeding habitat for*: Bobolink Canada warbler Eastern whippoorwill Olive-sided flycatcher
Pyquag[2]	Northern long-eared bat, tri-colored bat		*Migration habitat for*: Canada warbler Wood thrush Lesser yellowlegs Semipalmated sandpiper Wood thrush Olive-sided flycatcher Bobolink
Quonatuck[2]	**Dwarf wedgemussel, Puritan tiger beetle, Jesup's milk vetch, northeastern bulrush,** shortnose sturgeon, piping plover, red knot, Atlantic sturgeon, roseate tern, small whorled pogonia, , Canada lynx, northern long-eared bat, Indiana bat, tri-colored bat, monarch butterfly, yellow banded bumble bee	ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area (CT) and ACJV Connecticut River-Vermont and New Hampshire Waterfowl Focus Area	*Migration habitat for*: Canada warbler Wood thrush Canada warbler Wood thrush Lesser yellowlegs Semipalmated sandpiper Sanderling Wood thrush Olive-sided flycatcher Bobolink Cerulean warbler Saltmarsh sharp-tailed sparrow Whimbrel Black rail Black skimmer
Salmon River	**Puritan tiger beetle**, brook floater, northern long-eared bat, tri-colored bat	ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area	*Breeding habitat for*: Wood thrush Cerulean warbler Eastern whip-poor-will Black-billed cuckoo Prairie warbler Migration habitat for: Sanderling Lesser yellowlegs Semipalmated sandpiper Wood thrush Olive-sided flycatcher Cerulean warbler

Proposed Conservation Partnership (CPA) and Conservation Focus Area (CFA)	Strategic Growth Policy Targets		
	Federally listed species[1]	Waterfowl (NAWMP/ACJV Focus Area Objectives)	Migratory Birds (BCC 2014 species whose migration and breeding habitat are limited)
Scantic River	**Dwarf wedgemussel**, northern long-eared bat, shortnose sturgeon, tri-colored bat		*Migration habitat for*: Canada warbler Wood thrush
Sprague Brook	**Northeastern bulrush,** northern long-eared bat, tri-colored bat		*Breeding habitat for*: Canada warbler Wood thrush Black-billed cuckoo
West River	**Northeastern bulrush,** northern long-eared bat, cobblestone tiger beetle, brook floater, tri-colored bat		*Breeding habitat for*: Canada warbler Eastern whippoorwill Wood thrush
Westfield River (includes Dead Branch CFA)	Northern long-eared bat, tri-colored bat		*Breeding habitat for*: Black-billed cuckoo Canada warbler Eastern whippoorwill Wood thrush
Whalebone Cove	Red knot, piping plover, small whorled pogonia, northern long-eared bat, tri-colored bat, roseate tern, Atlantic sturgeon	ACJV Connecticut River and Tidal Wetlands Complex Waterfowl Focus Area	*Breeding habitat for*: Black-billed cuckoo Bobolink Cerulean warbler Eastern whip-poor-will Prairie warbler Migration habitat for: Sanderling Lesser yellowlegs Semipalmated sandpiper Wood thrush Olive-sided flycatcher
White River CFA	Northern long-eared bat, Indiana bat, tri-colored bat		*Breeding habitat for*: Canada warbler Eastern whippoorwill

[1] *Species in* **bold** *are federally listed species that have Service land protection identified as a strategy within their recovery plan. All other species are federally listed and Federal candidate species that do not have land acquisition mentioned in their recovery plan or do not have a recovery plan.*

[2] *These are stand-alone CFAs and not represented by a CPA.*

Relationship of Project to NALCC Representative (i.e. Surrogate) Species and Other Priority Species and Habitats

In 2009, the NALCC partnership published a development and operations plan which evaluated 74 species (including plants, all taxa of wildlife, fish, and other aquatic species), of highest priority for conservation for that geographic region based on consultations with BCR teams, ACJV teams, fish habitat partnerships, and the Service's endangered species program. Table C.1, presented earlier, lists those species occurring within the watershed. This priority species list served as an initial starting point for biological planning and conservation design within the NALCC, and provided guidance in developing this LPP. This LPP provides important habitat protection and/or potential enhancements for these highest priority species identified in the NALCC plan.

In 2011, the Service began facilitating a process to collaboratively identify "surrogate" species within each geographic LCC. This was a response to addressing the sheer number of species for which the Service, respective States, and other partners work with, and the impracticality of designing and conserving landscape-

scale habitats on a species-by-species basis. The basic concept is that conserving habitat for surrogate species will also address the needs of a larger group of species or other conservation targets (e.g., water quality, forest, or grasslands, etc.). Selected surrogate species and targets were used as the basis for regional conservation planning efforts within watershed landscape or geographic area. It was a practical step in implementing the SHC approach, using the best available science to conserve landscapes supporting multiple species. The surrogate species approach informed our agency's management practices, and enabled the Service to make better, more cost-effective conservation and management decisions and propose investments in this LPP. Most importantly, it improved our ability to work with partners to sustain abundant, diverse, and healthy populations of fish, wildlife and plants now and in the future in the watershed and as an agency (*http://www.fws.gov/landscape-conservation/selecting-species.html;* accessed October 2016).

The NALCC was one of the first LCC partnerships in the country to initiate the process to identify and select surrogate species. This partnership uses the term "representative" species in place of surrogate species.

Representative (e.g., Surrogate) Species Selection
The NALCC has designated an initial set of representative species as a tool for strategically conserving habitat at landscape scales (*http://www.fws.gov/northeast/science/representative_species.htm;* accessed October 2016). In 2011, the NALCC held workshops in each of its three sub-regions (northern New England and New York, southern New England and New York, and mid-Atlantic), where Service scientists and other experts selected a total of 87 terrestrial and wetland species to compile a NALCC representative species list. A subsequent effort identified 12 aquatic representative species. Some, but not all of these species, were identified as highest priority in the 2009 NALCC operations plan. Of the 99 representative aquatic and terrestrial species, 34 occur in the watershed.

The large proportion of LCC priority species supported in the watershed is a reflection of the broad diversity of habitats present, including habitat that is vital to species that range from migratory fish to boreal forest obligates. The watershed is centrally located in the NALCC; and ranges in elevation from sea level to the highest elevation (6,288 feet) in New England. Using the list, representative species are paired with the priority habitats included in each of the CFAs. Further details are available in appendix A of the final CCP/EIS. These species were used to help inform, focus, and evaluate the potential contributions of each CFA identified for habitat protection.

Relationship of Project to the *Connect the Connecticut* Landscape Conservation Design (*Connect the Connecticut* LCD)

The CCP core team has worked collaboratively with the four states on identifying and refining the CFAs identified in this LPP proposal since the CCP planning process was initiated in 2006 using an array of information made available by the states and other partners. During 2014, the CCP team spent a considerable amount of time working with the four respective State fish and wildlife agencies to seek preliminary agreements on those boundaries. The *Connect the Connecticut* LCD project was initiated in February 2014, with a final design released in May 2015. The project is now moving into its next phase of implementation. CCP core team members participated in the *Connect the Connecticut* LCD project, and thus, were able to share information from the LPP process, as well as compare and integrate LCD project results into this LPP proposal.

What follows is an overview of *Connect the Connecticut*. The project has been well-documented and can be further reviewed at: *http://connecttheconnecticut.org/* (accessed October 2016).

The LCD planning effort in the watershed was facilitated by the Service and supported by the NALCC. However, key to its success is the 30-member core team of conservation partners composed of Federal and State agencies and private organizations working at various scales in the watershed. As noted above, refuge staff participated on the LCD core team, as did the leadership of the Friends of the Silvio O. Conte National Fish and Wildlife Refuge (Friends of Conte Refuge) in an effort to design a tool with potential for broad application among diverse stakeholders within a large landscape. Fundamentally, the *Connect the Connecticut* LCD is a collaborative effort among partners to develop a strategic plan for the watershed that will sustain habitat for fish, wildlife, and plants within a working landscape, while also reliably providing clean water, storm protection, recreation and many other natural benefits that support people and communities. It is intended to guide collective conservation actions within the watershed and connect to broader regional conservation goals for conserving sustainable fish and wildlife populations and their habitat for people within a working landscape.

The LCD planning effort pioneers the use of new decision support tools and the best available science to set goals and measurable objectives for representative species of fish and wildlife, and the ecosystems that support them. It also translates those goals and objectives into projections of the amount, type, and distribution of habitat needed to sustain species and habitats at those levels. Finally, it allows users to incorporate expectations for climate change, urban growth, and other land-use changes and pressures into their conservation strategies.

The principal products of *Connect the Connecticut* are the networks of high priority core areas for both terrestrial (including wetlands) and aquatic ecosystems. These core-connector networks represent a synthesis of ecological information and are designed to provide strategic guidance for conserving natural areas, and the fish, wildlife, and other components of biodiversity that they support, within the watershed. The networks contain especially intact, resilient examples of each ecosystem type present in the watershed, including both widespread ecosystems such as hardwood forests and rare natural communities like bogs. They also contain important habitat for species such as brook trout and wood duck. Terrestrial cores (but not aquatic cores) are divided into two tiers of priority.

These networks were developed using supporting data layers, including measures of ecological integrity, terrestrial resilience, mapped rare natural communities, priority river floodplains, stream resistance to temperature change, modeled representative species landscape capability, and presence of five anadromous fish species. The proposed LPP fully complements and supports the *Connect the Connecticut* LCD core-connector networks. Attachment IV provides an example of how some of the LCD products (e.g., aquatic core areas, the blackburnian warbler landscape capability index, and the terrestrial core-connector network), overlap with proposed CFAs.

The LCD project's stated objectives were to:

- Establish common conservation goals and objectives for species and ecosystems in the watershed that are informed by watershed and regional priorities.
- Develop a strategic landscape design that prioritizes places, and identifies strategies and actions, necessary to meet and sustain those goals and objectives into the future.
- Deliver information, maps, and tools with design options at multiple scales (e.g. local, State, and Regional scales) and in formats needed by partners to guide conservation decisions and inform planning (e.g. town master plans, refuge CCPs, National Forest Plans, and State WAPs).
- Establish a process for conducting landscape conservation design that can be applied and adopted elsewhere in the region.

The *Connect the Connecticut* LCD core team set a conservation target of including approximately 25 percent (25%) of the watershed (approximately 1.8 million acres) in Tier 1 terrestrial core areas, and 25 percent (25%) of the aquascape (all water bodies) in aquatic core areas. The core areas are delineated based on ecological criteria without consideration of their current conservation status. An additional 22 percent (22%) of the land area is in the connectors that flow between one or more Tier 1 terrestrial cores.

Approximately 25 percent (25%) of the watershed is already currently under some form of protection within the watershed. However, only 35 percent (35%; ~1.2 million acres) of the terrestrial core-connector network is currently secured. Notwithstanding the lands already secured as refuge, under this LPP, further land protection within CFAs would allow refuge lands to contribute another 117,669 acres toward ensuring that the Tier 1 terrestrial core areas and connectors are conserved.

While implementation of the LPP will contribute to the watershed-wide goals from *Connect the Connecticut*, the LCD project also provides a number of useful decision-support tools for strategic conservation through acquisition of additional lands within the CFAs. Virtually all the lands within CFAs intersect with the terrestrial or aquatic core networks, the Tier 2 core areas, and the areas designated as Supporting Landscapes. These designations can be used to prioritize land acquisition. In addition, *Connect the Connecticut* includes over 40 individual products that can be used separately or in combination to inform strategies for land protection and management.

We anticipate that the *Connect the Connecticut* products will stimulate discussion and facilitate strategic conservation decisions in the watershed as more people become aware of its availability as a conservation decision support tool. We have worked to raise awareness of these products while distributing the Conte Refuge CCP/EIS for public review and comment. These products will be valuable tools for Federal and State agencies, and local communities, in making land use decisions. We expect the data and tools from the *Connect the Connecticut* project will be valuable to refuge staff when developing step-down plans such as Habitat Management Plans after the CCP is finalized.

Relationship of Project to Refuge System's Urban Wildlife Conservation Program

The watershed overlaps about 396 communities, 2.4 million residents, and two large New England urban areas: Springfield, Massachusetts (153,552 residents) (2013 U.S. Census) and Hartford, Connecticut (124,893 residents). Springfield is the fourth largest urban area in New England; only Boston (#1), Worcester (#2), and Providence (#3) are larger.

The proximity of existing and proposed Conte Refuge lands to major urban centers, such as Springfield, Massachusetts and Hartford, Connecticut, presents tremendous opportunity to reach new audiences who do not currently know about the Service and Refuge System, and therefore are less likely to visit refuge lands. Map C.2 shows major urban areas within the watershed, their proximity to existing conserved lands, and their distribution along the mainstem of the Connecticut River and its major tributaries. Proposed CFAs in proximity to these urban centers include: the Fort River and Mill River CFAs in Massachusetts, and the Farmington River, Muddy Brook, Scantic River, Pyquag, Maromas, Salmon River, and Whalebone Cove CFAs in Connecticut. The ever-growing urban population will be a critical constituency to engage as we work to ensure that future Americans continue to care about conservation. Connecting with urban communities is a major initiative within the Refuge System (*http://www.fws.gov/urban/index.php*; accessed October 2016). The goal of the Urban Wildlife Conservation Program is to engage urban communities as partners in wildlife conservation through collaborations both on and off refuge lands.

Existing and proposed refuge lands are strategically situated to provide opportunities for urban residents to directly experience the outdoors through fishing, hunting, wildlife observation, photography, environmental education, interpretation, and other compatible outdoor recreational pursuits. The refuge's existing and potential partnerships that operate in the urban environment are many and diverse. For example, Conte Refuge is an integral part of the Springfield Urban Wildlife Refuge Partnership, officially designated in September 2015. Urban Wildlife Refuge Partnerships are a key piece of the Service's Urban Wildlife Conservation Program. They are long-term partnerships, formalized through official agreements, which engage urban communities in conservation issues on partner-owned lands within urban neighborhoods. The partnerships serve as opportunities to help engage residents in place-based, outdoor experiences in their community, which foster connections with fish and wildlife and their habitats.

The Springfield Partnership brings together a multitude of partners including the Conte Refuge, Friends of Silvio O. Conte Refuge, ReGreen Springfield, Springfield Watershed Restoration Partnership, U.S. Forest Service, Massachusetts Division of Ecological Restoration, University of Massachusetts Amherst, Mount Holyoke College, Connecticut River Watershed Council, Keep Springfield Beautiful, Springfield Museums, Pioneer Valley Planning Commission, Chicopee 4Rivers Watershed Council, and the City of Springfield. The Partnership aims to engage students and community members in environmental education and urban restoration projects to create a network of conserved habitats in the Connecticut River watershed.

One of these urban restoration projects focuses on restoring urban streams and forests in the Abbey Brook Conservation Area, which have suffered from erratic storm water flows, invasive plants, adverse amounts of sedimentation, and other pressures common to urban streams and forests. With careful planning and adequate resources, partners hope to reverse these impacts, resulting in a neighborhood haven for wildlife and an asset to the city's residents. The refuge could also support urban education programs through implementing established programs such as Adopt-A-Habitat, Conte Corners, the Watershed on Wheels (WoW Express), Biological Assessment Trailer (BAT Express), Youth Conservation Corps, Student Conservation Association crews, and volunteers.

It is through opportunities like these on and off refuge lands that people will establish a relationship with nature, learn about our agency's important role in conservation, and garner an appreciation of the importance of sustainable conservation action in providing ecosystem and community services. As a result of these efforts to engage urban audiences, many people may become inspired to help protect and nurture public lands as citizen stewards.

IV. Threats to Watershed Resources and How This Proposal Addresses Them

Potential Threats to Resources

The threats to America's land, water, fish and wildlife, and cultural resources are greater than any one agency or organization can address alone. Threats such as land use change, a changing climate, and invasive species have the potential to affect multiple species and resources across an entire landscape. These stressors are amplified by habitat fragmentation, loss of wetlands, and reduced water quality, quantity, flows, and impaired function, posing ever greater challenges and threats to the quality, connectivity, and sustainability of watershed resources.

Climate Change

As the climate changes, the resulting impacts affect the full spectrum of habitats due to changes (increases and decreases) in temperature, precipitation, and water level. While the timing, extent, and location of these changes are not known, investments in land conservation that facilitate appropriate habitat connectivity (aquatic and terrestrial) in area (size), elevation, and latitude could help temper the impact, giving our Federal trust resources more opportunity to emigrate and the time to adjust and adapt. This proposal, along with existing and planned partner actions, would strive to assemble larger, better connected, more resilient, and redundant areas within the conservation estate that would afford ideal opportunities to evaluate, address, and employ adaptive management over time to temper the impacts of future climatic challenges on our Federal trust resources.

Land Use Change and Habitat Fragmentation

The river has been impacted by changes in land use, especially over the last 150 years. Changes in technology have dramatically changed farming, forestry, and real estate development while generational succession of landowners and the settlement of estates and the related impacts on parcel size and ownership pattern has changed the configuration of land use and management. Habitat fragmentation is typically preceded by ownership fragmentation. Ownership fragmentation in the watershed continues to increase as does the threat of development (commercial and residential). When the individual ownerships decline in size, and the purchase prices of smaller ownerships are reduced commensurately, the land becomes more available to a wider spectrum of potential buyers. As property changes hands or moves from one generation to the next, ownerships begin to fragment and become smaller. As ownerships become smaller, they are potentially more susceptible to conversion for development or other uses. A major focus of this proposal is to protect and assemble larger contiguous habitats within the existing watershed land conservation mosaic along latitudinal and elevation gradients in an effort to counter ownership and habitat fragmentation. This approach also accrues benefits to our desired outcomes for diversity and connectivity in area, aspect, process, and substrate that is well connected to a well-represented, redundant, and resilient core conservation network.

Impacts to Water Quality, Quantity, and Wetlands

Refuge staff have been working with the Service's Fisheries program, the NALCC, and other Federal and State agencies and private organizations to evaluate impediments to the functioning of natural hydrologic systems in the watershed. Our focus has been on determining which impediments have the greatest effect on wildlife and aquatic species movement, water quality and quantity, duration and timing of flooding, and the health and integrity of wetlands. We are working with partners to identify and prioritize areas of greatest impact and to develop an implementation strategy to improve water quality and quantity, and the timing and duration of flow. With our partners, we have started working with local jurisdictions to identify opportunities for funding from the Department of Transportation (public land) and Department of Agriculture (private land) to improve road crossings, and the management of storm water and dams.

Protection of wetlands, floodplain forest, and riparian habitat is a major emphasis of this proposal. Restoring and maintaining the integrity of wetlands and other waters is one of the purposes in the Conte Refuge Act. We are also working with our partners to identify floodplains and wetlands that are a priority for protection and as feasible, the restoration of the structure and function of the floodplain forest and wetland complex.

Invasive Species

Controlling invasive species is a major focus of current refuge management programs. Today, many communities are faced with threats from exotic species such as Japanese knotweed, oriental bittersweet, garlic mustard, water chestnut, purple loosestrife, Asian long-horned beetle and others. Our ability to effectively limit the impacts of these invaders is partially dependent on large-scale, intact, and resilient landscapes, such as those in our refuge proposal, which can be more resistant to new infestations when addressed at the CPA level.

How Project Proposal Addresses Threats from Climate and Land Use Change

When the refuge was authorized in 1995, the projected impacts of climate and land use change were not understood as they are today. Models to predict climate and land use changes have greatly improved in recent years. Today, we have more information and more sophisticated decision support tools to identify priority areas for protection to respond and better prepare for those changes.

This LPP, in conjunction with the land protection, restoration, and management programs of our partners working in the watershed, promotes the biological diversity, integrity, and resiliency of upland and wetland ecosystems in an amount and distribution that contributes to sustaining ecological function, supports healthy populations of native fish and wildlife, and anticipates the effects of climate and land use changes.

As noted previously, we used data and outputs from the *Connect the Connecticut* LCD, TNC, State fish and wildlife agencies and other conservation partners, agency personnel expertise, and a myriad of other data sets to identify, compare, and contrast the CFAs with the highest quality habitat and the most intact, integral, and resilient places in the landscape. The proposed CFAs, in conjunction with the conserved lands network, will help conserve a resilient and integral landscape, and fortify the full spectrum of physical characteristics, to support species diversity in the face of anticipated climate and land use changes.

Connectivity of Protected Habitats

On a landscape scale, the diversity in substrate and topography (elevation and aspect), and the range in latitude, within the watershed allow for diverse, strategic, and sustainable connections between the Long Island Sound, White Mountains, Green Mountains, and the Northern Forest. These connections will increase opportunities for species migration, emigration, and adaptation in response to climate change. For example, connecting and protecting floodplain forest and riparian areas, and efforts to reestablish a more natural flow of water within the watershed, which are all a priority in this proposal, will minimize the anticipated impacts from more frequent and intense flood events expected from climate change. Furthermore, these connections will help counteract, and prevent further impacts from, fragmentation.

The CFAs along the mainstem in the lower reaches of the watershed are vital to the landward migration of the tidally influenced coastal wetland complex due to anticipated increases in sea level attributed to climate change. The lower portion of the river is not obstructed until the first dam in Holyoke, Massachusetts, a point that is well above the head-of-tide which is presently near Hartford, Connecticut. As the sea level rises, the fortunate absence of mainstem dams could allow the existing tidally influenced coastal wetland complex (salt, brackish, and fresh) to "migrate" upriver over time, provided the appropriate lands have been protected.

Habitat Resiliency

The term "resilience" refers to the capacity of a site to remain viable and adapt to climate change while still maintaining diversity, but does not assume that the species currently located at these sites will necessarily be the same species present in a century or two (*https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/terrestrial/resilience/ne/Pages/default.aspx*; accessed October 2016). Instead, if the land is conserved, the area will support species that thrive in the conditions defined by the physical setting. The CFAs, in conjunction with other conserved lands in the watershed, would conserve a spectrum of physical settings that are connected in latitude, elevation, aspect, and substrate, thus providing a gradient of exposure, temperature, and moisture. This diversity will help increase resiliency within the landscape, in part, by supporting a wide variety of microclimates. Furthermore, a well-distributed conserved lands network, reducing barriers and minimizing fragmentation, would promote resilience by facilitating range shifts and the reorganization of ecological communities.

V. Partnerships Important for Project Design and Implementation

Established Partnership Framework

The Northeast Region is a large and populous region with diverse opinions, backgrounds, and politics. While the 13 States in the Region account for about 7 percent (7%) of our Nation's land base, it is home to about 25 percent (25%) of our Nation's population. Much has changed since the refuge was authorized in 1995. At that time, there was widespread skepticism about the value of Federal government involvement in the watershed. Based on our refuge partnerships, demonstrated actions, and shared outcomes, our relationship with the area communities, State agencies, and congressional delegations in the four States has strengthened over the past 15 years.

This proposal would further enhance the Service's collaborative, landscape-scale, partner-driven approach in the watershed and complements the vision which led to the passage of the Conte Refuge Act in 1991. As proposed, an expanded and strategic refuge design offers the opportunity to demonstrate the integrated implementation of SHC and adaptive management in a partnership approach to support the NAWMP/ACJV, endangered species recovery plans, BCR priorities, and habitats identified by the NALCC within a large watershed and landscape-based conservation mosaic. Further, it provides a framework and a forum for engaging multiple Federal agencies, State agencies, local municipalities, private organizations, interested landowners, and individual citizens in conservation, education, recreation, and sustainable and complementary economic efforts. Goal 4 in the final CCP/EIS details how the refuge would continue to initiate, support, and promote partnerships with other Federal, State, and local governments, Tribal governments, and private individuals and organizations

Specifically, our partnership goals with this LPP include the following:

- Conserving and protecting an array of terrestrial and aquatic habitats that support federally listed threatened or endangered species, waterfowl and other migratory birds as described in Service, State, and partner-supported plans;
- Monitoring and addressing socio-cultural values of interest to local communities, in particular, ecosystem services, as well as resource impacts associated with climate and land use changes;
- Providing opportunities to demonstrate adaptive land management techniques in response to landscape changes, and support those activities on partner and private lands;
- Seeking opportunities for partners to combine their strengths to make important contributions to conservation, and to link exceptional wildlife and public use values within reach of one of the most highly populated regions in the country; and
- Providing opportunities to connect people with nature in rural to urban settings by protecting public access and offering compatible programs to engage and motivate people to learn about and enjoy nature and act to conserve it.

While the Service contribution of conserving 197,337 acres may only represent less than 3 percent (3%) of the watershed, and about 10 percent (10%) of the existing conservation estate (1.8 million acres +/-), when added to the existing public and private conservation accomplishments, the benefits accrued to targeted trust resources and the overarching watershed partnership will be considerably greater. Decades of work to promote partnerships for wildlife habitat, outdoor recreation, working forest and farms, and leveraging these programs, has magnified the potential beneficial impact in the watershed. Approval of this proposal would expand the ability of the Service to accomplish those benefits working with conservation partners, landowners, and other stakeholders in the watershed.

A notable successful partnership is the Friends of Conte Refuge, which is best described as an association of approximately 70 conservation, recreation, education, and organizations and public agencies Over the past decade, the group has increased in representation, scope, and sophistication, and now works well beyond what is considered a traditional refuge boundary. The Friends Group strives to provide a foundation, forum, and framework to establish and facilitate diverse and creative partnerships that promote conservation, education, recreation, and sustainable economic opportunities within the watershed. Their successes and influences on conservation in the watershed are noteworthy and have drawn national attention (*https://www.facebook.com/pages/Friends-of-the-Silvio-O-Conte-National-Fish-and-Wildlife-Refuge/121976791147545?fref=nf;* accessed October 2016).

NALCC Partnership

Refuge lands will play a vital role in implementing the conservation actions identified by the NALCC partnership. This extensive partnership includes the Service, other Federal agencies, States, Tribal governments, universities, and private organizations. The NALCC Development and Operations Plan details this partnership and identifies priorities for the partnership (*http://www.fws.gov/northeast/science/pdf/NorthAtlanticLCCfinal.pdf;* accessed October 2016). Implementation of the *Connect the Connecticut*, previously described, is a priority for the NALCC.

Other Federal Agencies
The refuge has several memorandums of understanding (MOU's) with other Federal agencies engaged in conservation in the watershed. The 2012 MOU establishing the watershed as a large landscape demonstration project under the Presidential initiative "America's Great Outdoors" includes nine Federal agencies: NRCS, U.S. Forest Service, Farm Service and Rural Development agency, DOT, NOAA, Department of Housing and Urban Development, EPA, and U.S. Army Corps of Engineers. The final CCP/EIS, including this LPP, proposes to utilize a framework to catalyze and bolster Federal agency partnerships to align, target, and leverage public resources to accomplish shared goals and objectives in the watershed.

State Wildlife Agencies
The Service and the four State fish and wildlife agencies in the watershed already work collaboratively to benefit many species and habitats. This proposal would support priorities for habitat protection and management in State WAPs and the outcomes and benefitting State WAP species are tracked and listed in CFA specific tables in CCP/EIS appendix A. Species of greatest conservation need (GCN) have been identified in each of the four State plans: Connecticut (Connecticut Department of Environmental Protection Bureau of Natural Resources (CTDEEP) 2005 and 2015 update), Massachusetts (Massachusetts Department of Fish and Game 2006 and 2015 update), Vermont (Vermont Fish and Wildlife Department 2015), and New Hampshire (New Hampshire Game and Fish Department 2015). Almost without exception, the GCN species include those identified by the Service and are recognized by regional conservation partnerships (e.g., Joint Ventures) as priority resources of concern.

Tribal Governments
Native American Tribal Governments are important partners in the watershed. We will continue to pursue timely and effective collaboration in developing the CCP and protecting Native American cultural resources. Early in developing the Conte Refuge draft CCP/LPP/EIS, we contacted federally recognized Tribal governments with associations in the watershed to discuss issues, concerns, or opportunities they may have with existing or proposed refuge management. We also shared an internal review draft of the CCP/EIS, and a copy of the publically released draft plan. No issues or concerns related to land acquisition were expressed. The following Tribes were contacted:

- Narraganset Indian Tribe
- Mohegan Tribe of Indians of Connecticut
- Mashantucket Pequot Tribal Nation
- Wampanoag Tribe of Gay Head (Aquinnah)
- Mashpee-Wampanoag Tribe
- Stockbridge-Munsee Band of Mohican Indians

We will continue to engage and consult with Tribes throughout the planning and implementation phases of this project.

Private-Public Conserved Lands Network in the Watershed
As noted, the watershed has an extensive network of publically and privately conserved lands, totaling just over 1.8 million acres or 25 percent (25%) of the watershed. Conserved or "secured" lands in the watershed are lands that are permanently protected from development through fee title or easement restrictions, but in some cases may allow certain other sustainable land uses, such as farming and forestry. The conserved lands network is important to highlight because refuge lands are included, and because we have significant partnerships with other conservation land owners, especially those in proximity to refuge lands.

Within the watershed, many agencies, organizations, and private individuals own and maintain land included in the conserved lands network for a variety of different primary purposes. Those include: water supply, flood protection, timber and agricultural production, recreational use, and fish and wildlife habitat. Some owners place a restriction on development simply for aesthetic reasons.

Table C.7 presents the estimated conserved acres by state. It is important to note there are likely small parcels held by municipalities, small land trusts, or private landowners that are not in the secured lands database yet, and more are being added all the time. While 25 percent (25%) of the watershed benefits from some form of

conservation status; approximately half of these acres are situated in the desired system of connected core areas that are more functionally resilient to the anticipated changes in climate and land use (attachment IV).

Table C.7. Conserved Lands in the Connecticut River Watershed by State[1]

	Connecticut	Massachusetts	Vermont	New Hampshire	Totals
Federal	686	11,497	217,795	227,089	457,067
State	77,013	284,006	157,106	116,140	635,265
Local[1]	41,583	77,830	25,119	27,416	171,948
Private	26,724	126,787	114,040	264,577	532,128
Unknown[2]	740	73	2,541	61	3,415
Totals	**146,746**	**500,193**	**516,601**	**635,283**	**1,797,823**

[1] *The source for conserved lands is TNC 2014, Secured Lands Gap status 1, 2, 3 and 39.*

[2] *This could not be determined from the data available.*

VI. Implementing the Proposed Land Protection Strategy

Service Land Acquisition Policy

It is the Service's policy and long standing practice to work with only willing sellers to acquire the minimum interest necessary to achieve our objectives. An interest purchased by the Service can include fee-title or less-than-fee-title interest (e.g. easements and leases), and would be at market value. This approach has been modeled at the refuge over the past 15 years. A variety of different strategies were employed (fee title, easement, and use (term and life) reservations) to meet the resource protection objectives of the refuge in a manner that met the individual needs and preferences of the landowner.

The Service purchases land from willing sellers at market value, over time, as lands become available and only when funds are available and there is an agreement in terms and prices. Landowners are under no obligation to sell an interest in their properties to the Service, or change their practices or plans for their property due to location within an approved refuge acquisition boundary. In addition, owning land within an approved refuge acquisition area does not affect how the property owner can use their land or impact who the owner can sell their property to. In essence, defining the Service's areas of interest (e.g. a proposed CFA) authorizes the Service to be a "willing buyer" and an option to the landowner. The Service would strive to minimize the acquisition of infrastructure, unless the property is desirable for restoration purposes or is consistent with meeting other refuge goals or objectives.

Prioritizing Parcels for Acquisition within Proposed CFAs

As required by Service policy, we must indicate a priority ranking for identified parcels in the event multiple landowners offer parcels of land in the proposed acquisition areas at the same time, and funding is insufficient to respond to all willing sellers. Our acquisition activities will be informed and guided using priority rankings we have assigned in this LPP. We evaluated and prioritized approximately 5,000 parcels within 21 proposed CFAs (Quonatuck CFA not included), and arranged the parcels into three priority categories or "tiers": Tier I, Tier II, and Tier III, with Tier I being the highest priority. Individual parcels range in size from about 1 acre to approximately 3,600 acres. In order to establish the tiered ranking system, we evaluated three criteria which we describe further below: (1) the amount of priority species habitat within each parcel, (2) the amount of wetlands, and (3) the parcel size.

1. Priority Habitat

To evaluate this component of the tiered ranking system, we first identified the three highest priority habitat types in each CFA contributing to priority refuge resources of concern (final CCP/EIS appendix A; also, see table C.8 below), and then considered the following:

- Presence of suitable habitat for threatened and endangered species.
- Presence of suitable habitat for migratory birds in decline.
- Presence of important waterfowl habitat as identified by the ACJV.
- Overlap with *Connect the Connecticut* LCD Tier 1 core areas and connectors

Additional considerations include:

- Presence and amount of habitat for other species of conservation concern.
- Presence of riparian and floodplain forest.
- Connectivity in area, elevation, latitude, aspect, substrate, and process.
- Level of development on parcel, including buildings, roads, and other infrastructure.

With regard to developments, it is not our intent to purchase parcels with major improvements. Based on Service policy, during the planning process, we do not redefine parcel lines to work around improvements. Instead, we would work with individual landowners who might want to retain the improvements or redefine their ownership line to sell the developments to another entity.

Table C.8. Priority I, II, and III Habitats in Each Proposed CFA

CFA (state, acres[1])	Priority I Habitats	Priority II Habitats	Priority III Habitats
Whalebone Cove CFA, Connecticut (3,930 acres)	Freshwater Marsh	Hardwood Forest	Shrub swamp and Floodplain Forest
Scantic River CFA, Connecticut (4,144 acres)	Floodplain Forest	Hardwood Swamp	Freshwater Marsh and Shrub Swamp
Salmon River CFA, Connecticut (4,455 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Muddy Brook CFA, Connecticut (2,661 acres)	Floodplain Forest (currently agriculture)	Grassland (currently agriculture)	Hardwood Swamp
Pyquag CFA, Connecticut (3,329 acres)	Floodplain Forest (currently agriculture)	Hardwood Swamp	Freshwater Marsh
Maromas CFA, Connecticut (3,935 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Pasture/Hay/Grassland
Farmington River CFA, Connecticut and Massachusetts (7,661 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Westfield River CFA, Massachusetts (6,177 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Conifer Swamp
Mill River CFA, Massachusetts (2,300 acres)	Floodplain Forest	Hardwood Swamp	Freshwater Marsh
Fort River CFA, Massachusetts (1,660 acres)	Floodplain Forest	Grassland	Hardwood Forest
Dead Branch CFA, Massachusetts (5,186 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Sprague Brook CFA, New Hampshire (3,016 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Pondicherry CFA, New Hampshire (10,249 acres)	Spruce-fir Forest	Peatland	Shrub Swamp and Floodplain Forest
Mascoma River CFA, New Hampshire (20,593 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Conifer Swamp

CFA (state, acres[1])	Priority I Habitats	Priority II Habitats	Priority III Habitats
Blueberry Swamp CFA, New Hampshire (4,636 acres)	Spruce-fir Forest	Shrub Swamp and Floodplain Forest	Conifer Swamp
Ashuelot River CFA, New Hampshire (17,860 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
White River CFA, Vermont (10,054 acres)	Hardwood Forest	Pasture/Hay/Grassland	Cliff and Talus
West River CFA, Vermont (22,947 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Freshwater Marsh
Ottauquechee River CFA, Vermont (5,985 acres)	Hardwood Forest	Pasture/Hay/Grassland	Cliff and Talus
Ompompanoosuc River CFA, Vermont (15,072 acres)	Hardwood Forest	Shrub Swamp and Floodplain Forest	Pasture/Hay/Grassland
Nulhegan Basin CFA, Vermont (32,779 acres)	Spruce-fir	Shrub Swamp and Floodplain Forest	Peatland
Quonatuck CFA, Connecticut, Massachusetts, Vermont, and New Hampshire (8,000 acres)	Floodplain Forest	Tidal Marsh	Hardwood Swamp and Shrub Swamp

[1] *Potential acres under Service ownership.*

After compiling the information above, we next assessed each individual parcel within each CFA to determine how much of the parcel contains the priority habitats for the species of conservation concern identified for that CFA. We categorized parcels containing at least 67 percent (67%) priority habitats as "important habitat parcels." We also categorized larger, individual parcels that included at least 3 percent (3%) of all priority habitat identified for an entire CFA as "important habitat parcels."

2. Wetlands
We next used National Wetlands Inventory data and USGS data to map wetlands, rivers, and streams, and then buffered each by 100 feet. Any parcel that contained at least 3 acres of buffered water and/or 3 acres of buffered wetland was categorized as an "important water parcel." Within the watershed, wetlands only account for 3 percent (3%) and open water only 2 percent (2%) of the habitat. Therefore, it is important to adequately protect these elements of the conservation mosaic in a manner that assures wetland and water quality and quantity for the benefit of wildlife and people.

3. Parcel Size
We used professional judgment to establish 5 acres as meaningful threshold on which to rank individual parcels. It is based on our experience that areas less than 5 acres, by themselves, can be challenging for effectively protecting, managing, or connecting habitat patches. A parcel is ranked lower if it is smaller than 5 acres.

Determination of Tier I, II, or III rank
Using the three criteria of habitat, wetlands, and parcel size, we then assigned a priority, or tier ranking, to each parcel. Tier I (highest priority) was assigned to parcels that were found to be important on all three criteria. Tier II was assigned parcels were important in two of the three criteria. Tier III was assigned to parcels important in one of the criteria. Table C.9 below illustrates the assignment logic. An example of a parcel map for a CFA, and the respective parcel tier assignments that we are recommending, is presented in attachment III (map CIII.1; table CIII.1). CFA parcel maps and tier assignments for the approximately 5,000 parcels that comprise the full project are posted on our Website at *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

Table C.9. Criteria Used to Establish Tier Designation for Each Parcel Proposed for Acquisition in Project

Important Habitat in Parcel[1]	Important Water or Wetlands in Parcel[2]	Parcel Size > 5 acres	Tier Designation for a Parcel
Yes	Yes	Yes	I
No	Yes	Yes	II
Yes	No	Yes	II
Yes	Yes	No	II
No	No	Yes	III
No	Yes	No	III
Yes	No	No	III

[1] *Important Habitat Parcel: Any parcel that contains at least 67 percent of a priority CFA habitat type (re: table C.7), or that contains more than 3 percent of all priority habitat for a particular CFA.*

[2] *Important Water or Wetlands Parcel: Any parcel that contains at least three acres of water, including 100-foot buffer, and/or that contains three acres of wetlands, including 100-foot buffer.*

In addition to the priority criteria identified above, these other factors will also influence acquisition decisions:

- Availability of willing sellers.
- Availability of funding.
- Presence of infrastructure.
- Landowner needs.
- Operational efficiencies.
- Unforeseen site characteristics.
- Updated resource information and increased scientific knowledge.
- Proximity and connection to other conserved lands.
- Changes in habitat and other ecological conditions.
- Conservation status: we do not expect to purchase any lands already permanently conserved by others, except under extenuating circumstances.
- Presence of rare species and/or rare/imperiled habitat communities.
- Tangible threats to resources of concern.

The Service reserves the right to be flexible with the tier group rankings detailed above because, as SHC principles emphasize, the identification and evaluation process is dynamic and must be adaptive to new or changing conditions. Smaller parcels, and parcels with significant improvements, development, and/or other alterations, will generally be eliminated from future consideration, unless protection is necessary to achieve restoration and management objectives within the surrounding landscape. In addition, the Service may need flexibility to meet the needs of individual landowners.

Description of Land Protection Options Considered for Project

The following land protection options were considered as we developed our project proposal:

- Option 1: Landowner retains ownership and all use of property.
- Option 2: Management and/or land protection measures by others.
- Option 3: Less-than-fee-title acquisition (easement, lease, management agreement) by the Service.
- Option 4: Fee-title acquisition by the Service.

Option 1: Landowner Retains Ownership
Landowners who do not wish to convey their lands to the Service or another conservation entity may still be interested in improving their lands for wildlife. We may provide technical expertise or inform the landowner of voluntary incentive based programs offered by the Service or its partners to assist in habitat conservation. Landowners within a CPA or CFA would not be subject to any additional obligation or regulation due to their property's location within a proposed CPA or CFA.

Option 2: Management and/or Land Protection by Others
About 25 percent (25%) of the watershed is already under the stewardship of conservation partners via fee title, easement, leases, and/or management agreements. This option includes the diverse menu of partner initiatives that are intended to keep working farms and forests, restore wetlands and wildlife habitat, and promote and employ best management practices for land stewardship in support of landowner preferences.

The U.S. Department of Agriculture has a very active easement program for private landowners in the watershed, historically offering the Forest Legacy Program (FLP), Farm and Ranchland Protection Program (FRPP), the Wetland Reserve Enhancement (WRE) Program, and the Conservation Reserves Program (CRP). USDA easement programs are diverse and typically well-funded, when compared to the Service's traditional land protection funding sources. For example, if a willing seller within a CFA would like to protect their forest as a working forest and manage it to produce lumber and to allow public access; the FLP may be the best option. If another willing seller who owns a farm that has residential development capacity reflected in the tax assessment, and they want to keep it as a working farm, an FRPP easement with USDA may be the best option. Working forests and farms are a very important and traditional component of this large New England landscape.

We would promote the use of these USDA programs, as well as other Federal and State agency land conservation programs, across the watershed to support achieving Conte Refuge's legislated purposes and landowner preferences, especially within CPAs and CFAs. Each of these voluntary and incentive based programs, and similar State and locally based conservation alternatives, are important conservation strategies to promote an integrated and sustainable working landscape. Management and protection of land and related resources by others will continue to add to the conserved lands network and the suite of choices available to landowners. This proposal could enhance the availability of watershed protection efforts by expanding the options available to the landowner, rather than compete or duplicate existing partner initiatives.

Option 3: Easements, Leases, and/or Management Agreements obtained by the Service
This option allows the Service to acquire a partial interest in lands through use of tools such as easements, leases, or cooperative agreements. This option employs long-term or permanent easements, renewable leases, and/or management agreements as a means of protecting and managing land to benefit fish and wildlife, and possibly providing wildlife-dependent recreational and educational opportunities. To date, the Service more frequently uses conservation easements, but short-term leases or management agreements have also been used effectively to protect or manage habitat on a temporary basis.

Specifically, conservation easements convey a partial, typically permanent, interest in land to the Service. Easement interests are acquired by the Service at market value from willing sellers to accomplish the purposes of the refuge. The underlying fee title to the property is retained by the landowner, leaving the parcel in private ownership. The Service and landowner agree to land-use practices that enable both to meet their conservation goals, as well as provide the landowner continued stewardship and use of these lands.

The Service would negotiate, on a case-by-case basis, the extent of the rights to acquire. Those may vary, depending on the configuration and location of the parcel, the current extent of development, habitat management requirements, the needs of the landowner, and other considerations. The structure of such easements will provide permanent protection of existing wildlife habitat while also allowing habitat management or improvements and access to sensitive habitats, such as for endangered species or migratory birds. During this process, programs offered by other partners may ultimately be a better fit with landowners expectations and needs.

Where consistent with our management interests, we may also seek to acquire public access rights to secure wildlife-dependent recreational opportunities. However, the conveyance of any interest in land to the Service is up to the landowner. Easements are best employed by the Service as a conservation measure when:

- Only minimal management of the resource is needed, but there is a desire to ensure the continuation of current sustainable uses, wildlife habitat conditions, public access, and to prevent fragmentation over the long term.

- A landowner is interested in maintaining ownership of the land, does not want it to be further altered, and would like to realize the benefits of selling management rights, and/or public access rights.

- Properties subject to easements generally remain on the tax rolls, although the change in market value may reduce the assessment and ultimately the amount of property tax liability for the landowner. The Service does not pay refuge revenue sharing (i.e., funds the Service pays to counties and municipalities in lieu of taxes) on easement rights.

Other less-than-fee options include cooperative management agreements or leases, which convey management rights on a temporary basis. Similar to an easement, a lease represents an interest in the real estate for a specific period of time. Service easements are typically perpetual, while leases are temporary. The Code of Federal Regulations (CFR) can apply when the Service acquires interests in land via leases, similar to lands acquired in fee title or easement. For example, we could post the property and protect it as a national wildlife refuge for the duration of the lease, provided the appropriate clause was agreed to by the landowner (lessor) who is granting the lease.

Option 4: Fee Title Acquisition by the Service
This option includes the Service acquiring fee title interest in land. A fee-title interest is normally acquired when: (1) the area's fish and wildlife resources require permanent protection not otherwise assured; (2) land is needed for visitor use development; (3) a pending land-use change may adversely impact the area's resources; (4) it is the most practical and economical way to assemble tracts into a manageable unit; or, (5) the landowner is not interested in retaining any interest in the property. Fee-title acquisition conveys all ownership rights under the control of the landowner to the Federal Government and provides the best assurances of permanent resource protection. A fee title interest may be acquired by donation, transfer, or purchase when funds are available and once there is an agreement in terms and price and the owner is a willing seller. We also have the authority to exchange land in Service ownership for other land that has greater habitat and/or wildlife value. Inherent in the land exchange option is the requirement to get dollar-for-dollar land value with, occasionally, an equalization payment. Exchanges are attractive because they usually do not increase Federal land holdings or require purchase funds. However, they also may be very complicated and take time to complete due to the nature and extent of the compliance process mandated by Federal law.

The fee title acquisition option provides us the most flexibility in managing priority lands, and ensuring perpetual protection of nationally significant trust resources and their habitat, and providing opportunities to engage the public through wildlife-dependent recreation and education opportunities. Generally, the lands the Service acquires will require some active management, including controlling invasive species, mowing or prescribed burning, planting, or managing for the compatible, priority public uses. In some cases, we may acquire fee interest on lands encumbered with a conservation easement, such as when an owner is interested in selling the remainder of interest in the land on which the Service or other partners have acquired an easement. We evaluate this need on a case-by-case basis and often in consultation with our partners, provided the landowner is agreeable to involving of others and the sharing of relevant or private details involved in the negotiations between the Service and the landowner.

Land Protection Options Recommended for this Project

Our proposal includes a combination of Options 1, 2, 3, and 4. We believe this approach provides a range of flexible and cost-effective methods of implementing Service policy, while offering alternatives responsive to the preferences of local landowners interested in contributing to conservation, but who may or may not want to sell a full interest in their lands. We would also consider a donation as the opportunity arises, but this is difficult to anticipate and is not planned as part of our proposal.

We will continue to abide by the Service's policy to only acquire the minimum interest necessary to achieve refuge purposes. However, for this proposal, based on our history of land acquisition and landowner interest, we are assuming acquisition of approximately 65 percent (65%) of the entire refuge in fee, and the remaining 35 percent (35%) via easements, or other less-than-fee options. To date, fee title acquisition from willing sellers has been the Service's principal method of ensuring permanent protection of high priority habitats within refuge

boundaries. However, we are finding that conservation easements are becoming more popular and appreciated by landowners who wish to conserve their properties, receive some financial benefits, and keep the land in traditional uses. To that end, and given the unique legislative mandate for this refuge, we will emphasize the use of wildlife conservation easements for habitat management and/or public access for compatible outdoor recreation as an important tool of our land protection strategy.

Ultimately, it is the landowner who will determine what, when, or even if, land is purchased to become refuge. With available funding and an agreement in terms and price between the Service and the owner, land can be protected. The actual configuration of the purchase could include the whole parcel, a subdivision of the parcel, or only a portion of the ownership. Final action will be based on mutual agreement as to the type of protection strategy (fee or easement) employed. It is for these reasons and more, we estimate that, on average, approximately 90 percent (90%) of the land identified within the CFAs will be conserved.

Further, should another Federal or State agency or organization administer a program that is more compatible with the desires of the landowner, the Service will strive to connect the landowner to those opportunities. Examples include the FLP, CRP, and FRLP programs, and other easement, lease, and voluntary and incentive based protection options. This approach will be better for the landowner and allow the Service to expend its limited funds to protect lands that are most aligned with our Strategic Growth policy.

Once the landowner preference is identified and a description of what may be conveyed to the Service is described, an appraisal that meets stringent Federal requirements will be conducted. Willing-seller landowners interested in selling fee title ownership, easement, or sell a lease to the Service, and who give written permission, will initiate our process to work with the Department of the Interior's Office of Valuation Service to conduct, review, and approve an appraisal to determine market value. Once an appraisal has been approved, we can present an offer for the landowner's consideration. The Service is required by Federal law to offer 100 percent (100%) of the appraised market value or the interest in the property being conveyed; however, we can accept landowner offers of selling for less than the appraised value.

VII. Project Costs and Funding

As of February 2016, approximately $34 million has been used to purchase the current 37,000 acres of refuge lands. These funds were used to pay for direct land costs, plus incidental real estate expenses to cover appraisals, surveys, title work, and relocation expenses; resulting in an average $921 per acre acquisition cost since the refuge was first established on October 3, 1997.

Using the previous per acre value, the proposed 99,507-acre refuge increase could increase the project cost by approximately $91.2 million. Based on our financial capacity over the past fifteen years, it could take another 50 years to acquire the entire project. A long-term commitment of this nature is not at all uncommon when compared to the status of other Refuge System land protection projects, and in light of our willing-seller-only approach.

The legislated purposes in the Conte Refuge Act create both an opportunity and a justification for other Federal agencies to participate and leverage their human and financial resources within a partnership context, and in support of mutually-beneficial programmatic and landscape agency goals. These resources could be focused on public or private land within a CPA or CFA, and augment the efforts and accomplishments by the Service and many other partners.

There are many sources of funding that could be pursued to achieve conservation objectives and outcomes that contribute toward the refuge's legislated purposes. Sources of land conservation funding could be derived from: Land and Water Conservation Fund, Migratory Bird Conservation Fund, North American Wetlands Conservation Fund, State Wildlife Grants, FLP, CRP, and FRPP funds, WRE, Pittman-Robertson and Dingell-Johnson funds, and respective State conservation dollars. In addition, habitat restoration could be accomplished using: Partners for Fish and Wildlife Funds, Habitat Recovery Grants, State Wildlife Grants, Wildlife Habitat Incentive Program, Environment Quality Investment Program, and Coastal Program Funds. Further, additional resource outcomes could be realized using DOT and EPA funding. While many of these funding sources are outside our agency's annual budget allocation process, they could complement Service efforts, potentially decrease Service costs, and provide more options for landowners.

VIII. Proposed Management Direction Under Service Ownership

Land Management Direction

Emphasis will be on promoting habitat that improves and sustains biological diversity, integrity, and ecological function within habitat communities listed below. Additional details are available by CFA in the refuge's final CCP/EIS appendix A which details priority species, habitat targets (type and amount), and related management objectives and strategies. Below we present the general management objective for major habitat types which are outlined in more detail in the final CCP/EIS appendix A.

Forested Upland and Wetland—Protect, manage, and/or restore forested acres within the watershed to assemble resilient forest blocks valuable to conservation targets (i.e. migratory birds of conservation concern).

Riparian Habitat and Floodplain Forest—Protect, manage, and/or restore priority riparian areas, including forested floodplains and river and stream banks to promote habitat connectivity, migration and emigration corridors, and water quality.

Shrub and Grassland—Protect, manage, and/or restore grasslands and shrublands, consistent with site capability, within the watershed to support early successional dependent migratory bird species and NEC.

Agricultural Land —Support the conservation and sustainable use of agricultural land within the watershed to reduce the permanent loss or degradation of current and potential wildlife habitat.

Non-forested Wetlands—Protect, manage, and/or restore non-forested wetlands, including shrub swamps, peatlands, herbaceous marshes, and wet meadows to benefit declining migratory birds.

Water Resources (Rivers, Streams, Lakes, and Ponds)–Protect and restore water quality and in-stream structure, function, and process within the river mainstem and its tributaries, and lakes and ponds to benefit aquatic species, including federally listed threatened and endangered species.

Tidal Wetlands and Adjoining Uplands (Salt, Brackish, and Fresh)—Protect, maintain, and restore tidaly influenced wetlands in the watershed to benefit migrating and wintering waterfowl and other migratory bird species and allow for their landward migration due to climate change.

As land is acquired from willing sellers and becomes a manageable unit, CFA specific habitat management plans will be developed in consultation with the public, partners, and other stakeholders. Species and habitats will be managed to protect ecosystem structure and function in an effort to provide viable habitat for wildlife in the face of climate and land use changes.

In appendix A, we also detail our general management direction for enhancing environmental, interpretive, and outreach programs and their delivery on refuge lands, while also continuing to expand opportunities off-refuge using the WoW Express, BAT Express, Adopt-a-Habitat program, "Conte Corners" and private lands program. In appendix A, we also emphasize our intent to continue robust hunting and fishing programs consistent with state regulations when deemed compatible, and to provide other outdoor recreational opportunities that provide quality, nature-based experiences, and which foster an appreciation for conserving natural resources and garner support for, and promote relevance of, the Refuge System.

IX. Special Considerations

Conservation Plans and Initiatives Guiding Development of the LPP

This proposal will contribute to a variety of important ecoregional landscape plans and partnership initiatives that include the ACJV Implementation Plan and the Black Duck Joint Venture Strategic Plan of the NAWMP, the Northern Atlantic Regional Shorebird Plan, the Waterbird Conservation Plan for the Mid-Atlantic/New England/Maritimes Region, the BCR 14 and 30 Plans, and the State WAPs in Connecticut, Massachusetts, New Hampshire, and Vermont. In all, we consulted over 60 other plans to help develop the land protection actions outlined in this proposal. The myriad of plans confirms the importance of the watershed to many governmental and non-governmental conservation organizations. These plans range from watershed-wide conservation plans to species-specific recovery plans, representing all major taxa, both terrestrial and aquatic. They are summarized in appendix M of the refuge's final EIS/CCP.

International, National, Regional, and State Designations

Landscape conservation actions within the watershed date back to at least 1952 when the Connecticut River Watershed Council was created. Since that time, the watershed has been the subject of attention by many diverse agencies and organizations that recognize its significance as a landscape worth conserving. International, national, and state conservation and recreation designations recognize many attributes within the watershed for exceptional, high quality wildlife and fish habitat, as recreation destinations, for its working landscapes and many cultural and historic resources, including:

- The river and the watershed were designated by the Secretary of the Interior as the Nation's first, and only, National Blueway on May 24, 2012.
- The river was designated as an American Heritage River on July 30, 1998.
- The tidal wetlands complex in the vicinity of where the river meets the Long Island Sound was designated as a Ramsar Wetland of International Importance (under the Ramsar Convention) on October 14, 1994.
- Eleven areas with high quality habitat that are vital to birds and other biota are recognized by the National Audubon Society as Important Bird Areas (IBA). There is at least one IBA in each of the four States within the watershed. The refuge's Pondicherry and Nulhegan Basin Divisions include recognized IBAs.
- The river mainstem, from the Massachusetts stateline north to about Claremont, New Hampshire, is a NAWMP focus area and an IBA.
- Fourteen areas in or intersecting the watershed are designated as National Natural Landmarks, including a portion of the refuge's Pondicherry Division in New Hampshire and the Fannie Stebbins Unit in Massachusetts.
- The watershed is also a focus for the NALCC, the Northeast Region of the Service, and it is part of one of the five (5) large iconic landscapes identified by the Administration and a focus for the DOI, Department of Agriculture, and the Army Corps of Engineers.

X. Socioeconomic and Cultural Impacts

Socioeconomic Impacts

We do not predict significant adverse socioeconomic or cultural impacts as a result of this proposal or other components of the Service-preferred alternative C in the final CCP/EIS. We anticipate there will be an overall positive effect on the socioeconomic environment as a result of the action outlined in this document. If the Service protects lands identified in this proposal over an extended period (decades) of time, we believe positive benefits for communities in the watershed will include: increased property values in the vicinity of the conserved properties, increased watershed protection, maintenance of many traditional uses, increased opportunities for outdoor public use activities, and increased revenues for local businesses from refuge visitors who participate in hunting, fishing, wildlife observation, and other outdoor activities. Recreational use on national wildlife refuges nationally generated almost $2.4 billion in total economic activity during fiscal year 2011, according to the Service's *Banking on Nature 2013: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation* report (Carver and Caudill 2013).

According to the Banking on Nature study, nearly 46.5 million people visited national wildlife refuges in 2011, supporting almost 35,000 jobs and producing about $793 million in employment income. In addition, recreational spending on refuges generated nearly $343 million in tax revenue at the local, county, State, and Federal levels. An estimated 87 percent (87%) of refuge visitors travel from outside the local area (Carver and Caudill 2013).

The potential exists for some adverse impacts, namely a potential decline in tax revenue to local governments (as lands come under Service ownership). However, this decline may or may not occur, since those lost tax

revenues could be offset partially by the Refuge Revenue Sharing (RRS) Program (*http://www.fws.gov/refuges/realty/rrs.html;* accessed October 2016). Funding of the RRS program will be dependent on future congressional appropriations and receipts generated by the sale of refuge products and access.

For refuge CCP planning, we enlisted the assistance of economists with the USGS Fort Collins Science Center, to assess the economic impact of the alternatives evaluated in the final CCP/EIS, including this land protection proposal. The full report is included as appendix I of the final CCP/EIS. Among other details and analysis, the report includes a description of the current economic setting and illustrates the refuge's economic contribution to local communities. The refuge management activities of greatest, direct economic impact in the watershed are:

- Refuge purchases of goods and services within the local communities.
- Refuge staff salary spending.
- Refuge visitor spending in the local communities.
- Revenues generated from timber harvesting for habitat management on the refuge.
- Refuge land purchases and how the equity is reinvested to affect local tax revenue.

The USGS economic report focuses on describing and assessing six focal sub-regions within the watershed. The sub-regions incorporate 11 counties that make up the bulk of the watershed and are central to the refuge's existing and proposed future land base. The sub regions described are:

- Northern Sub-Region: Essex County, Vermont, and Coos County, New Hampshire.
- White River Junction Sub-Region: Orange County, Vermont, Windsor County, Vermont, and Grafton County, New Hampshire.
- Tri-State Border Sub-Region: Windham County, Vermont, Cheshire County, New Hampshire, and Franklin County, Massachusetts.
- Greater Amherst Sub-Region: Hampshire County, Massachusetts.
- Greater Hartford Sub-Region: Hartford County, Connecticut.
- Southern Connecticut Sub-Region: Middlesex County, Connecticut.

Section 1 of the USGS report provides a description of the various regional economies and select local communities that comprise the watershed and specific management areas for the refuge. Section 2 is a qualitative discussion regarding the current and potential economic and fiscal impacts generated by the refuge from additional land acquisition. It also provides an in-depth discussion of ecosystem services and relative values in a qualitative manner, which we summarize below. Section 3 describes the methods used to conduct a regional economic impact analysis, followed by an analysis of the final CCP/EIS management strategies that could affect the local economy.

The report quantifies current contributions of the refuge to regional economies, but emphasizes that the economic impacts from additional land acquisition are highly dependent on the timing, amount, and distribution of those acquisitions. With the high level of uncertainty, and the many variables at play, it is not possible to precisely predict the economic impacts from a refuge expansion thus they are presented qualitatively. The authors predict that over time, any possible losses in local government revenues from property taxes, or from losses from agricultural and forestry production, will be at least partially offset by the gains from refuge management activities and spending within other economic sectors (food, recreation, and other service sectors) generated through refuge visitation. There is no expectation of a significant impact on the economies of any subregion as a result of the proposed refuge expansion. However, in some of the more forestry based economies, it could result in some diversification in the economic base in the service sectors.

While quantifying individual ecosystem service values was beyond the scope of their report, USGS authors report notes that the economic value of a refuge encompasses more than just the direct impacts to the regional economy. Refuges and other conservation areas also provide substantial nonmarket values (values for items not exchanged in established markets) such as conserving threatened and endangered species, preserving wetlands, developing future generations of citizen stewards and outdoor enthusiasts, and adding stability to

the ecosystem (Caudill and Henderson 2003). Other services include water supply and quality, flood protection, aesthetic beauty, and quality of life values. These natural "services" provided by the conserved landscape can be extremely valuable to one's well-being and to society. A study by Ingraham and Foster (2008) attempted to value the bundle of ecosystem services provided by national wildlife refuges in the contiguous U.S. The authors determined that various habitats within the Refuge System were providing services valued at $32.3 billion (2011 dollars) per year, or an average of $2,900 per acre per year. As such, these ecosystem service values can be substantial and should not be overlooked or underestimated.

Cultural Resources

Refuge lands will increase protection for cultural resources in the area. Service ownership will protect unidentified or undeveloped cultural sites from disturbance or destruction. Partnering with Native American Tribal Governments will aid in identifying and protecting sites, cultural landscapes, and specific biota of importance to the tribe(s). Potential interpretation and environmental education programs could continue to promote public understanding and appreciation of the area's rich cultural resources. Taken together, we believe there to be a net positive effect to the cultural and historic resources of the region.

Impacts on Other Community Resources

Many other values associated with the lands and waters in the watershed are important to communities. We mention below three resource values that would be protected and enhanced through our proposal.

Historical and Cultural Conservation

The river has a long and storied history in the development of both Native and settlement cultures and played a pivotal role in the development of New England's rural commerce. The proposal is respectful of the working landscape tradition and the New England Governors' recent compact to sustain forestry and agriculture as a priority within this large working landscape. A concerted effort will be made by refuge staff to promote enrollment of working forests and farms into the appropriate voluntary landowner incentive program.

River and Riparian Conservation and Restoration

The river is perhaps New England's richest, bordered by some of the region's most productive soils and floodplain forest habitat. Consistent with the refuge's legislated purposes, the removal of barriers to the passage of aquatic species and improvements to aquatic and riparian habitat, are a prominent and priority focus for the refuge on public and private land. Many conservation organizations in the watershed view floodplain restoration as a priority, and many active efforts are underway. We will continue to support those efforts and assist in strategically planning where additional work to restore not only floodplain forests, but riparian forest, and natural water regimes (quality, rate, and timing) within the watershed.

Recreational Opportunities

Providing and maintaining recreational opportunities, especially access to the river, is of paramount concern to local communities. This would be a priority on lands within our proposal, as it has been to-date on existing refuge lands. We would also continue to provide opportunities for fishing, hunting, wildlife observation, photography, environmental education, and interpretation. Snowmobiling is very popular in various regions of the watershed, and is permitted on refuge lands, where appropriate, compatible, and where the trail is part of an existing State-recognized trail system.

The proposal would enhance protection of the Appalachian Trail which meanders through the northern-half of the watershed, making its way through the impressive White Mountain National Forest in New Hampshire. Land acquisition would also enhance tourism in local communities. The middle portion of the watershed in Massachusetts is bordered by the Berkshire Mountains to the west, which have been attracting tourists and recreationists for decades. Towns in the southern portion near the mouth of the river heavily promote recreation opportunities associated with saltwater experiences.

Expanding Service ownership would increase public opportunities for appropriate and compatible wildlife-dependent recreation. In particular, hunting, fishing, wildlife observation, nature photography, environmental education, and interpretation would be encouraged where compatible. Increased recreational opportunities on and adjacent to refuge land could protect a dependable destination to accommodate the demand for traditional outdoor activities, maintaining elements of the local culture while attracting visitors, and potentially, an additional source of revenue for local and regional economies.

XI. Public Review of Proposal

Public Scoping

The Service recognizes that effective and responsive conservation begins with community involvement. We announced the initiation of the Conte Refuge CCP/EIS planning process and a public scoping and comment period through a *Federal Register* notice of intent on October 11, 2006. During this step, we sought public involvement in the planning process. From the responses we received, we developed a list of points of interest, challenges, opportunities, or any other item requiring a management decision.

During the public and partner scoping period we used the following techniques to ensure we reached out to a wide variety of stakeholders and obtain all of the points of interest, challenges, and opportunities identified by the public, our conservation partners, and other Service program staff:

- Distributed an "issues workbook" which asked recipients questions about their interest and concerns related to the refuge.
- Held public scoping meetings throughout the watershed where we explained the planning process and gathered comments. We held 9 meetings in the fall of 2006 and then another 12 in the winter of 2007 to 2008.
- Coordinated CCP planning team meetings with State fish and wildlife agency representatives and invited guest experts to share information.
- Attended meetings sponsored by the Friends of Conte Refuge and provided updates on CCP planning.
- Coordinated meetings with other Service programs and other Federal and State agencies.
- Responded to individual requests, or those from organized groups, to provide CCP planning updates.

Public Review and Comment of Draft Plan

The draft CCP/LPP/EIS was made available for public review and comment for a period of 90 days from August 18 to November 16, 2015. Concurrently, a series of 14 information meetings were convened in the vicinity of CFAs to afford an opportunity for the affected public to ask questions and obtain additional information. In addition, four public hearings were held in each of the four states in the watershed. In each of the information meetings, we requested that prospective commenters provide us with as much rationale as possible, so that we could be more specific in our responses.

All comments received were posted to the refuge website and were viewable by anyone accessing the site. Comments received during the comment period were used to revise and refine the final CCP/EIS. The Service's response to public comments is provided as appendix O to the final plan. The final CCP/EIS will be distributed for an additional 30-day review period. Notice of its availability will be published in the *Federal Register*. The final decision, which is detailed in a Record of Decision, will also be published as a notice in the *Federal Register* following the review period.

Attachment I

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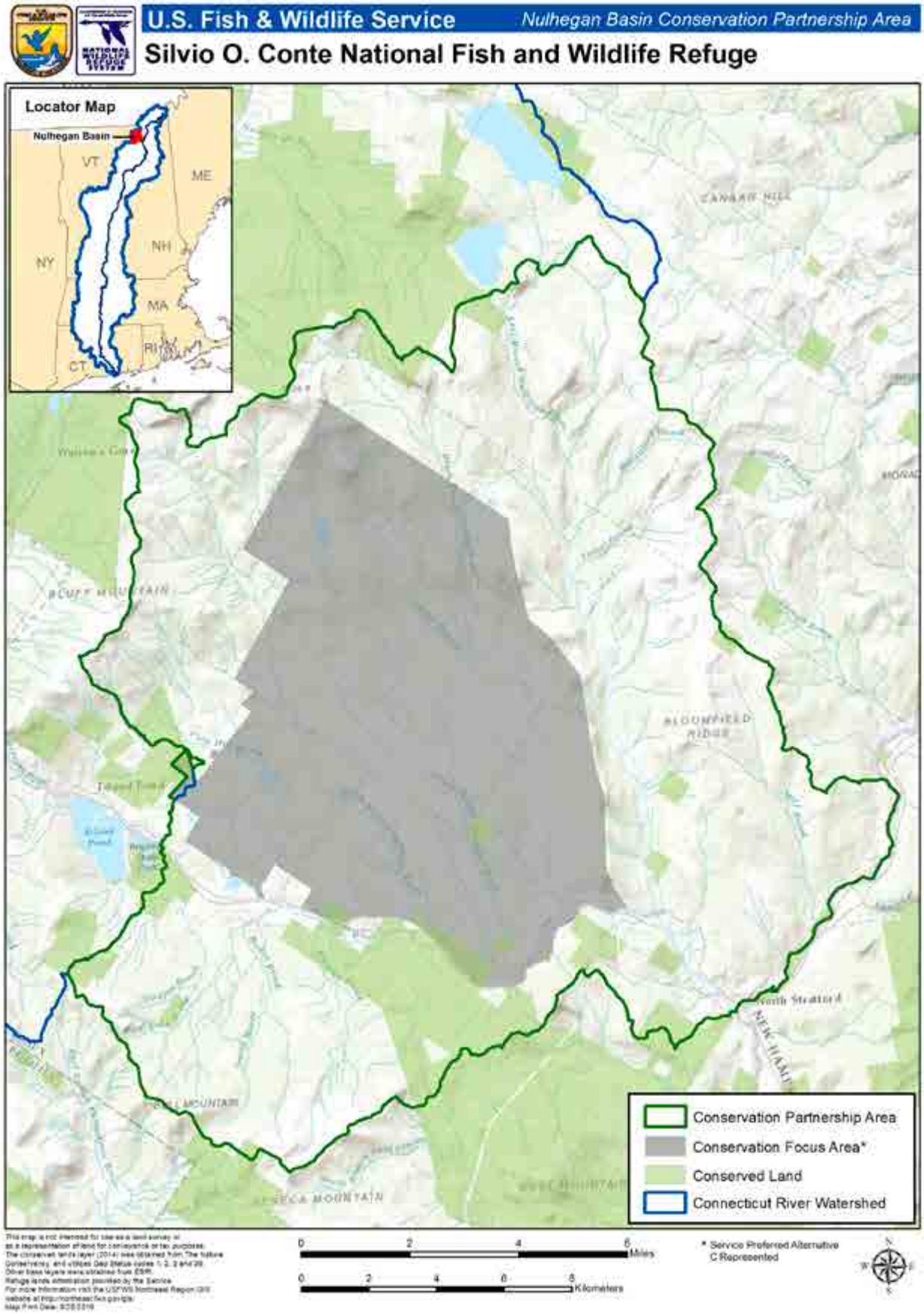
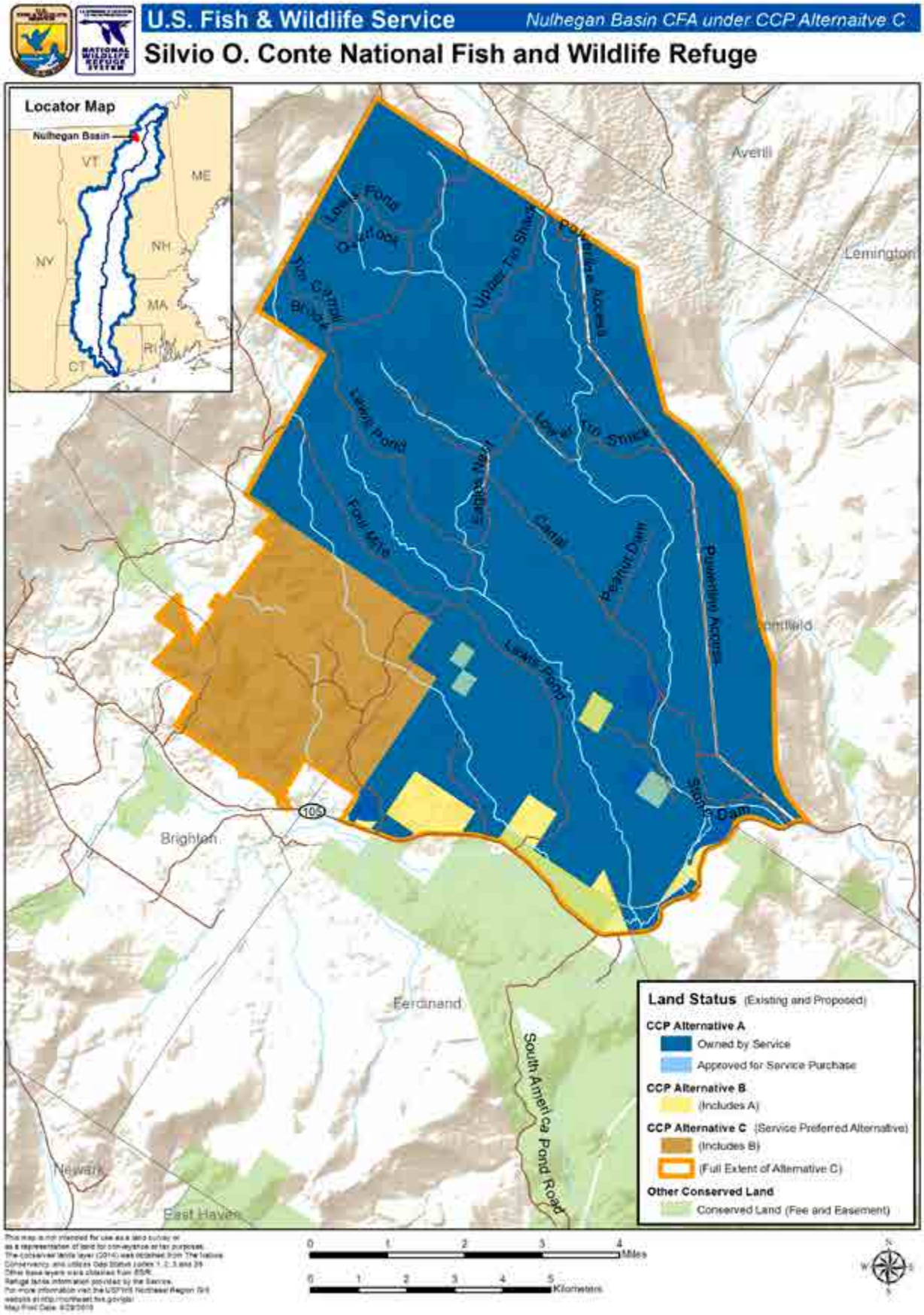
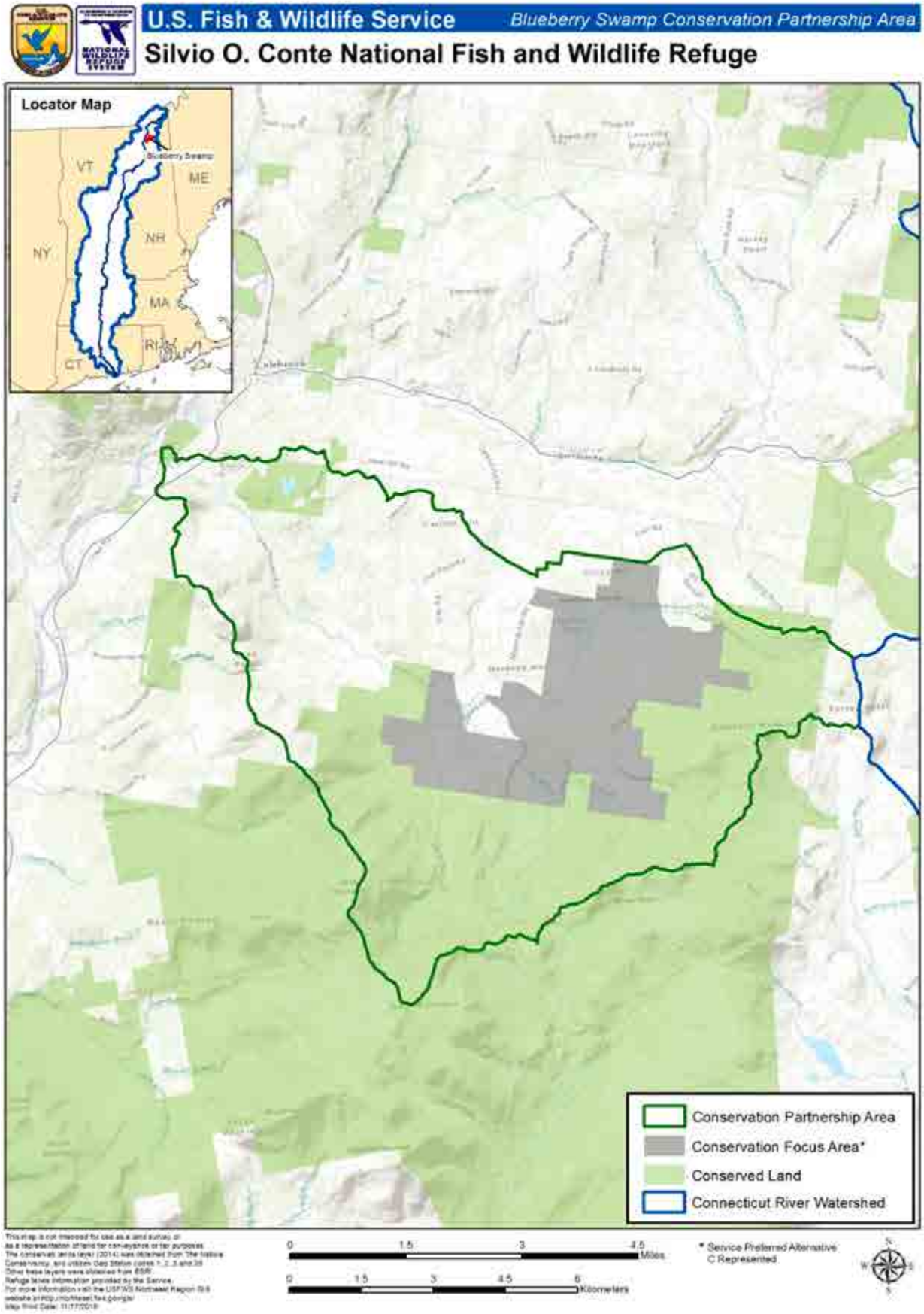


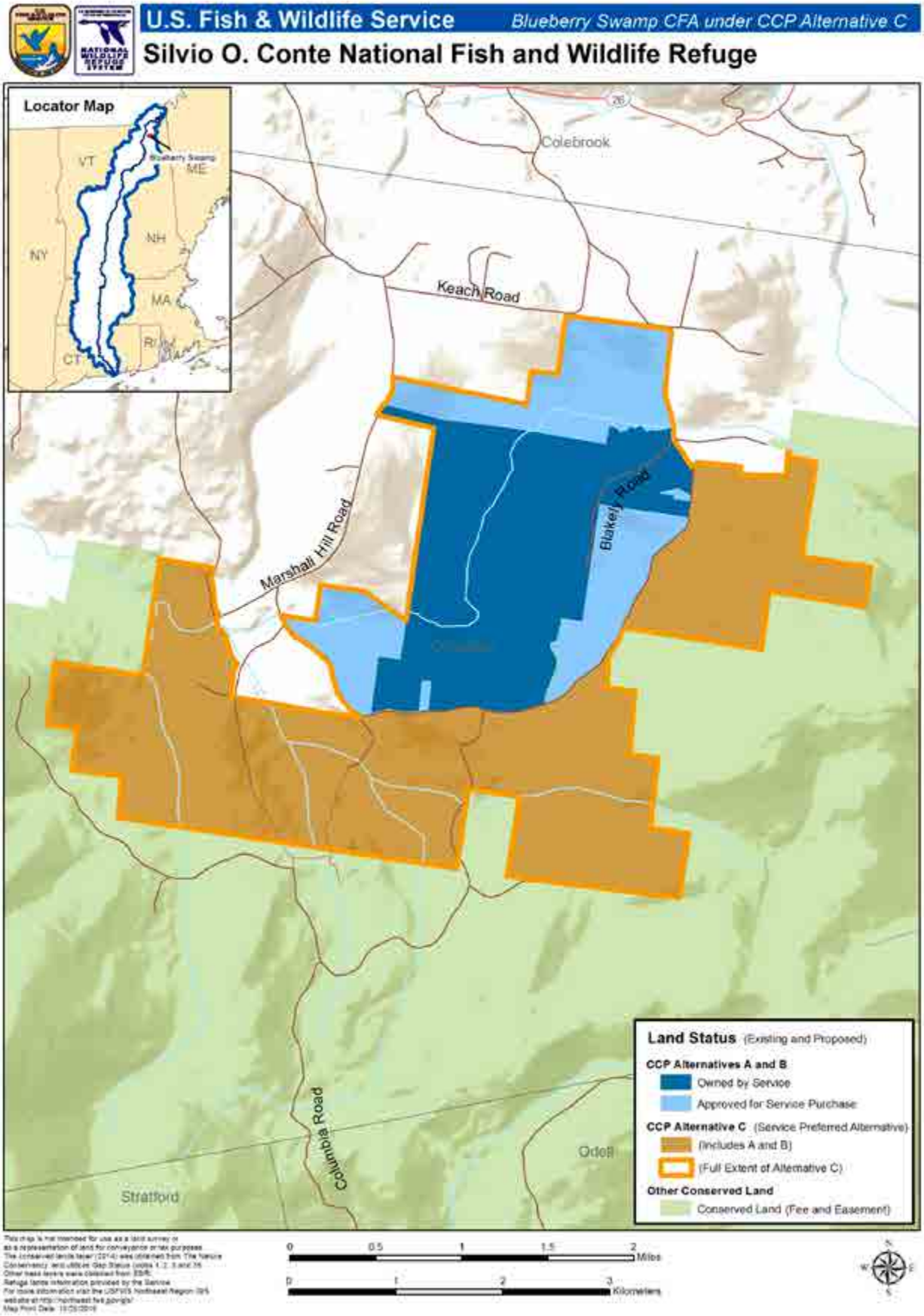
Map CI.2 Nulhegan Basin CFA under CCP Alternative C



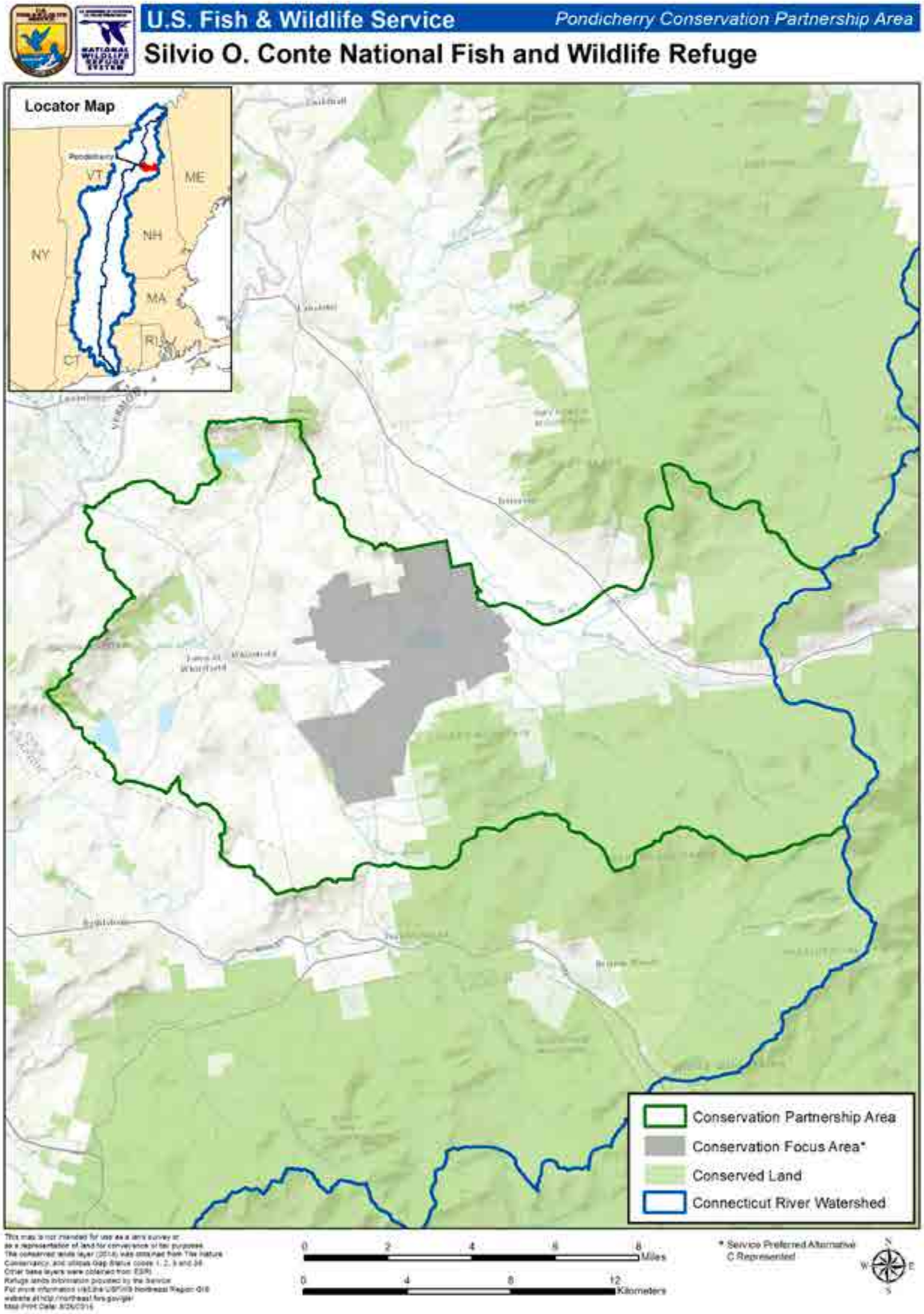
Map CI.3 Blueberry Swamp Conservation Partnership Area



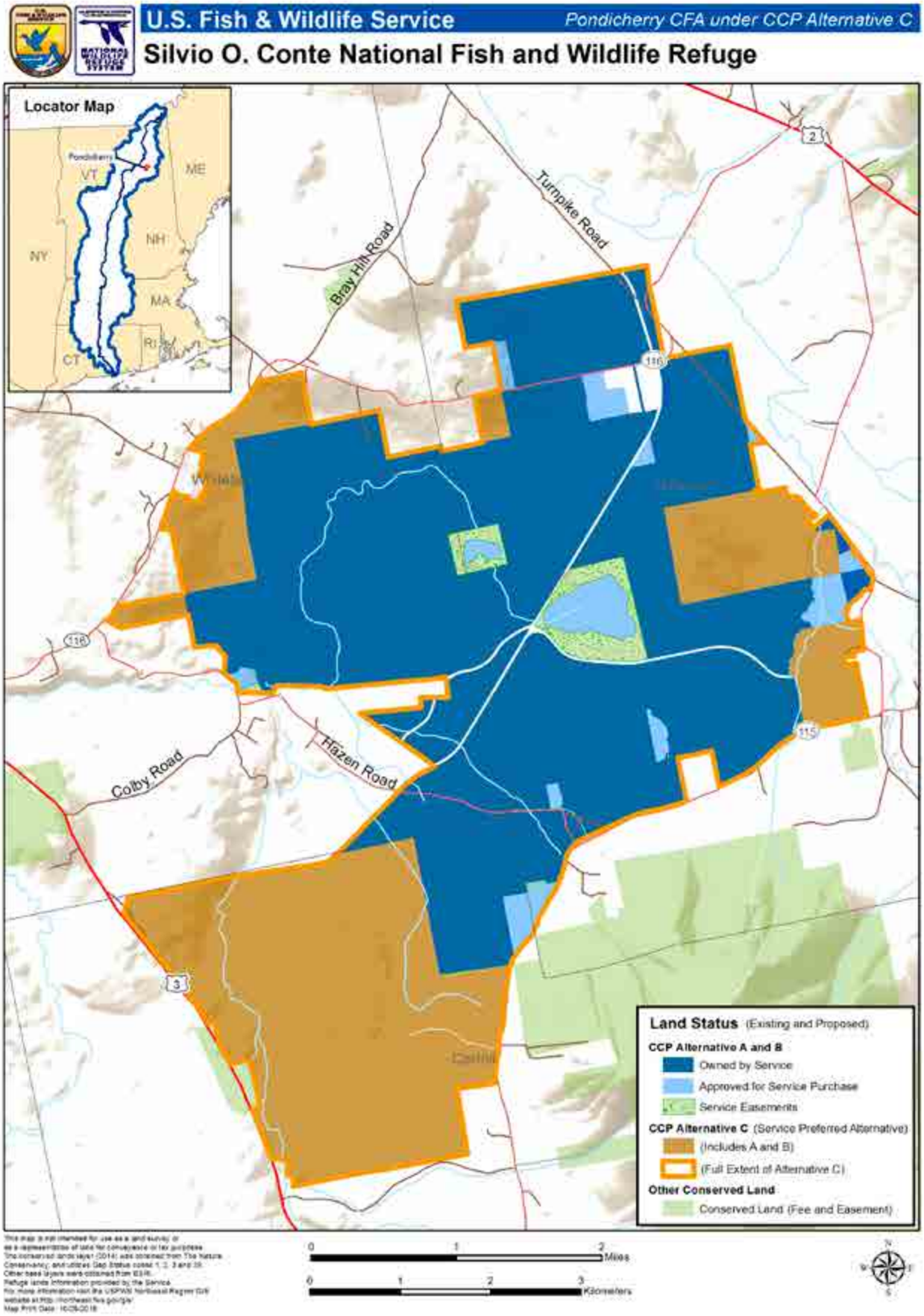
Map CI.4 Blueberry Swamp CFA under CCP Alternative C



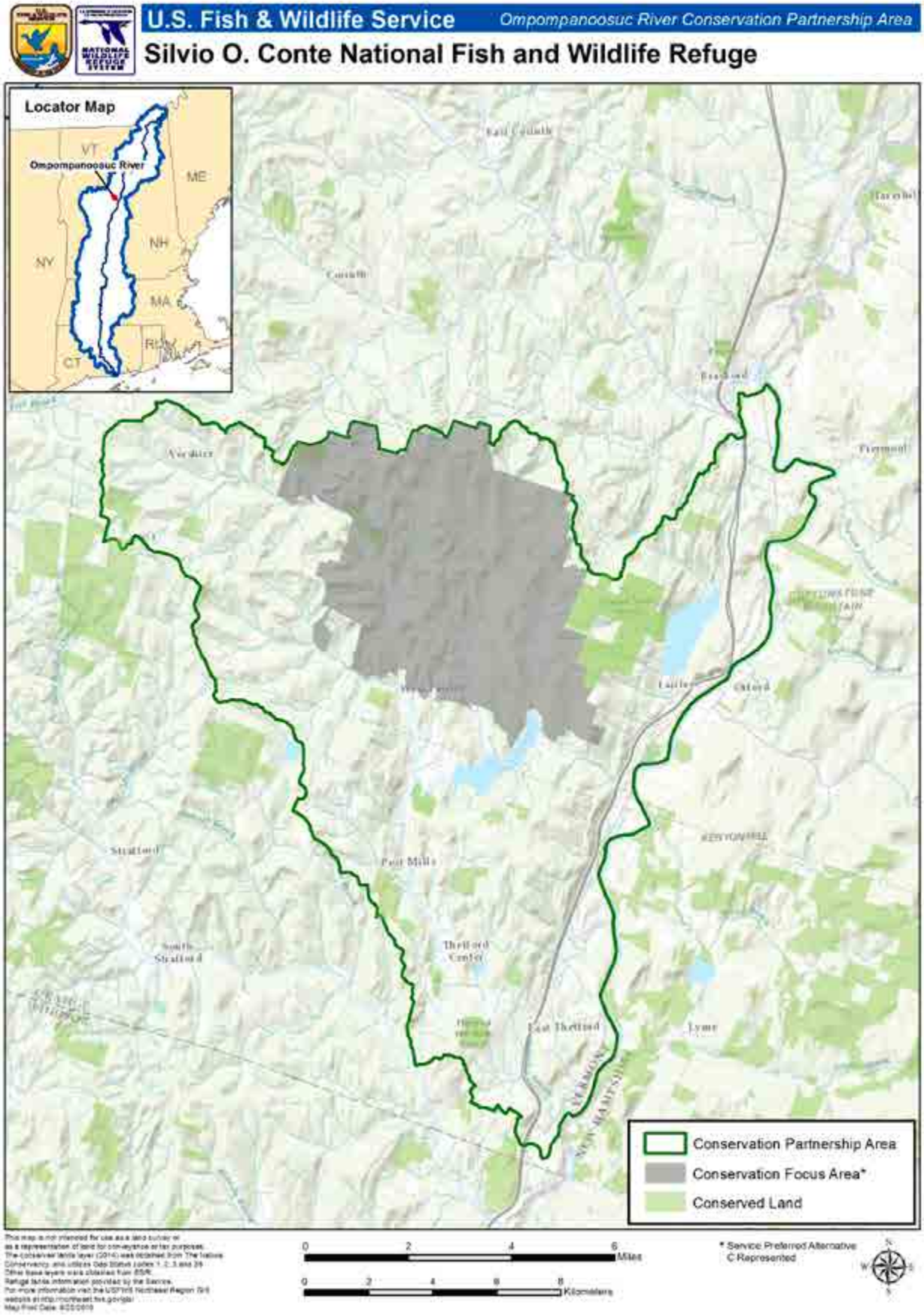
Map CI.5 Pondicherry Conservation Partnership Area



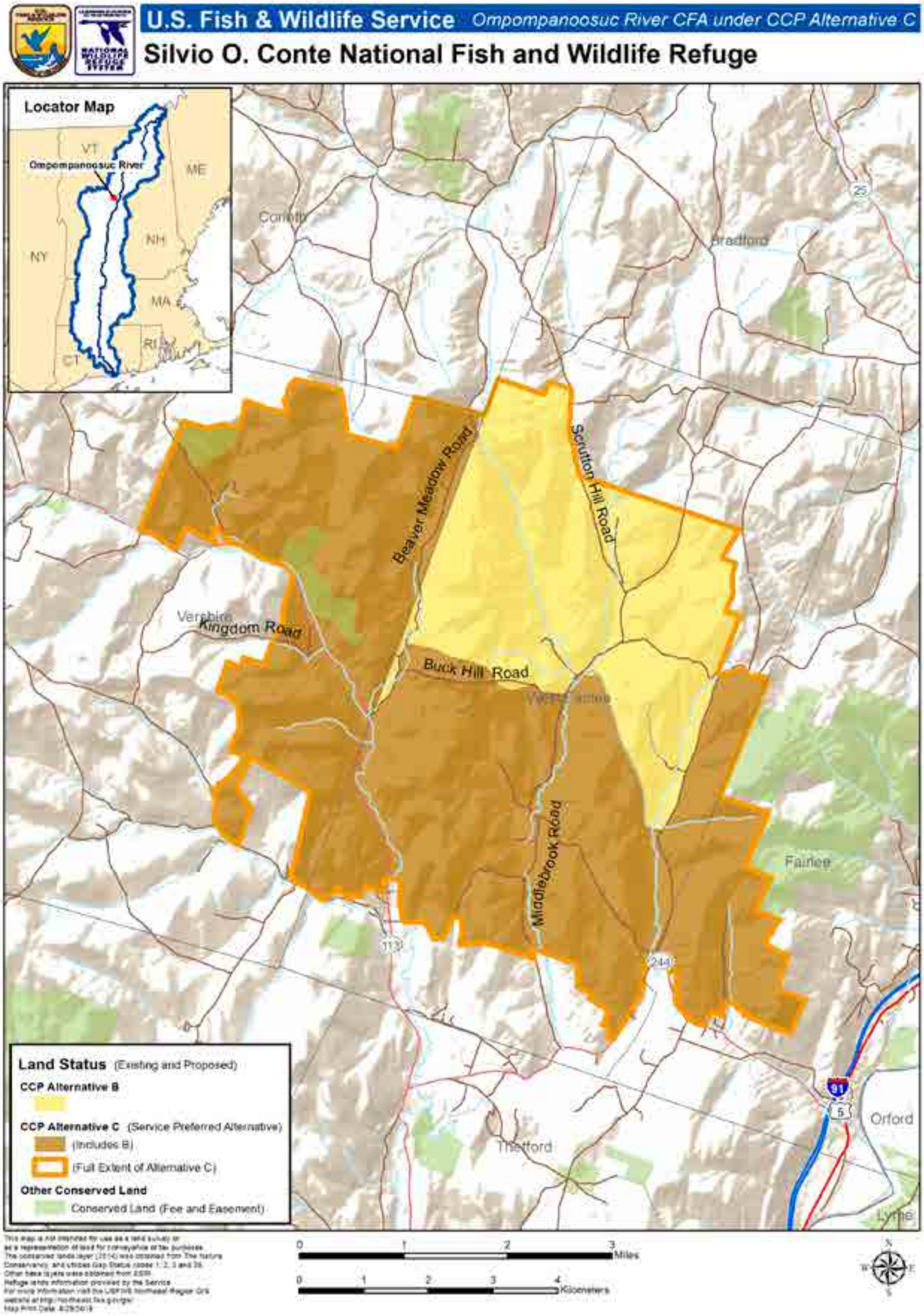
Map CI.6 Pondicherry CFA under CCP Alternative C



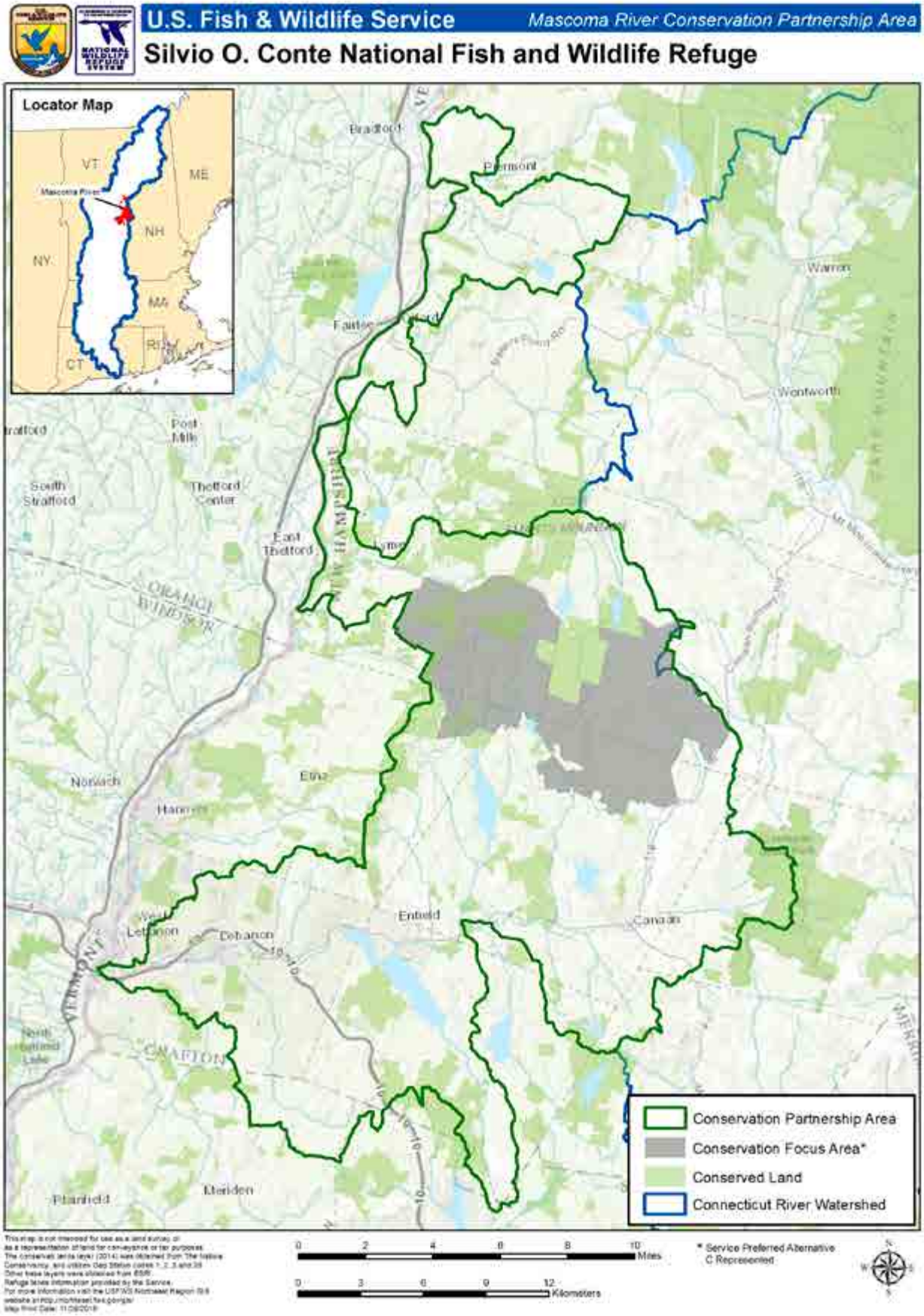
Map CI.7 Ompompanoosuc River Conservation Partnership Area



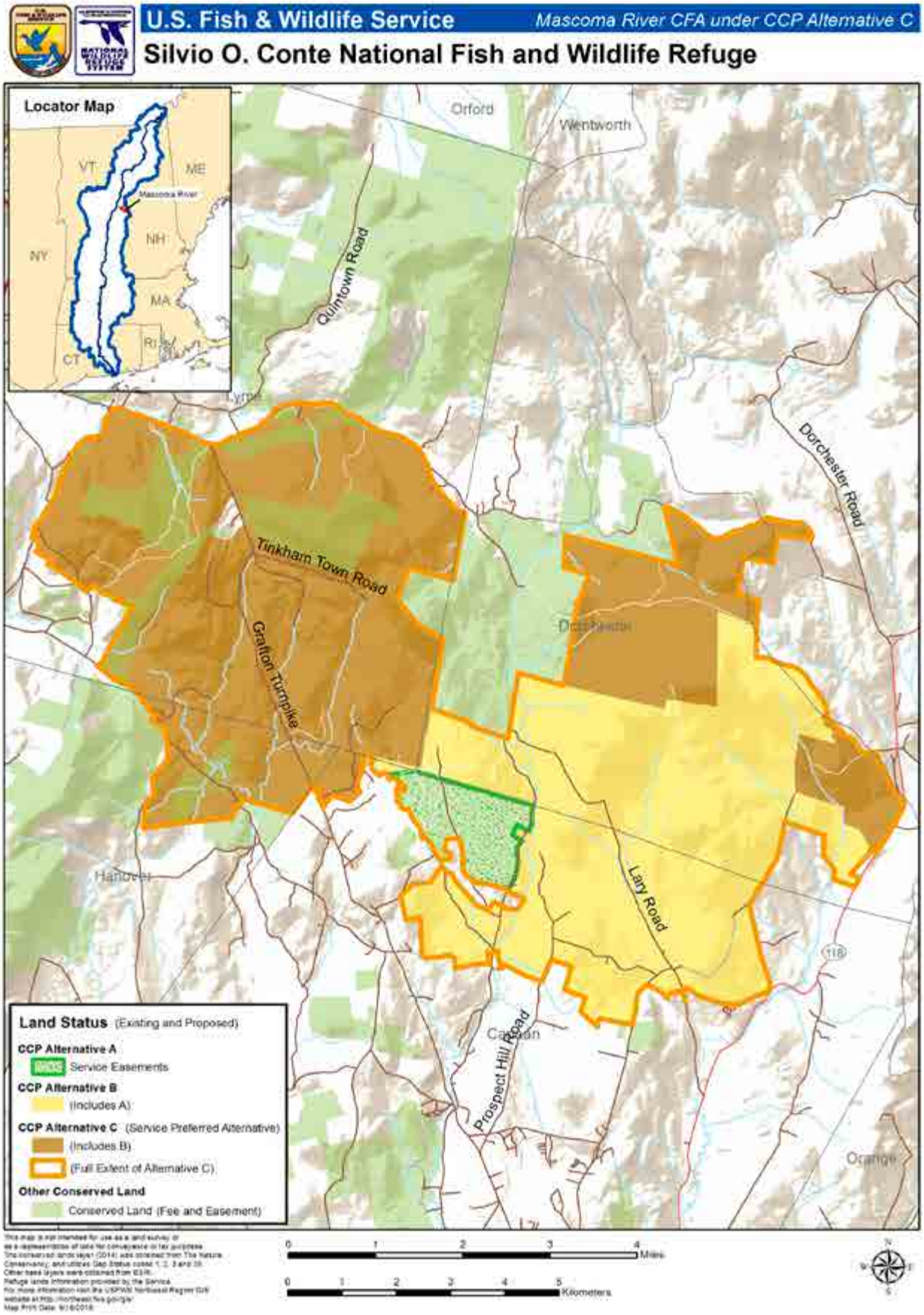
Map CI.8 Ompompanoosuc River CFA under CCP Alternative C



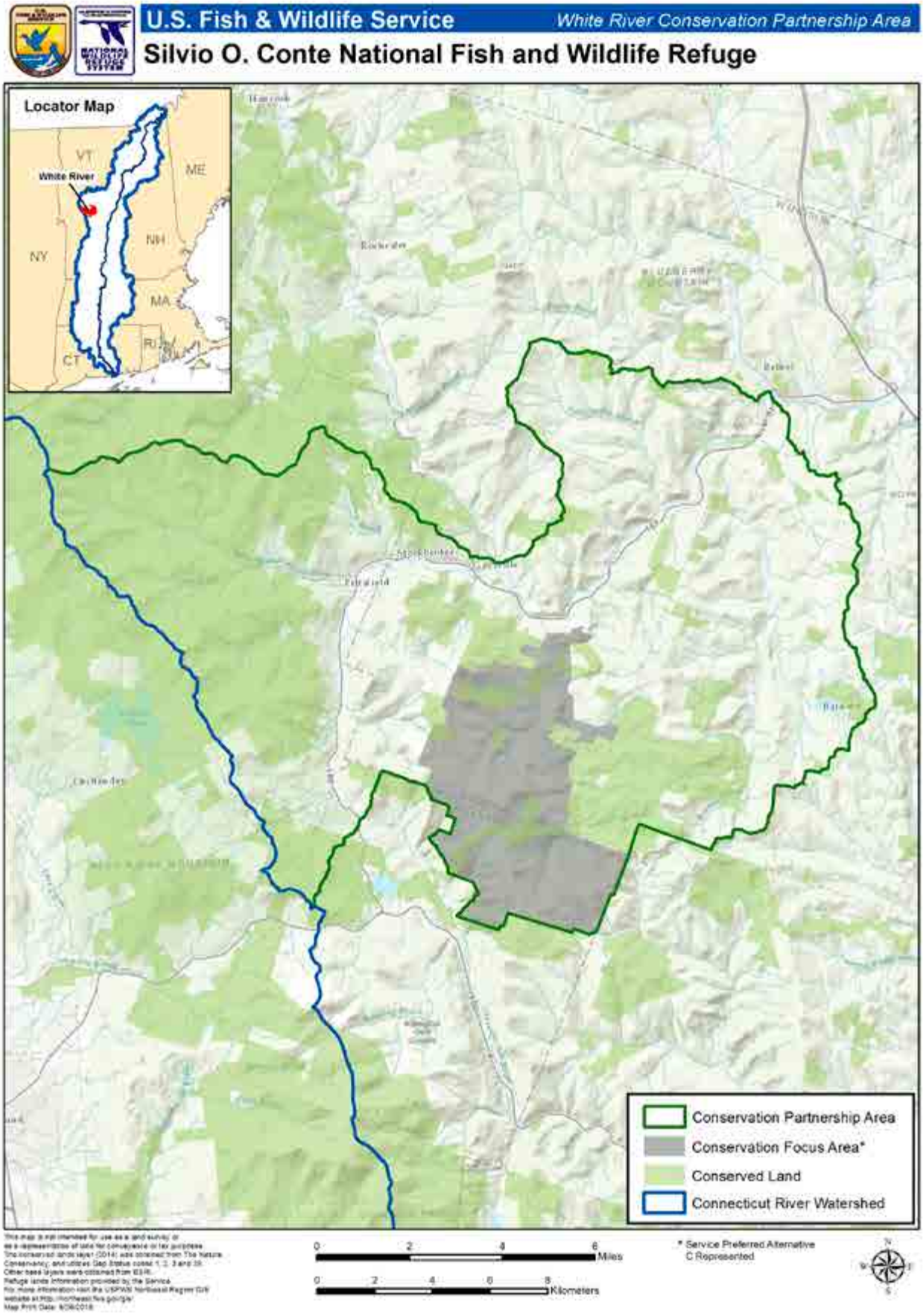
Map CI.9 Mascoma Conservation Partnership Area



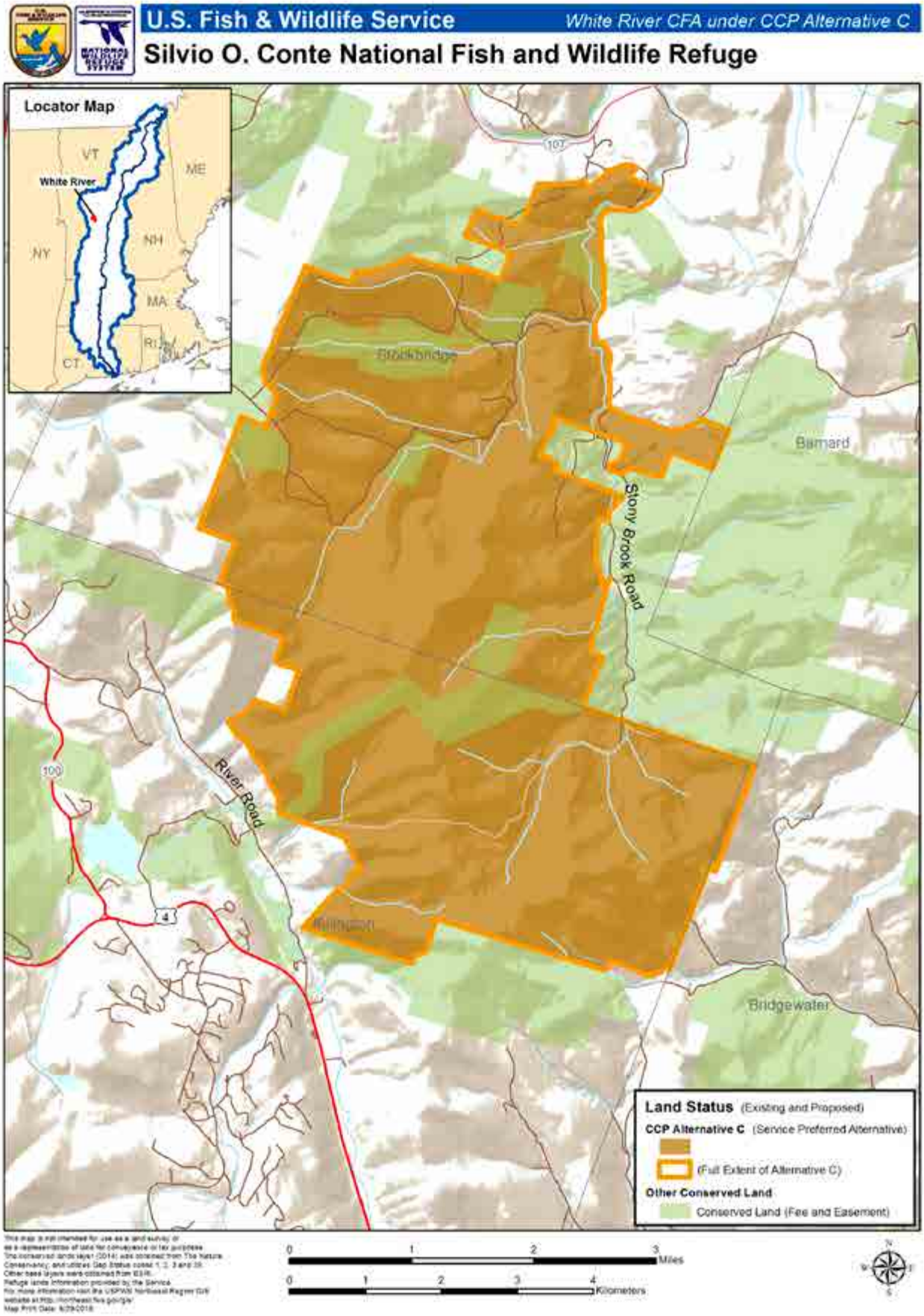
Map CI.10 Mascoma CFA under CCP Alternative C



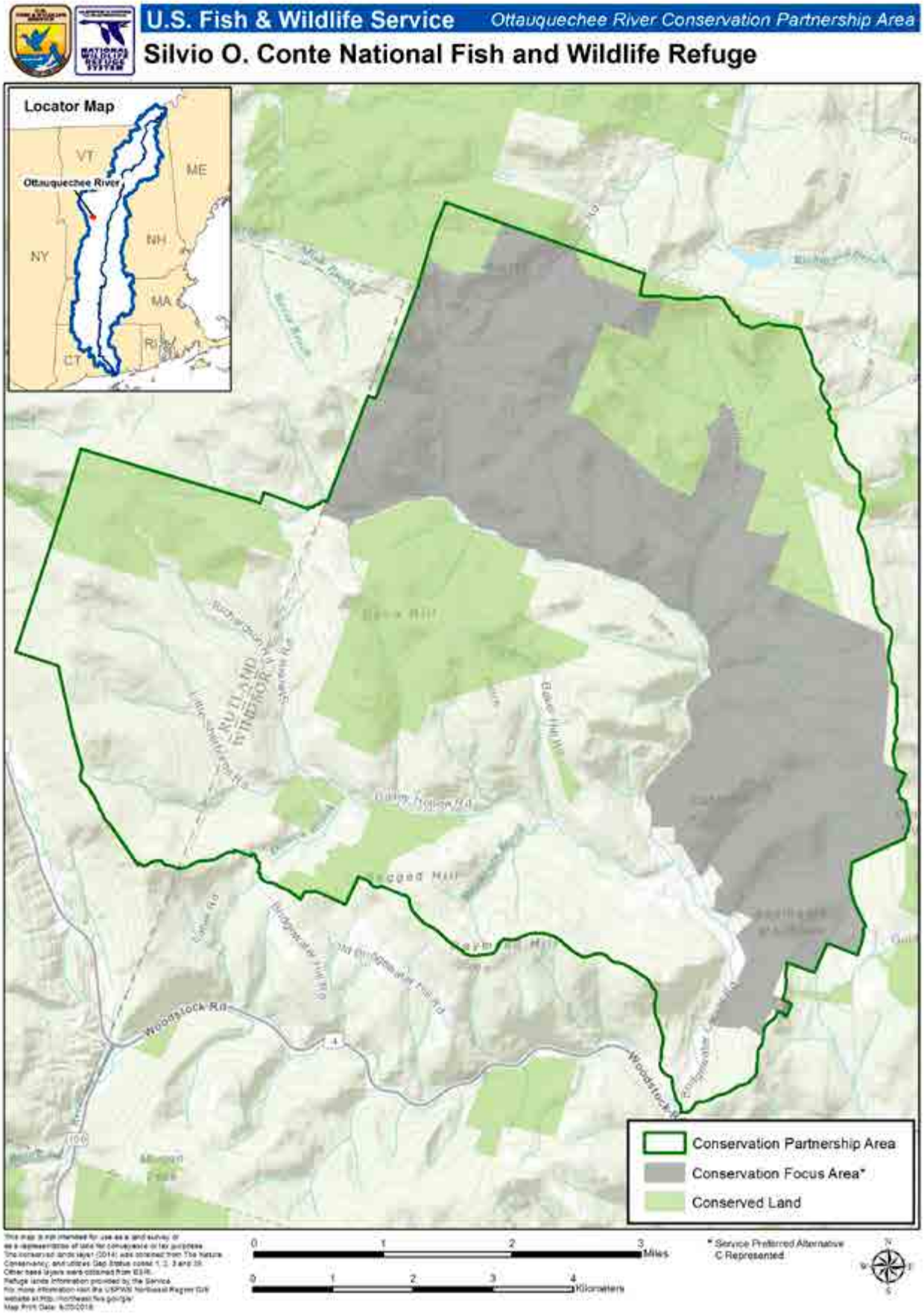
Map CI.11 White River Conservation Partnership Area



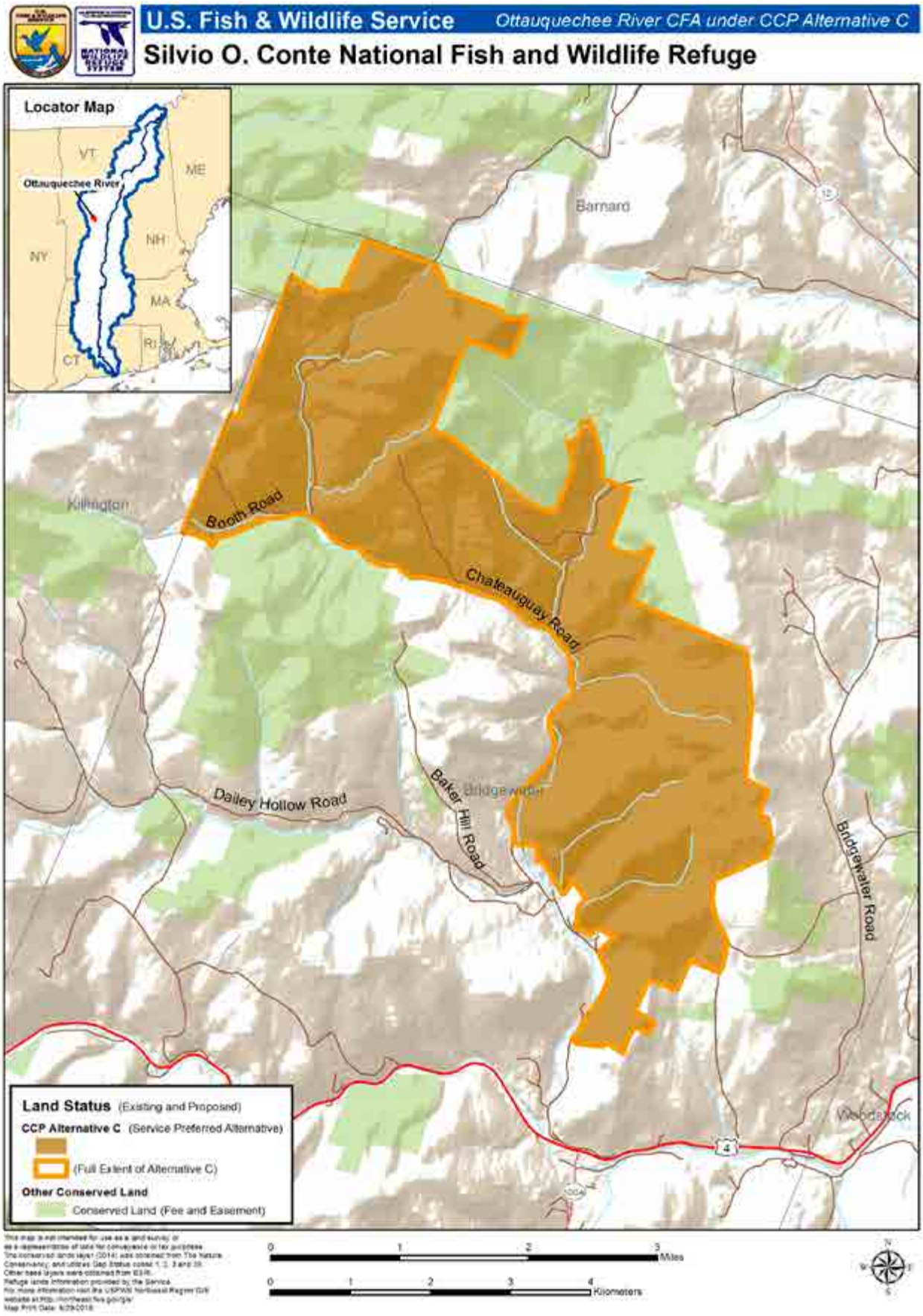
Map CI.12 White River CFA under CCP Alternative C



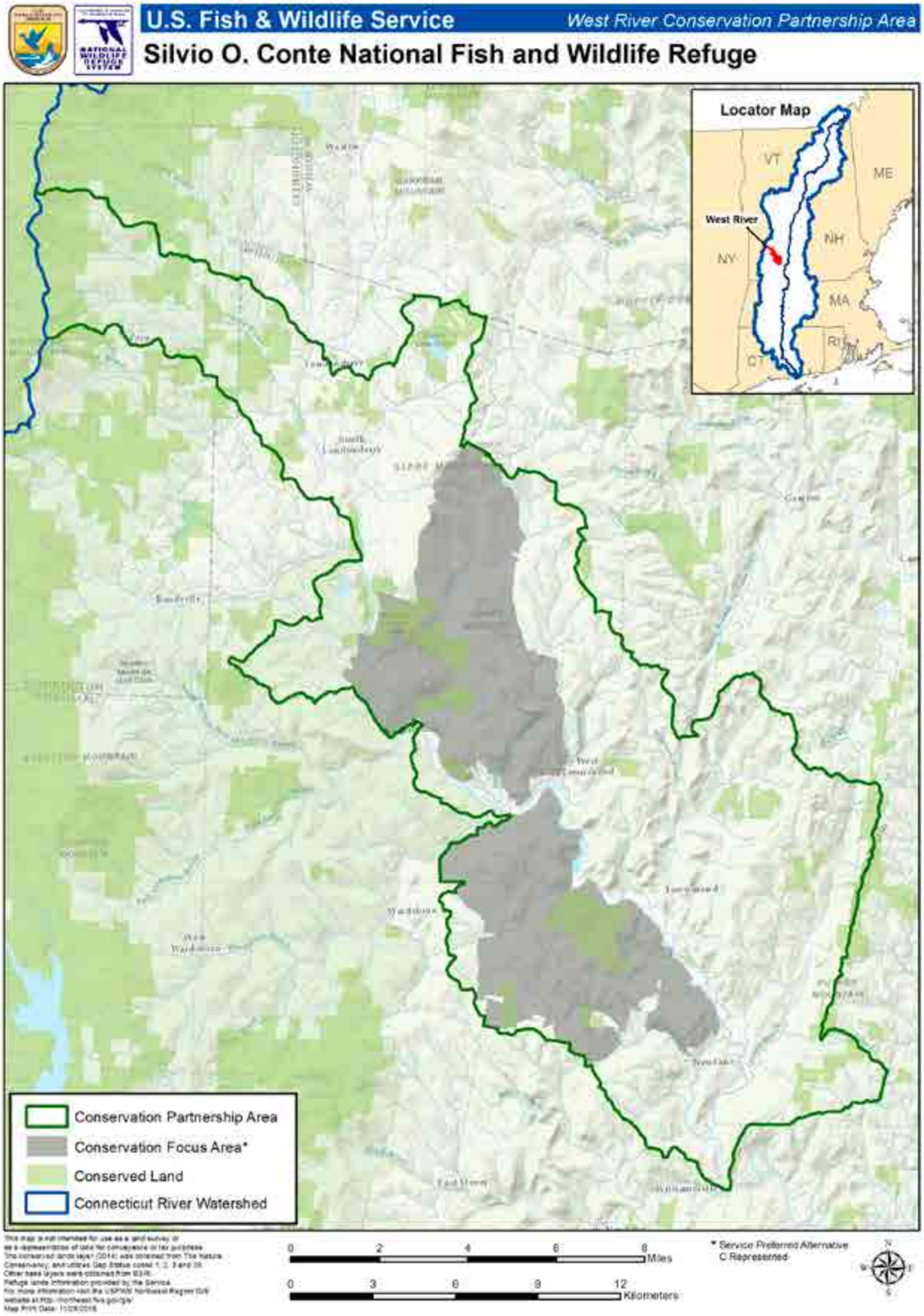
Map CI.13 Ottauquechee River Conservation Partnership Area



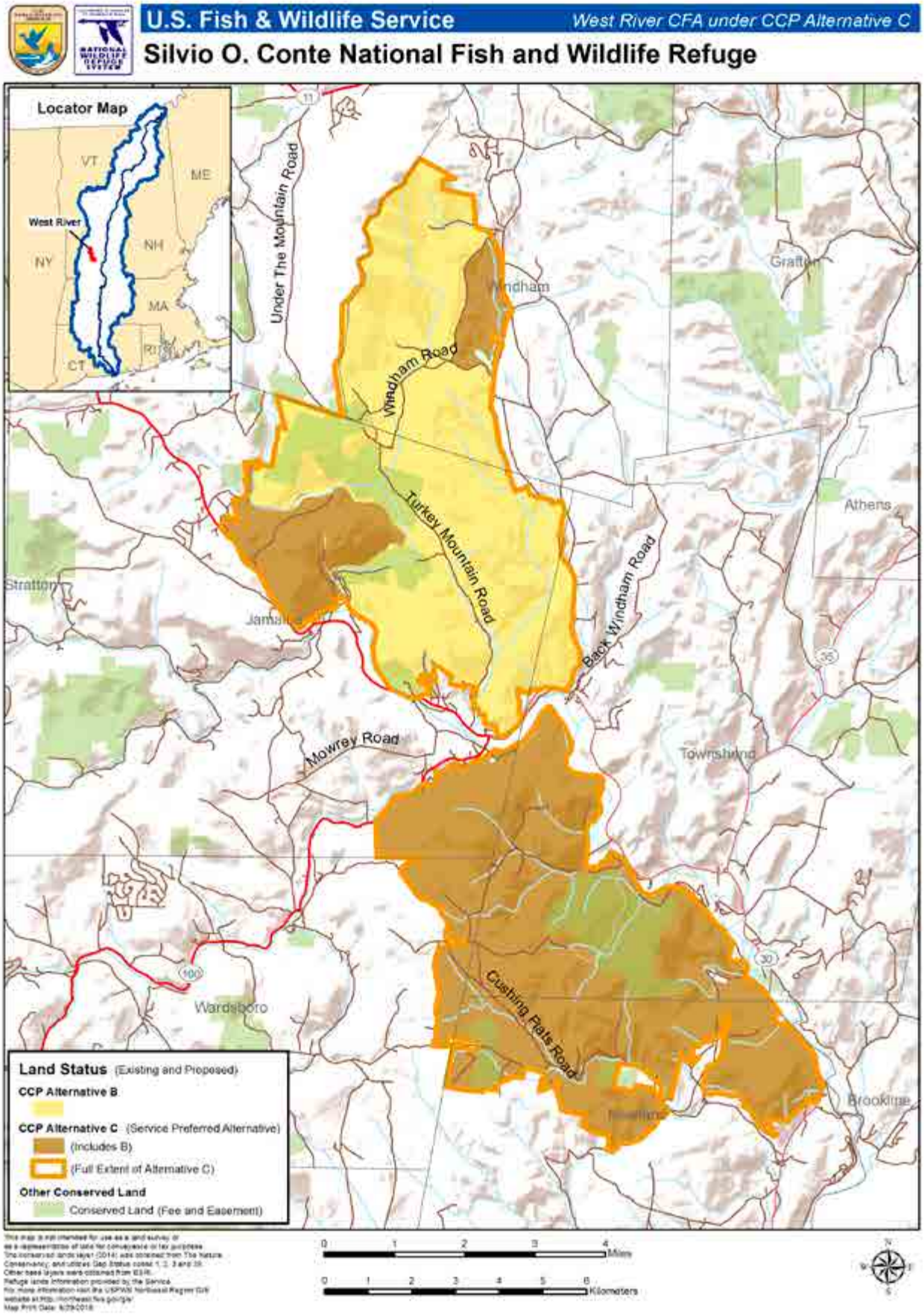
Map CI.14 Ottauquechee River CFA under CCP Alternative C



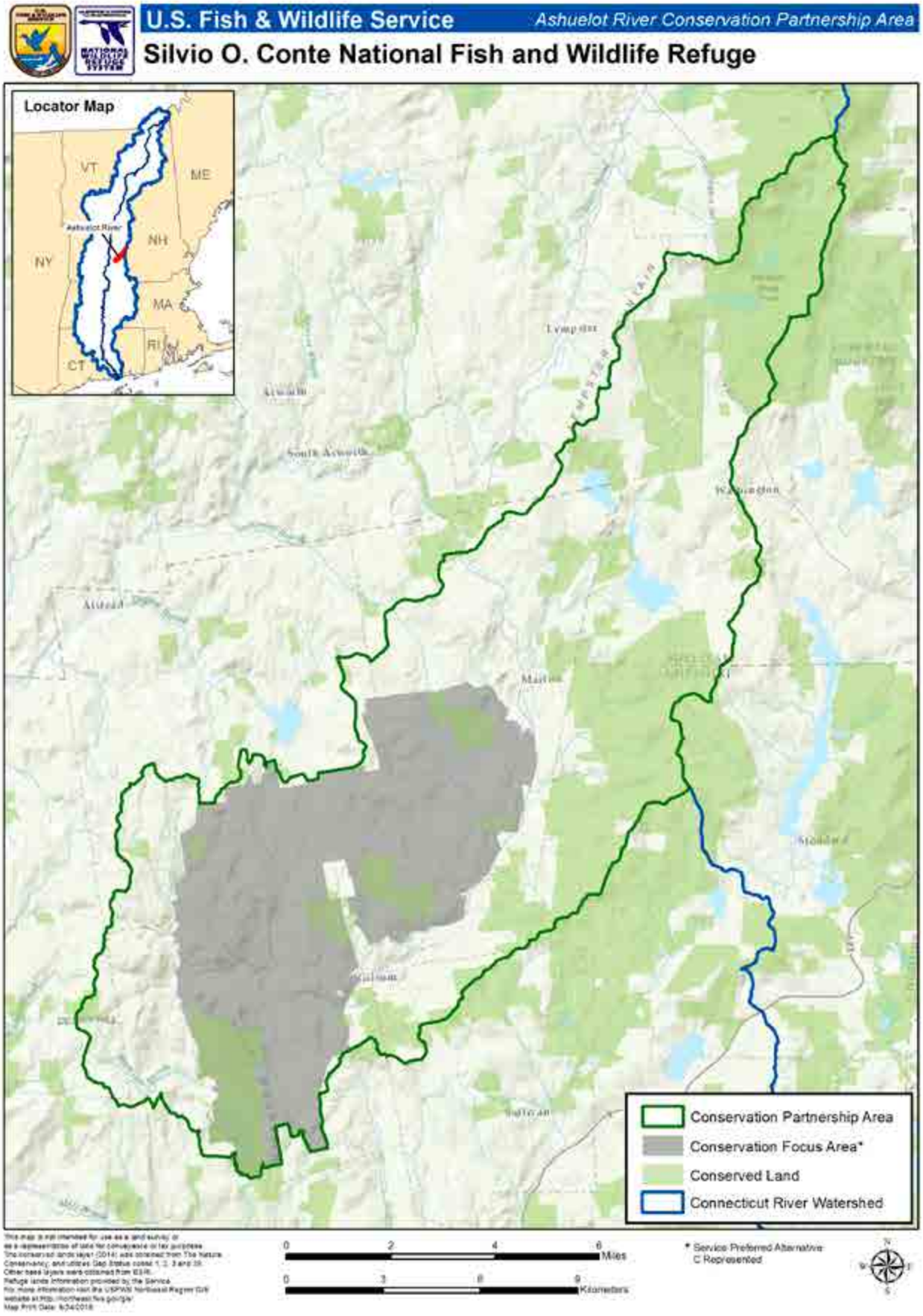
Map CI.15 West River Conservation Partnership Area



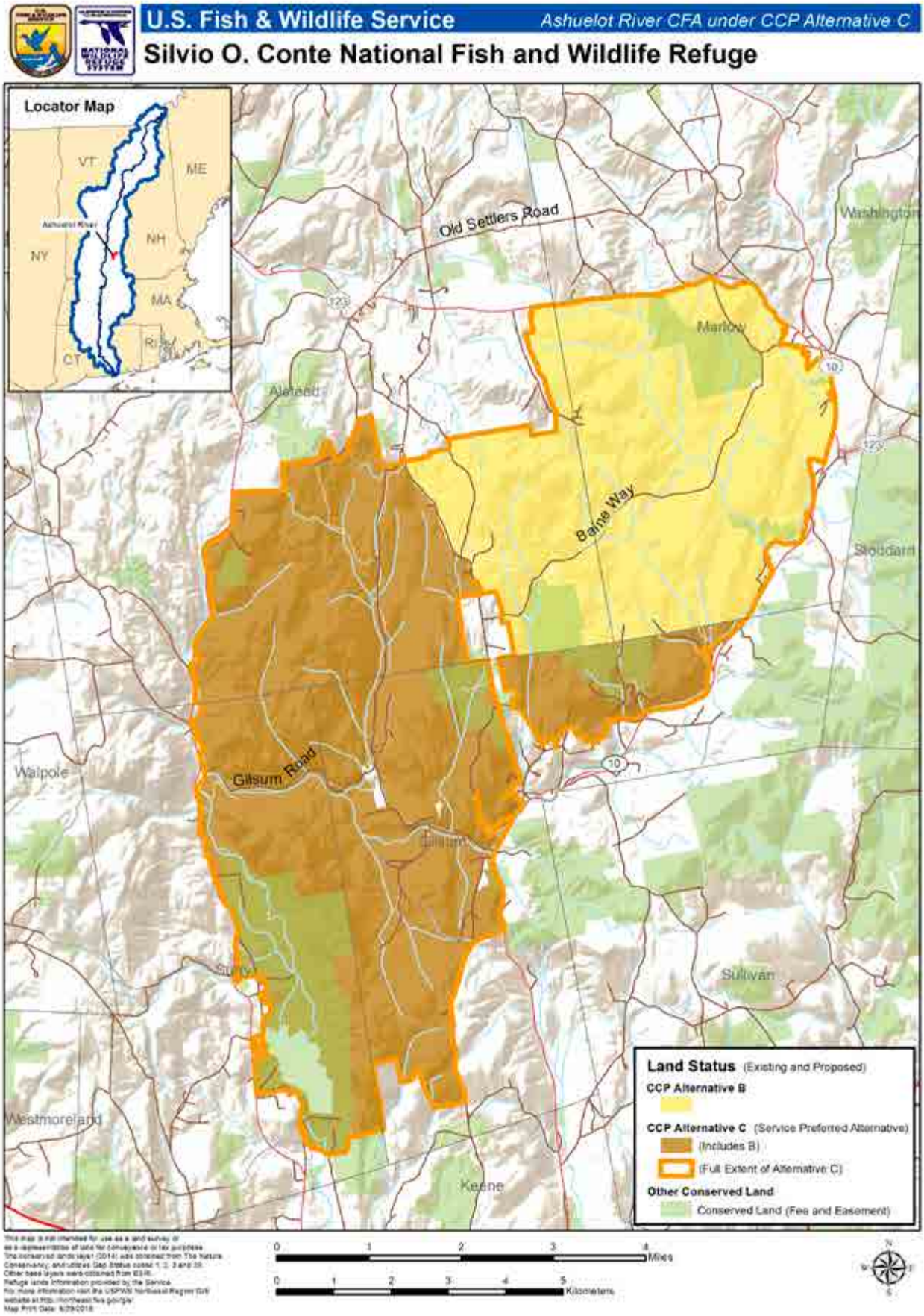
Map CI.16 West River CFA under CCP Alternative C



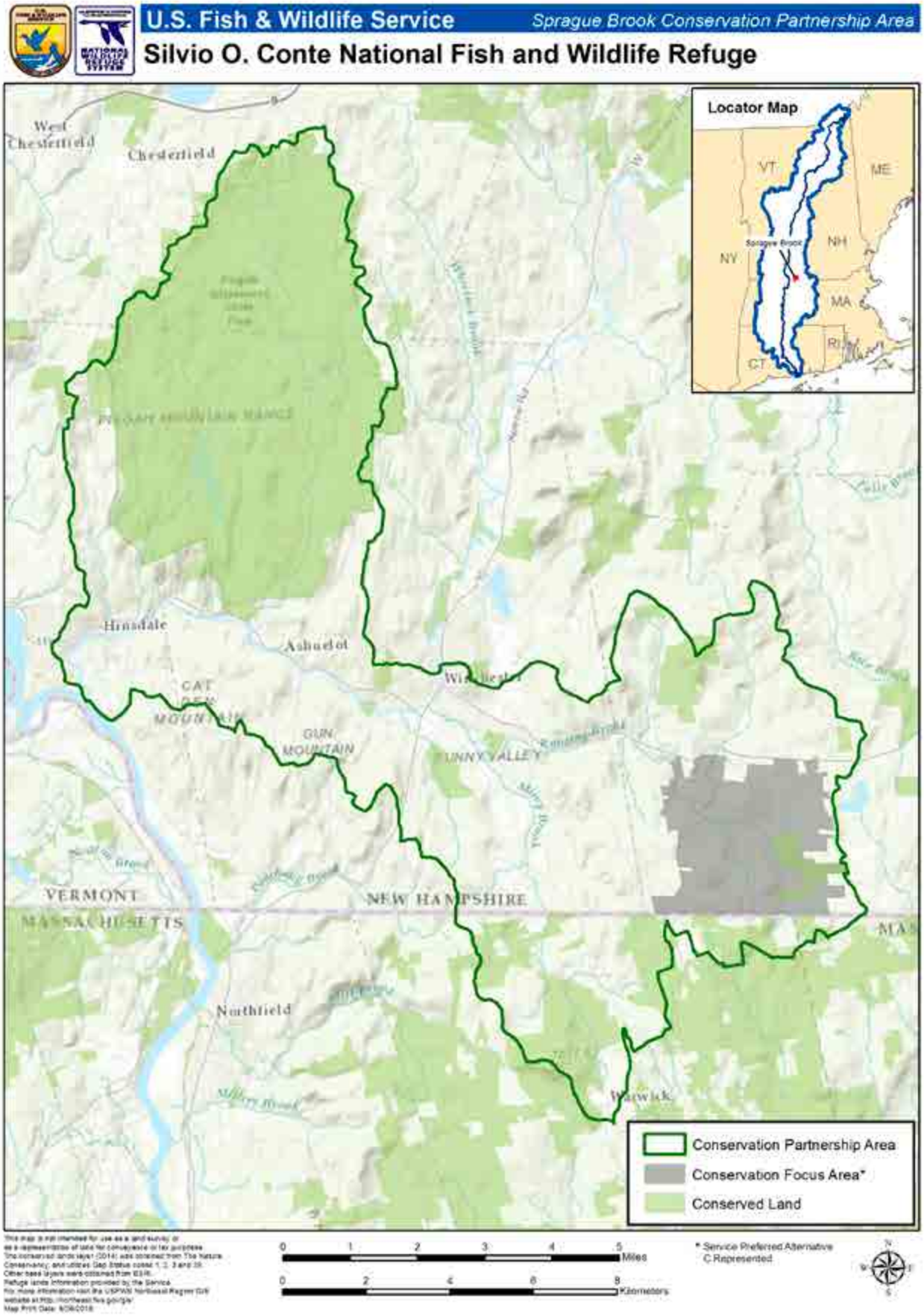
Map CI.17 Ashuelot River Conservation Partnership Area



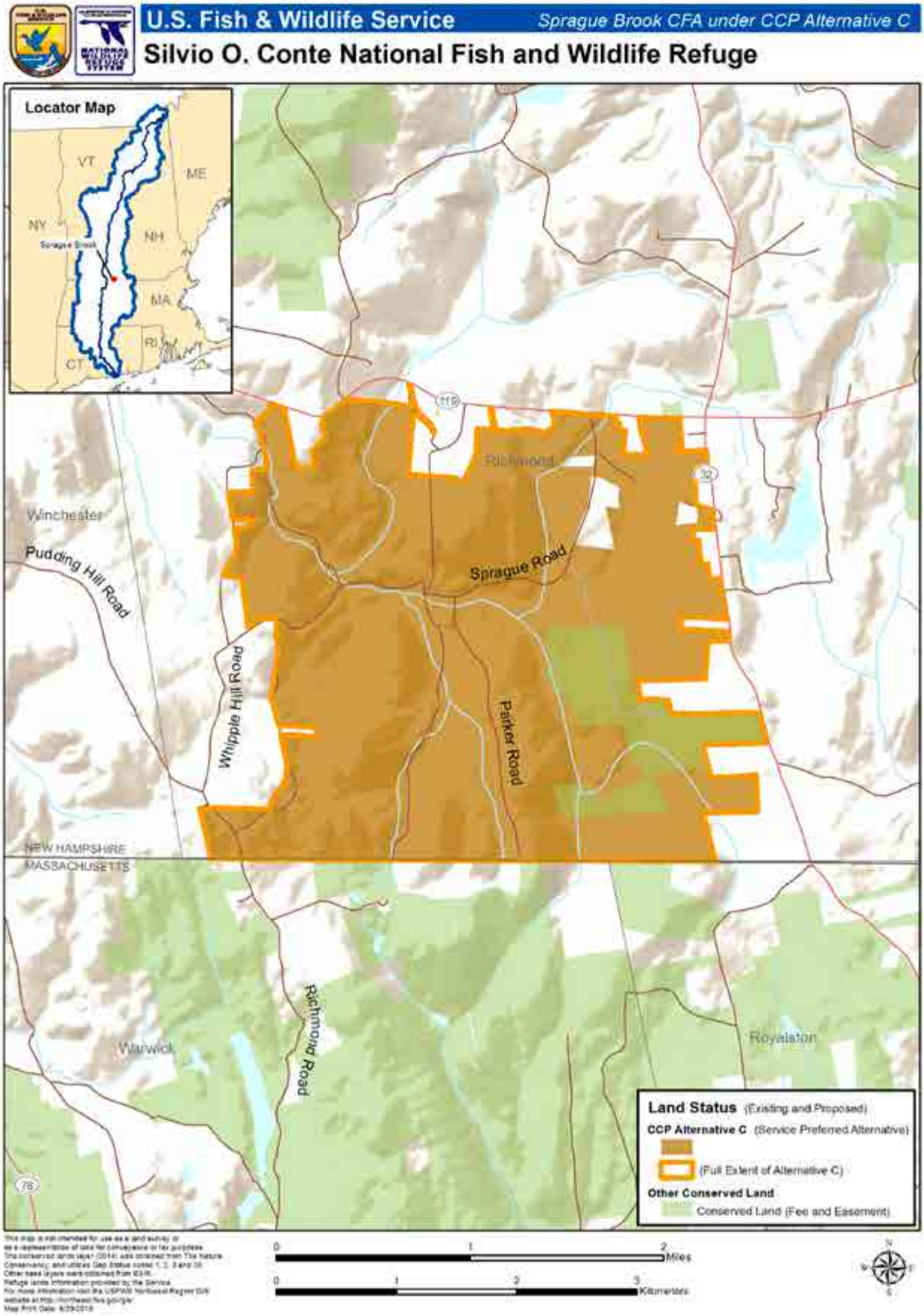
Map CI.18 Ashuelot River CFA under CCP Alternative C



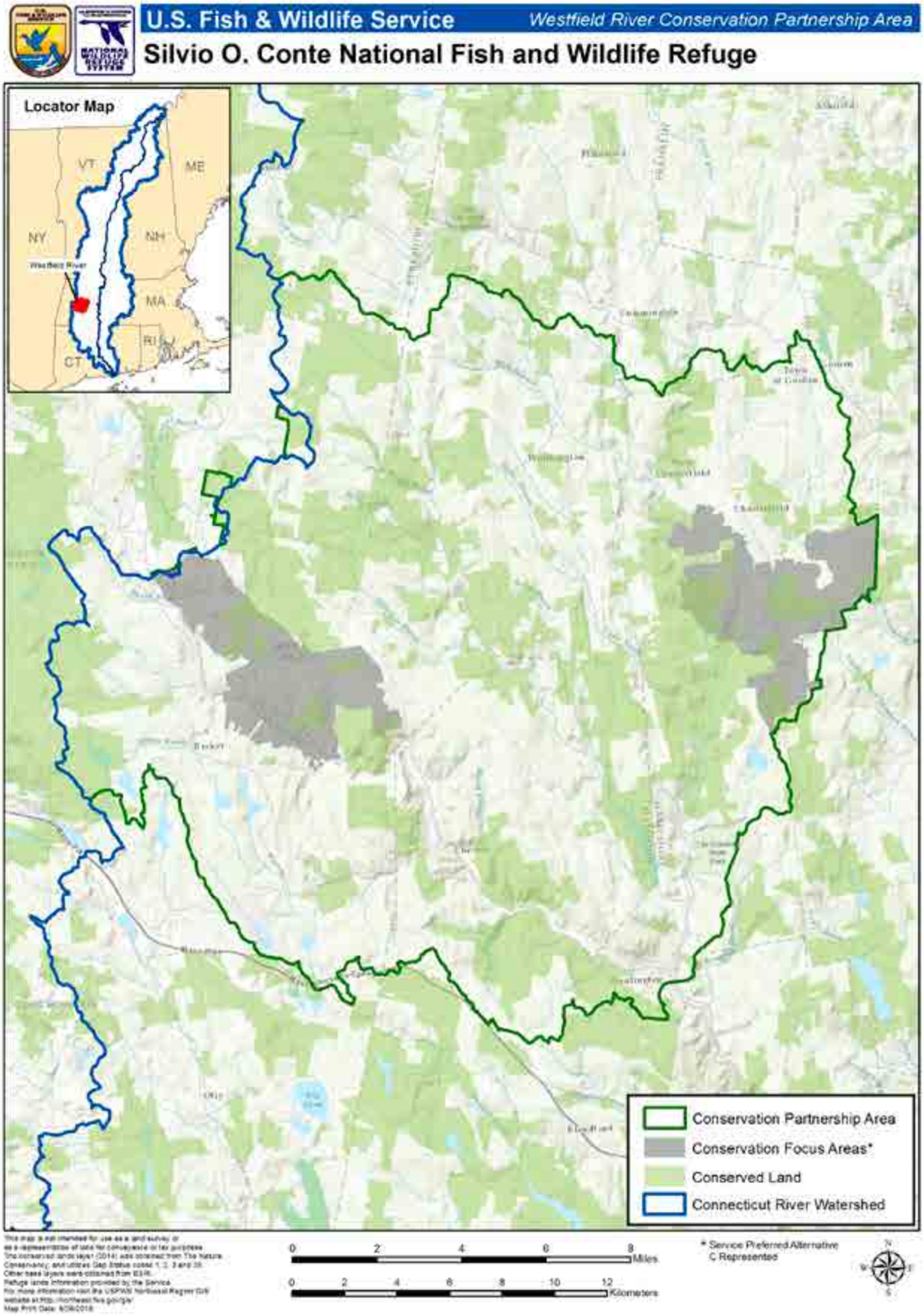
Map CI.19 Sprague Brook Conservation Partnership Area



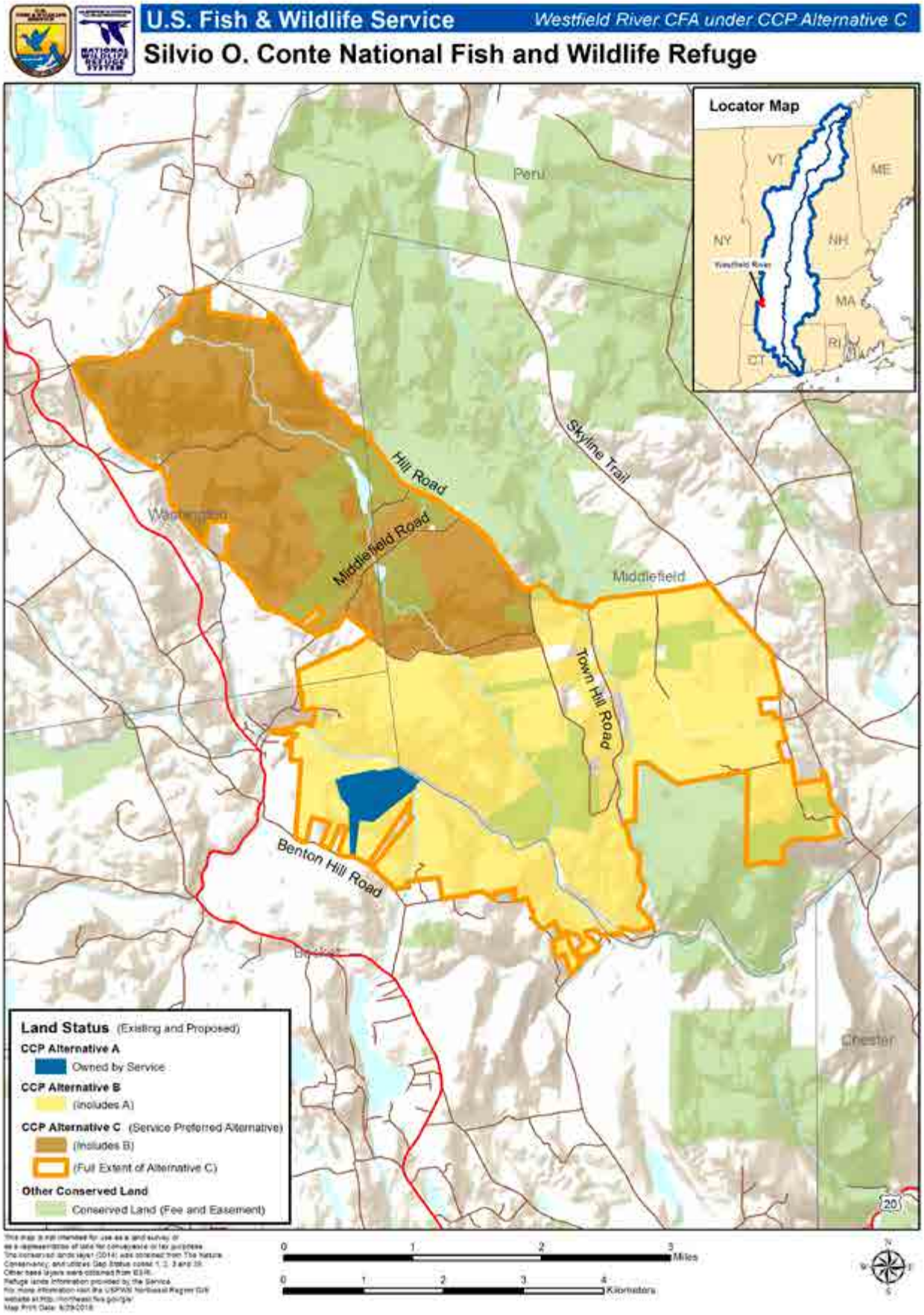
Map CI.20 Sprague Brook CFA under CCP Alternative C



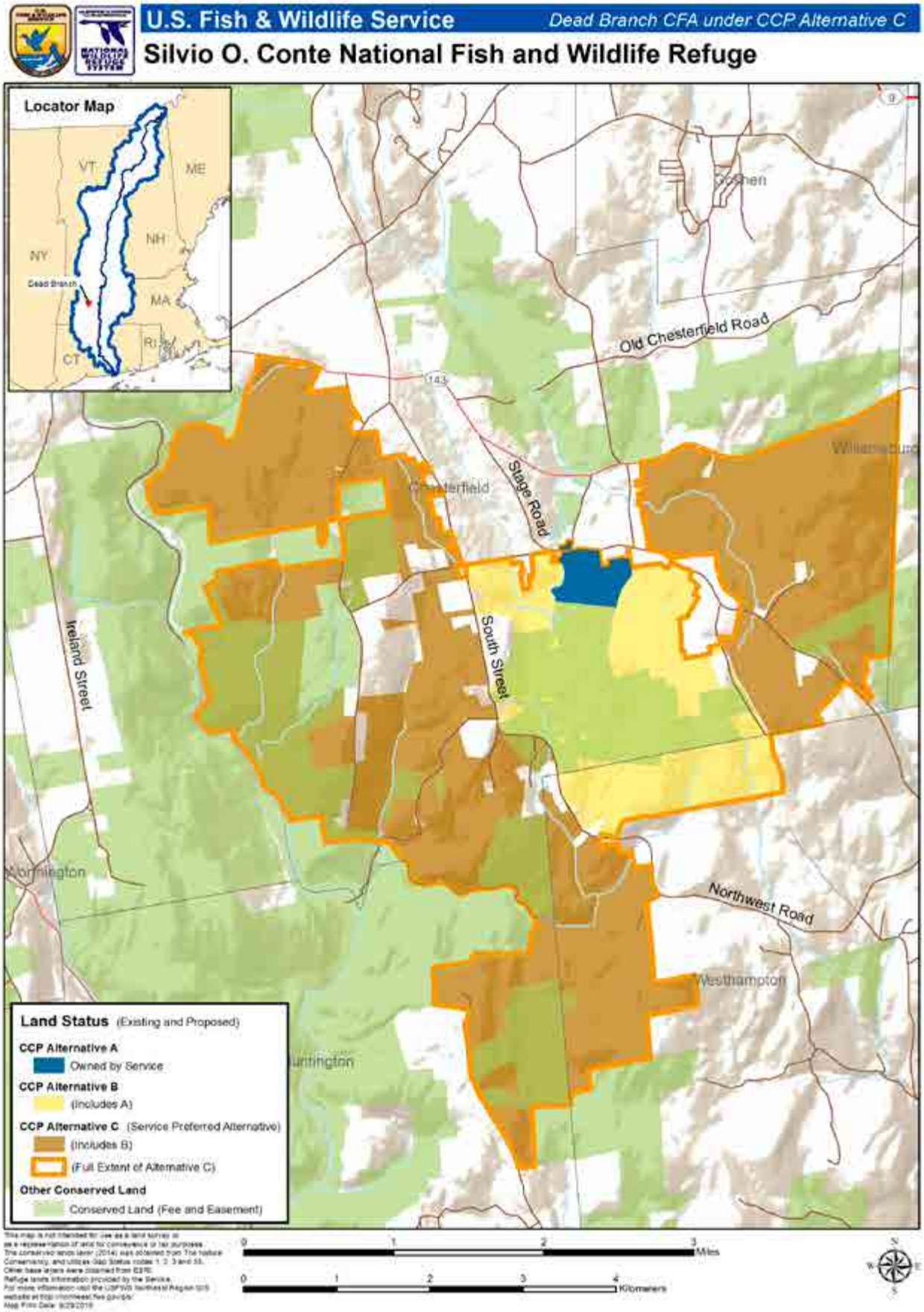
Map CI.21 Westfield River Conservation Partnership Area



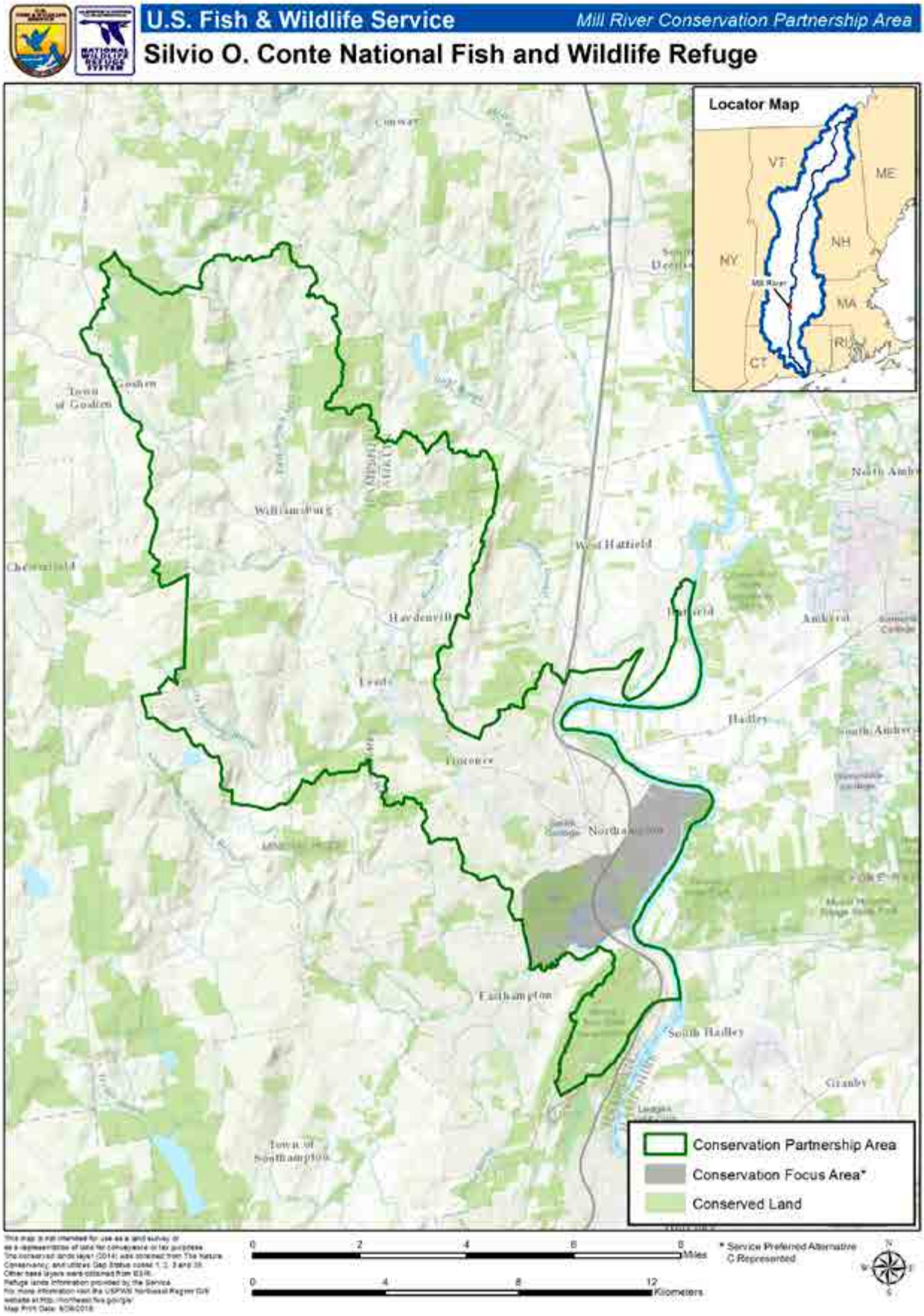
Map CI.22 Westfield River CFA under CCP Alternative C



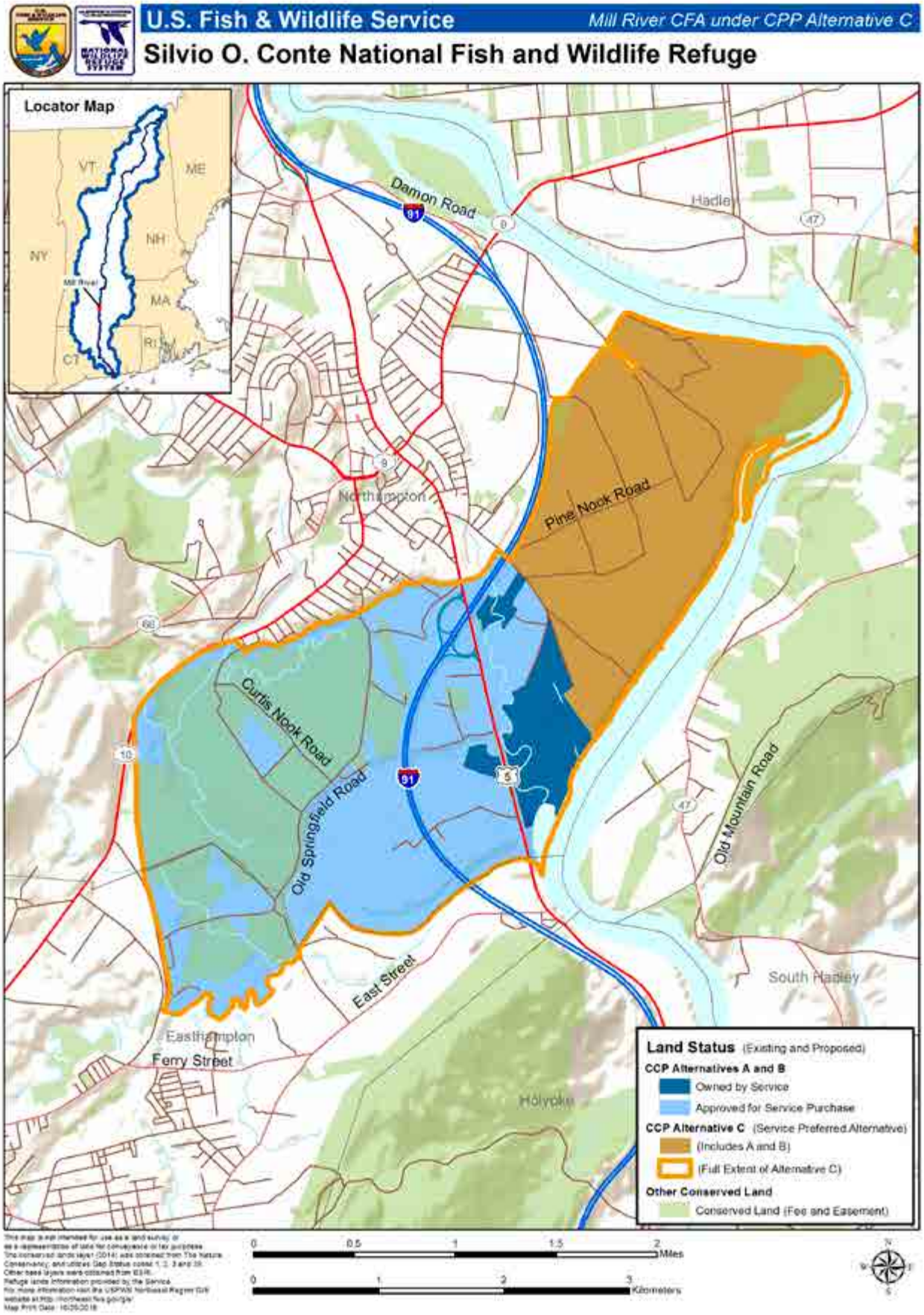
Map CI.23 Dead Branch CFA under CCP Alternative C



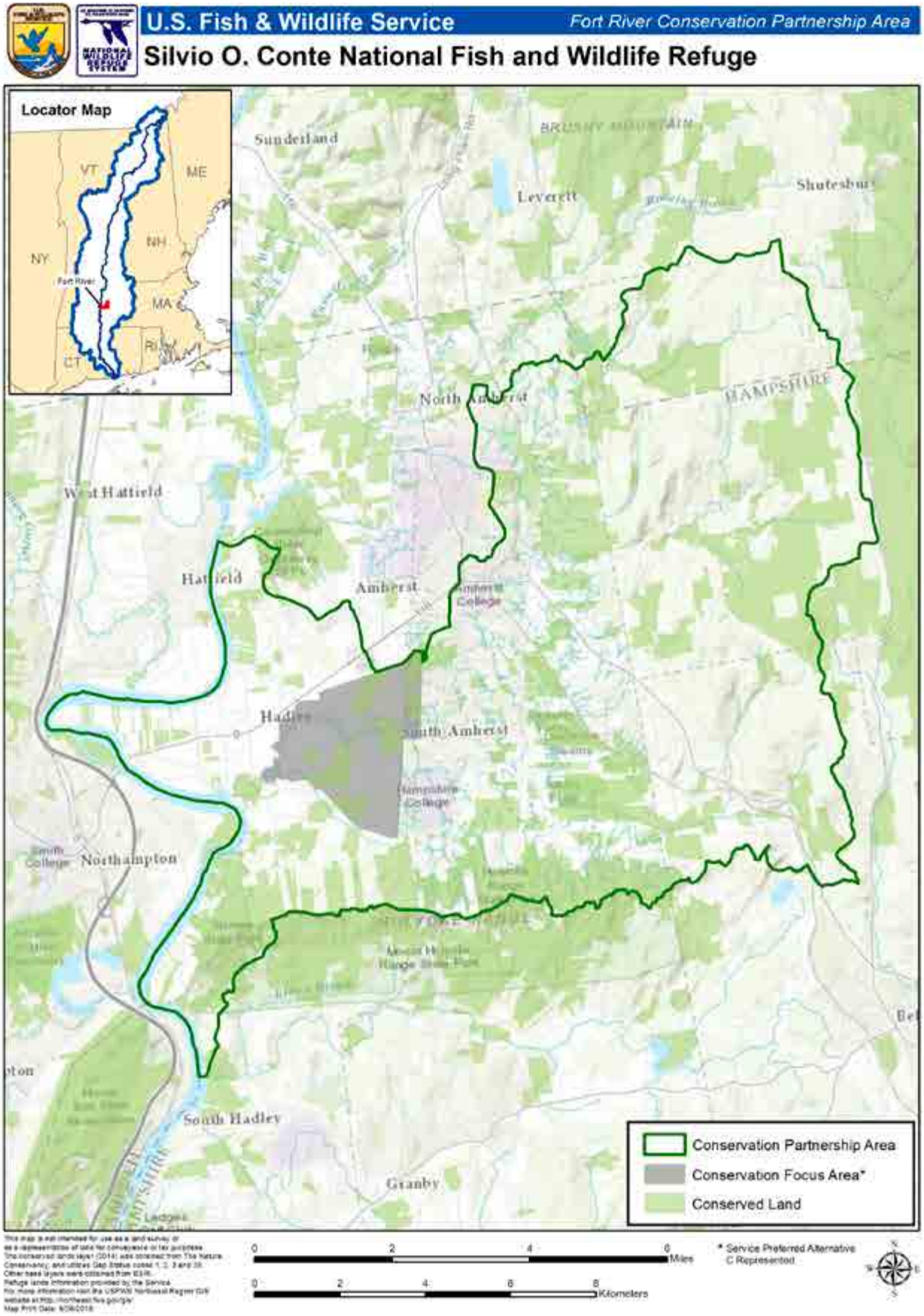
Map CI.24 Mill River Conservation Partnership Area



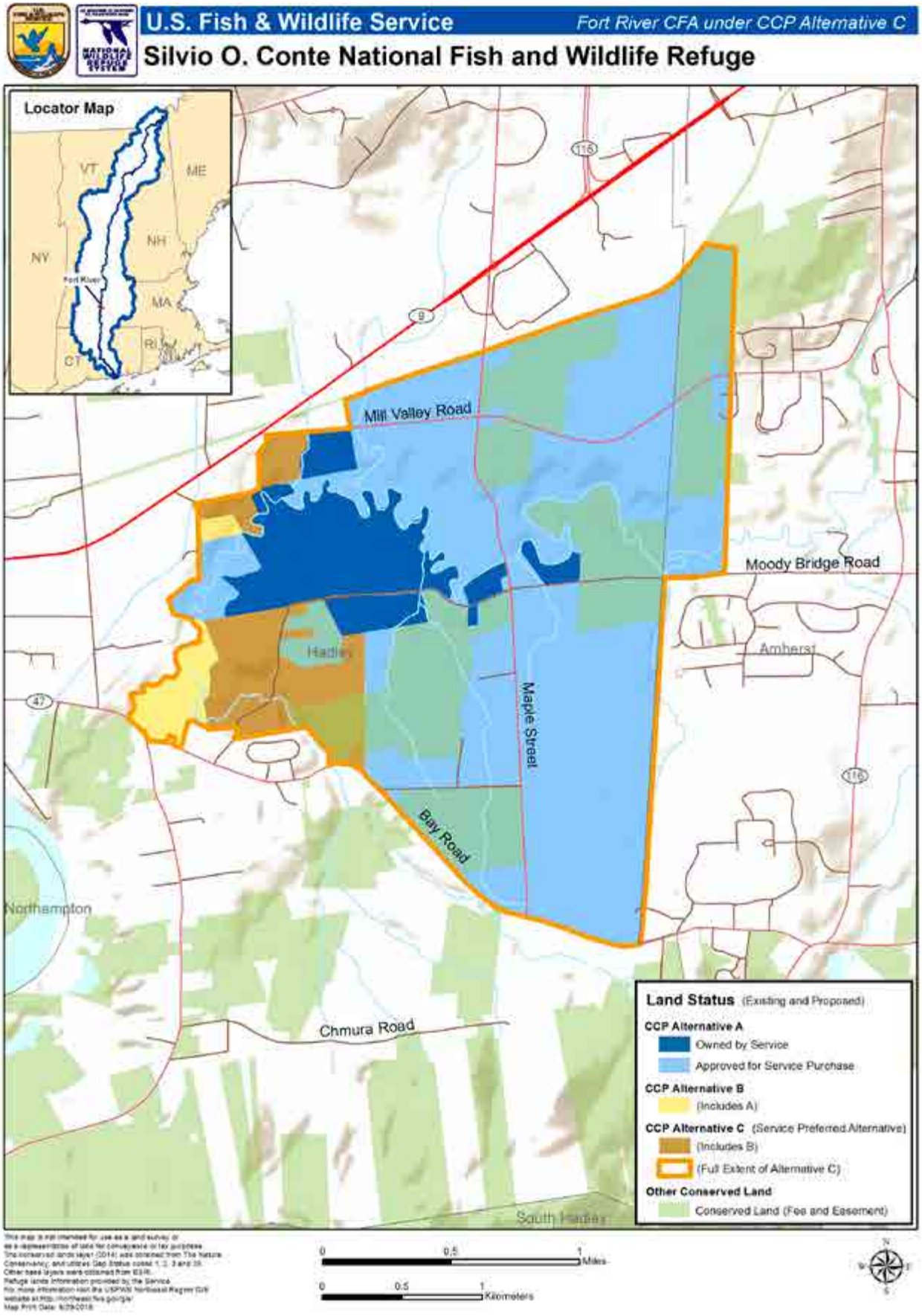
Map CI.25 Mill River CFA under CCP Alternative C



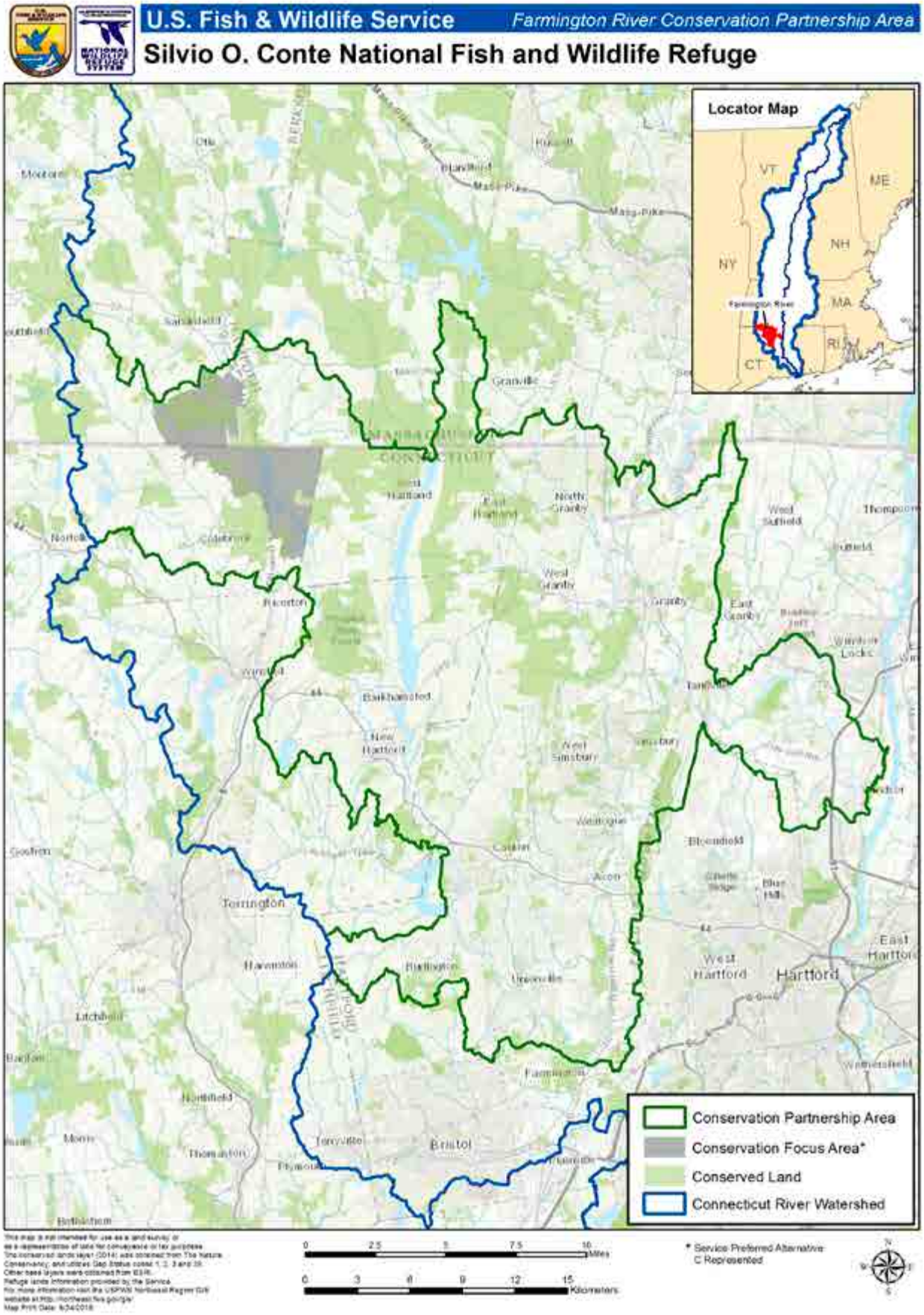
Map CI.26 Fort River Conservation Partnership Area



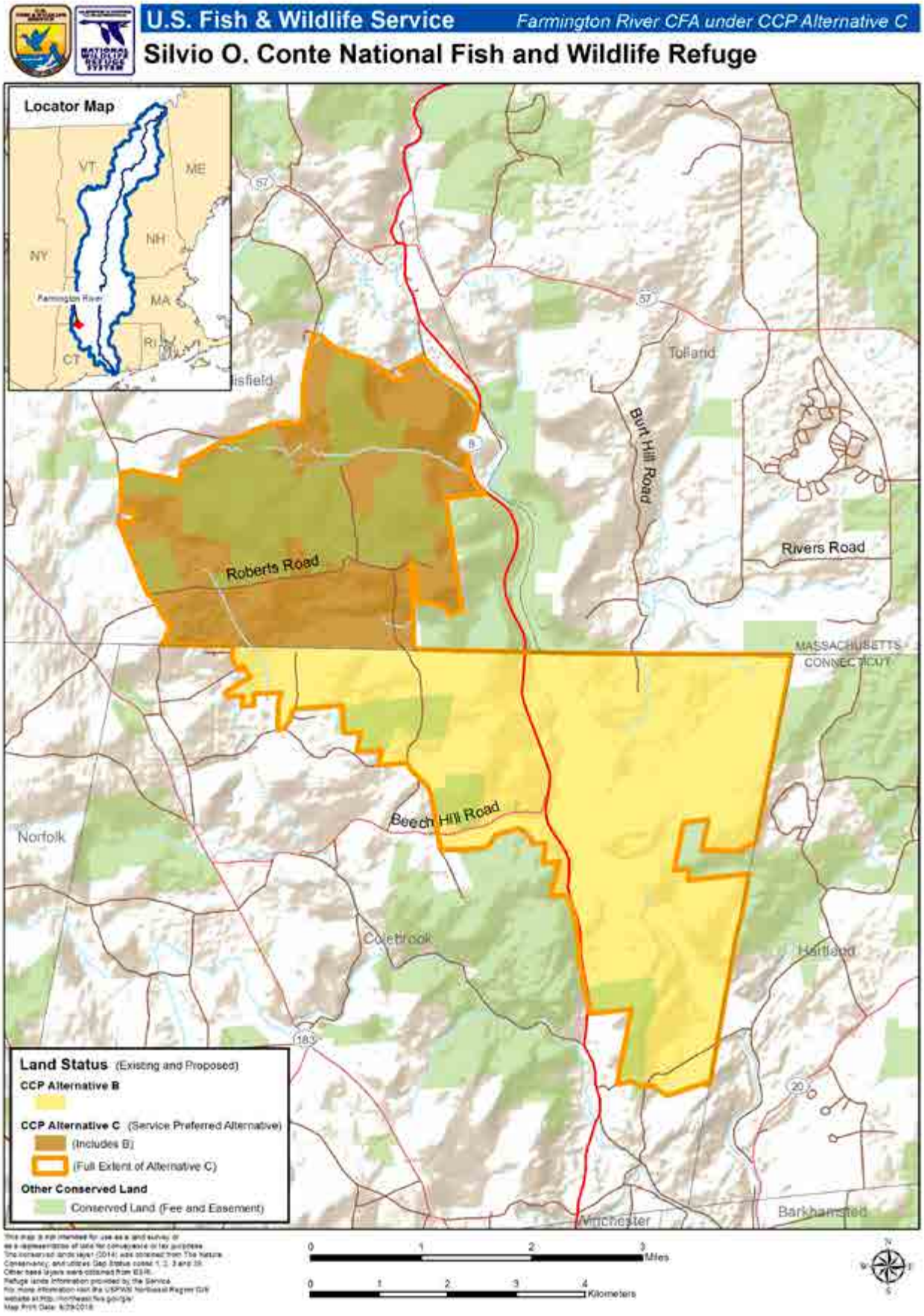
Map CI.27 Fort River CFA under CCP Alternative C



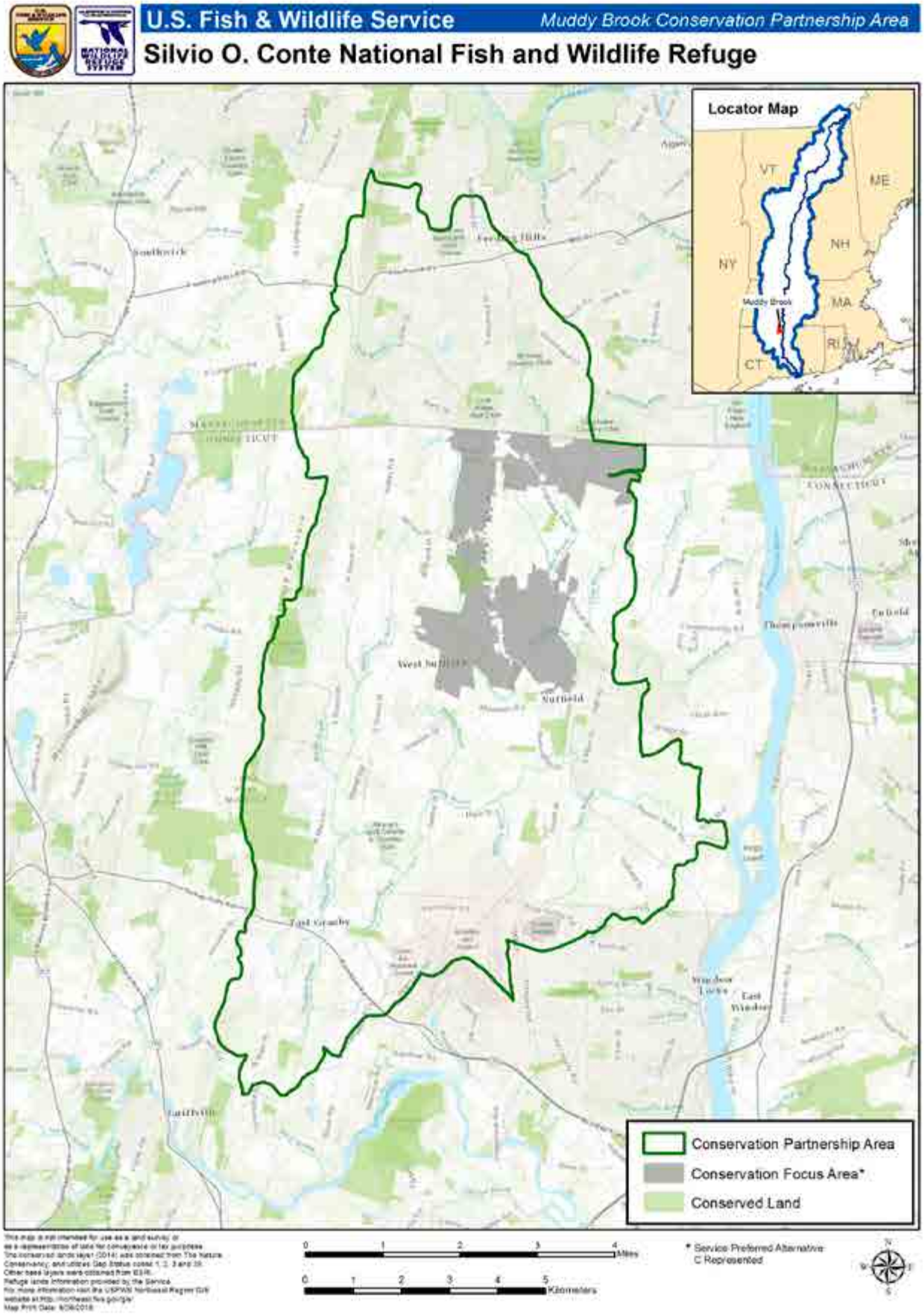
Map CI.28 Farmington River Conservation Partnership Area



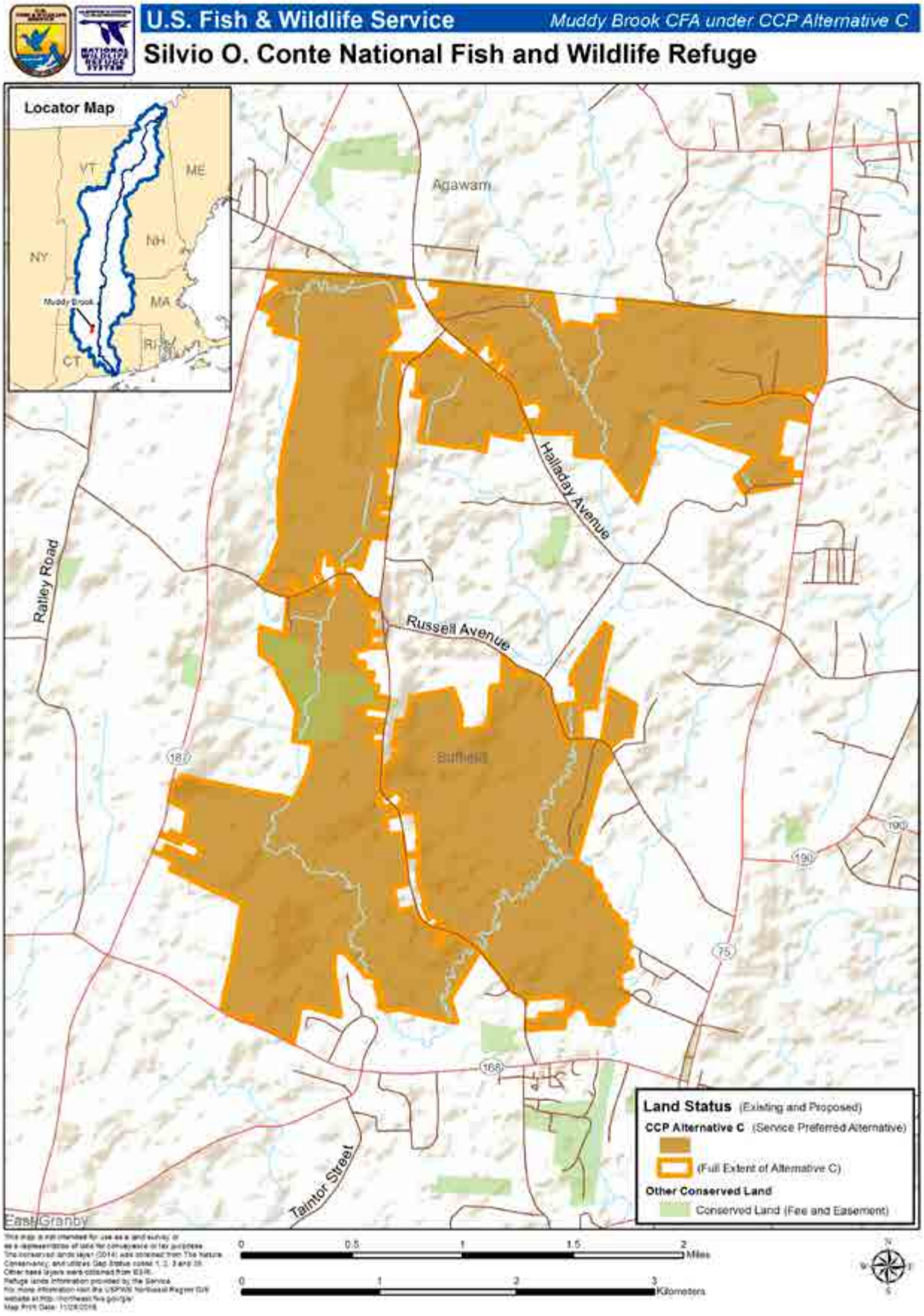
Map CI.29 Farmington River CFA under CCP Alternative C



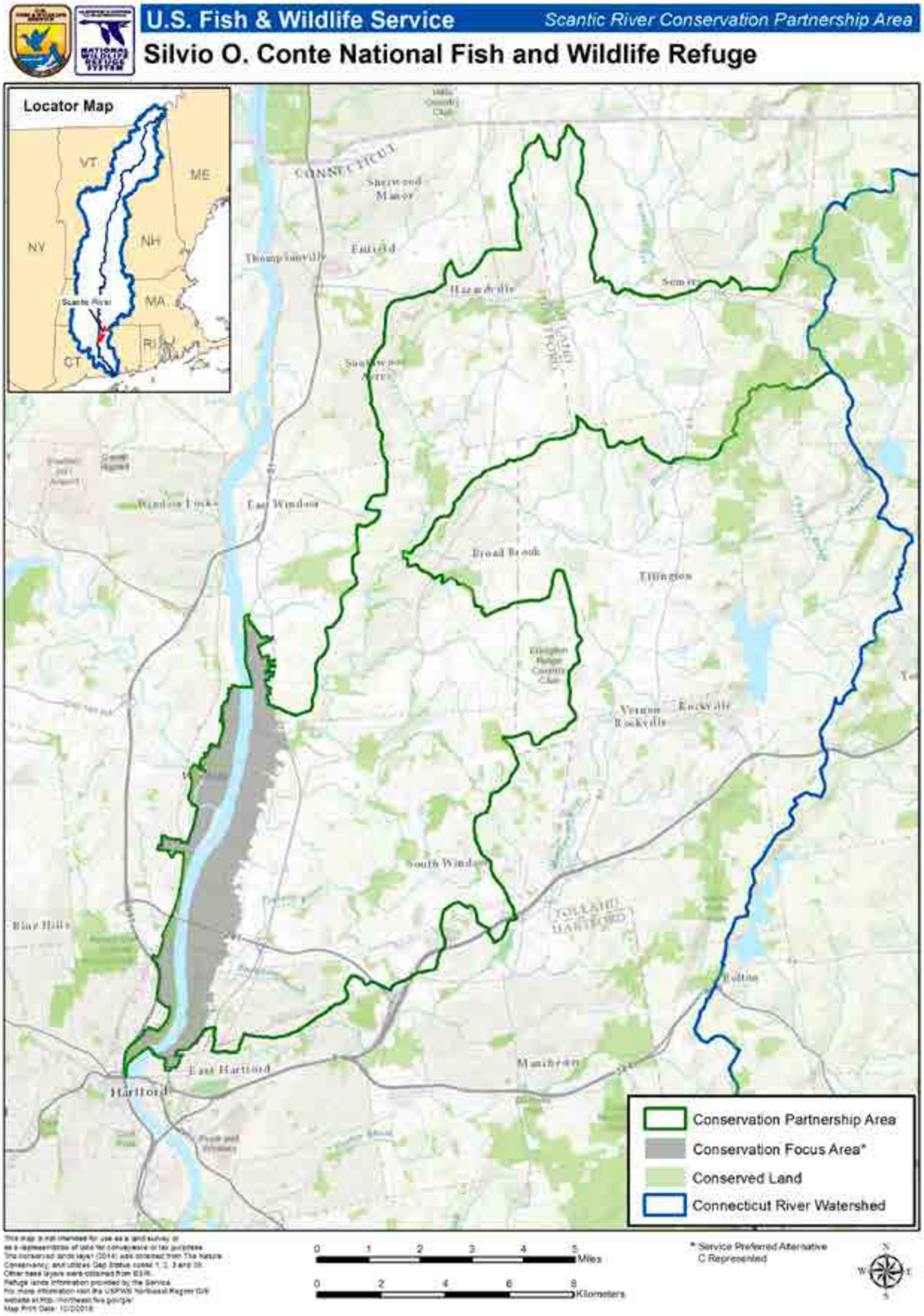
Map CI.30 Muddy Brook Conservation Partnership Area



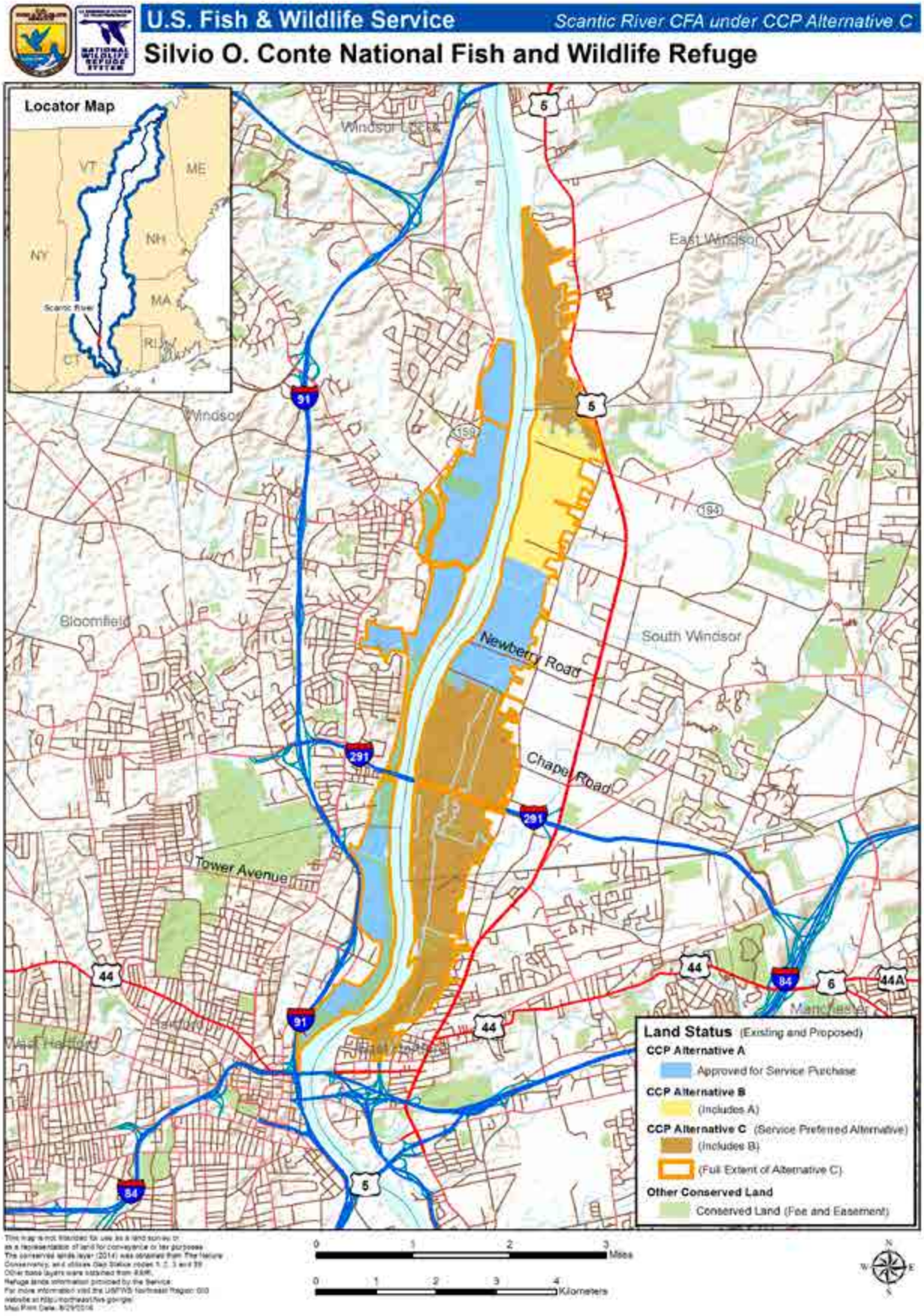
Map CI.31 Muddy Brook CFA under CCP Alternative C



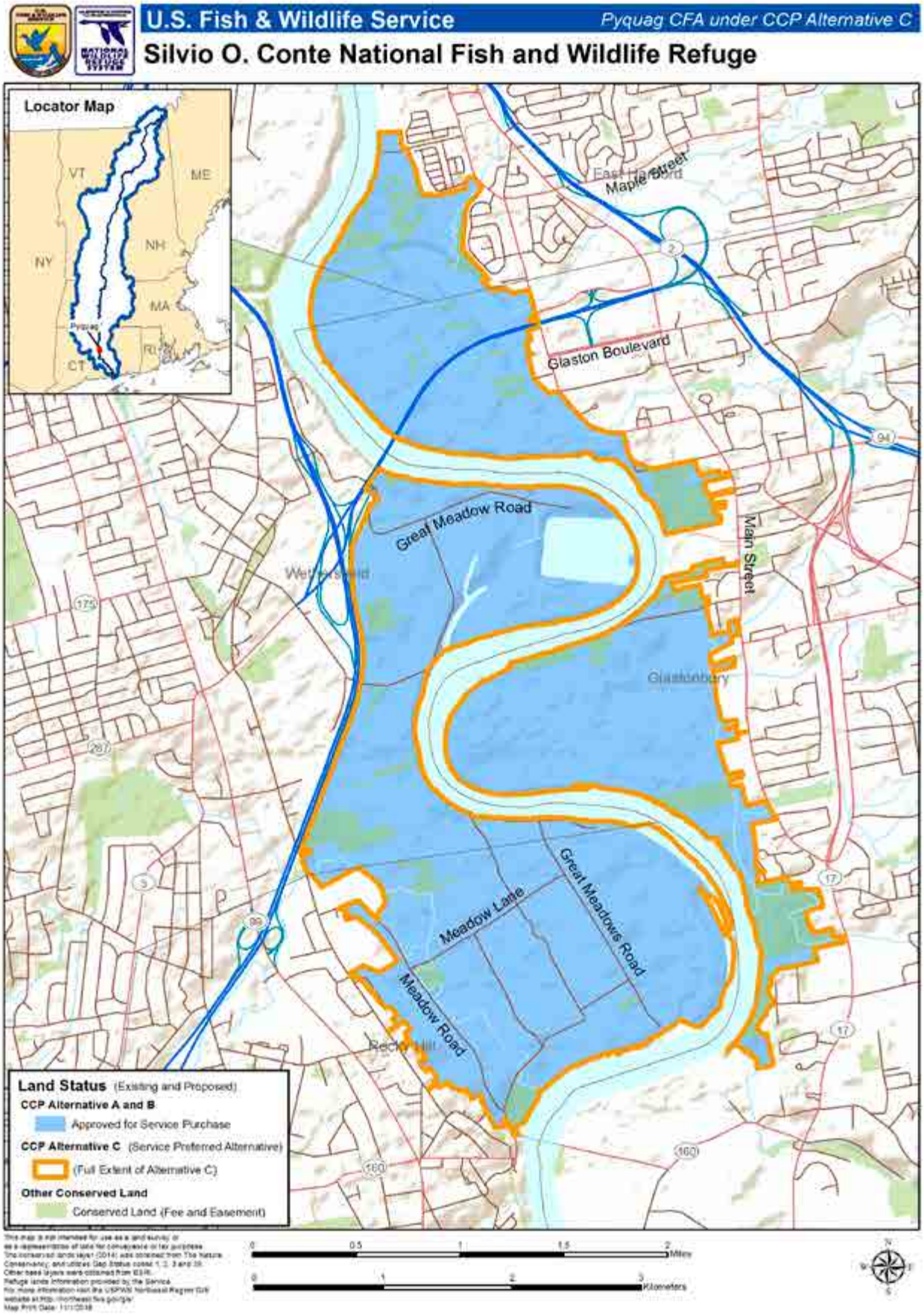
Map CI.32 Scantic River Conservation Partnership Area



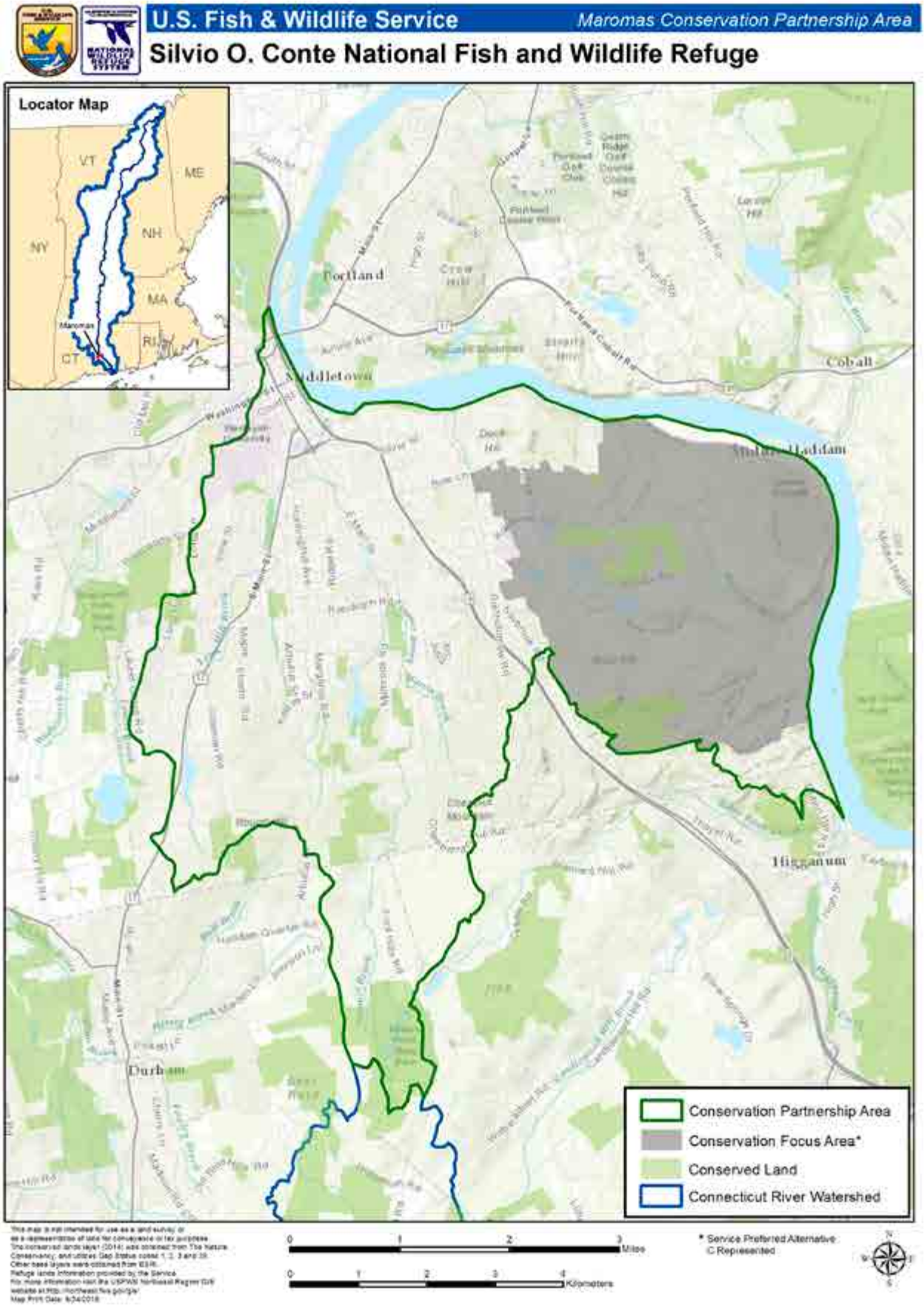
Map CI.33 Scantic River CFA under CCP Alternative C



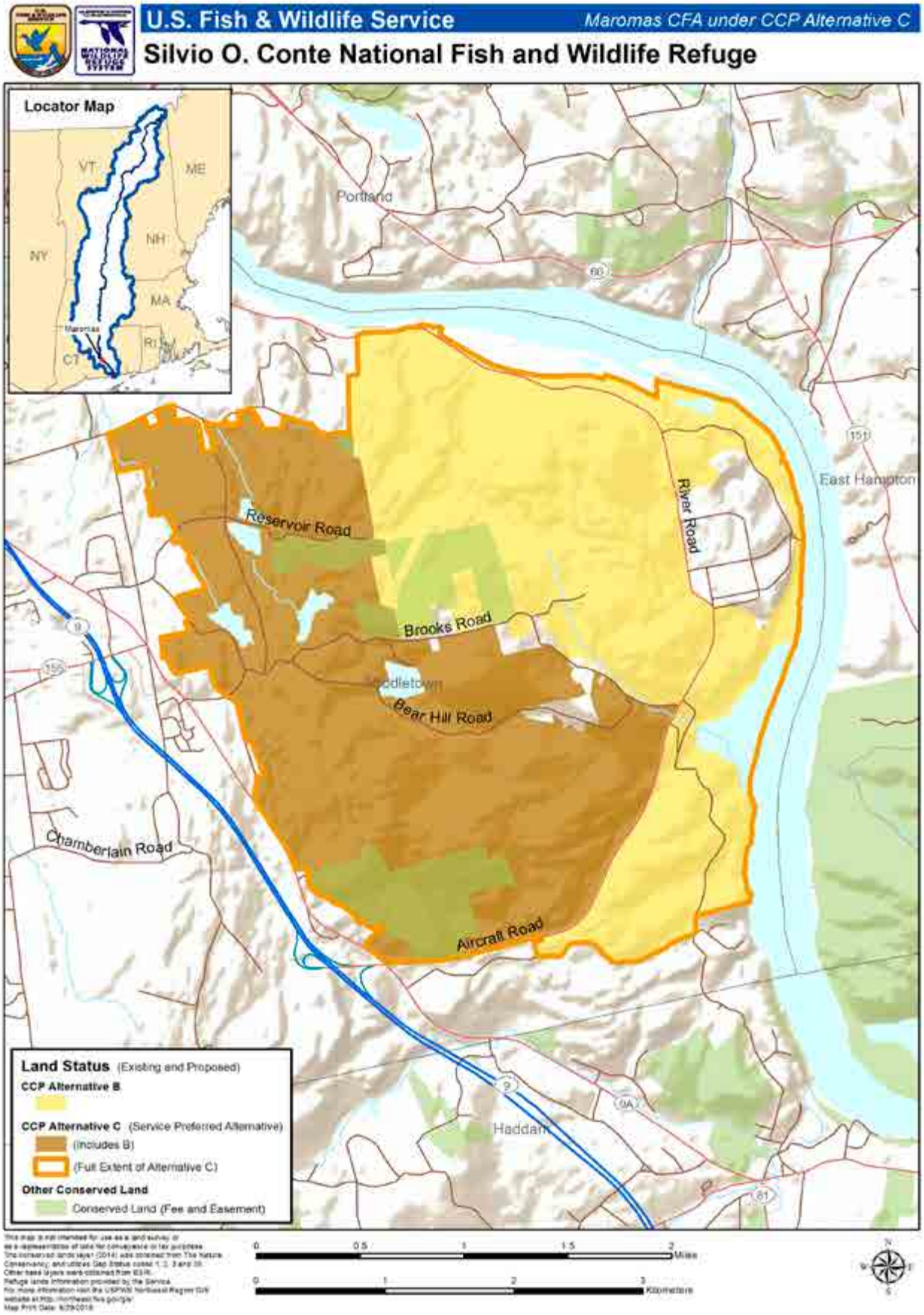
Map CI.34 Pyquag CFA under CCP Alternative C



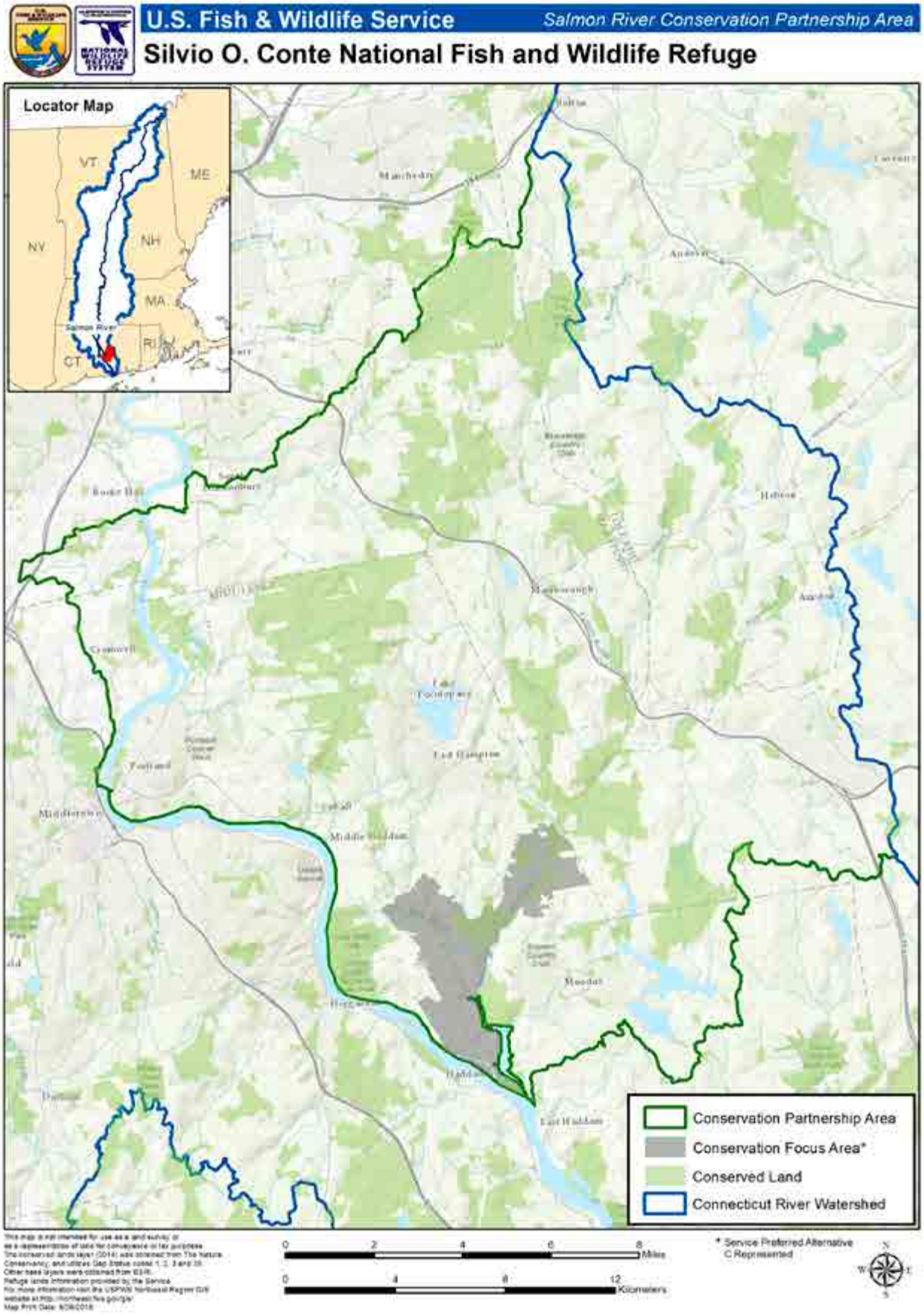
Map CI.35 Maromas Conservation Partnership Area



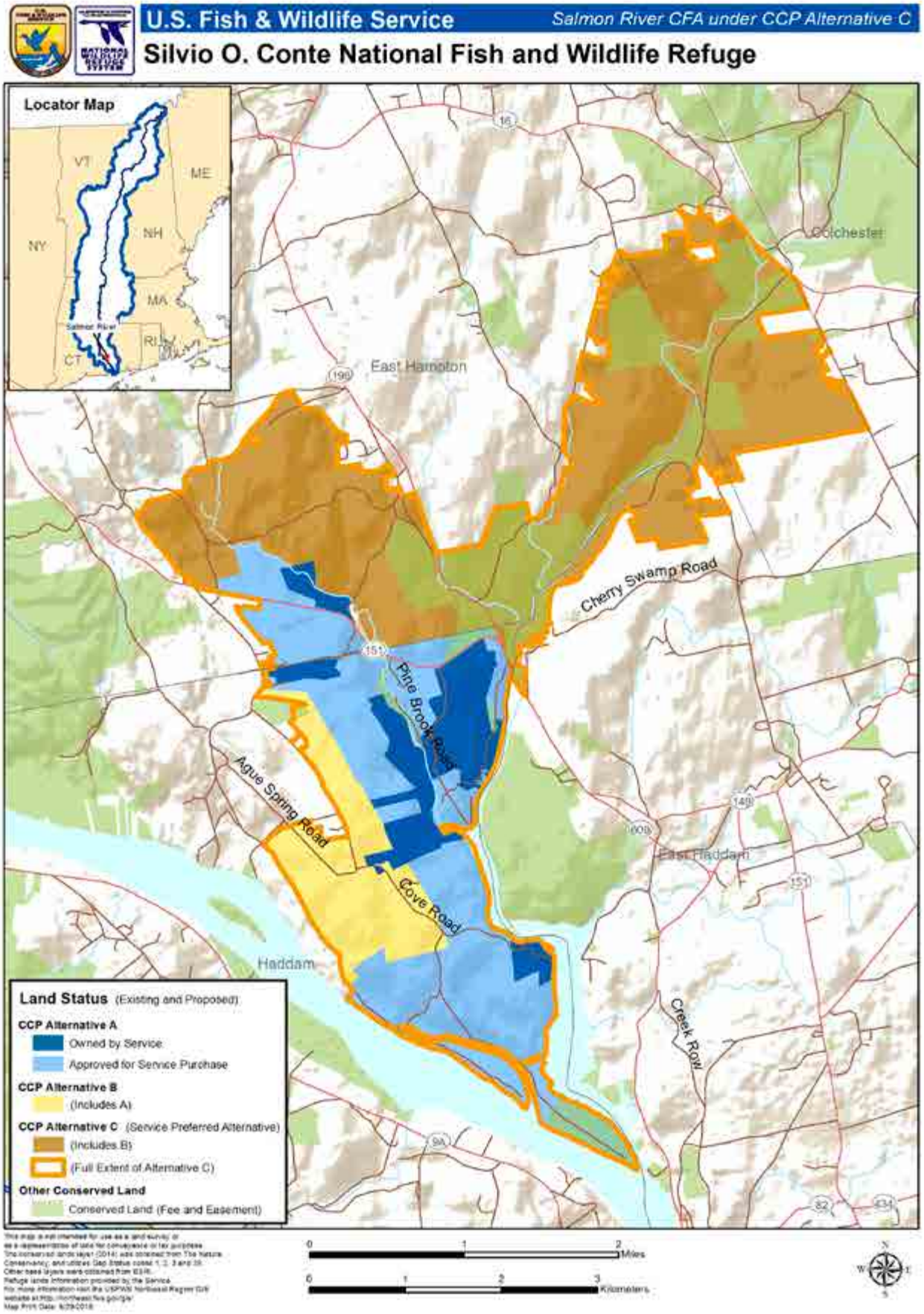
Map CI.36 Maromas CFA under CCP Alternative C



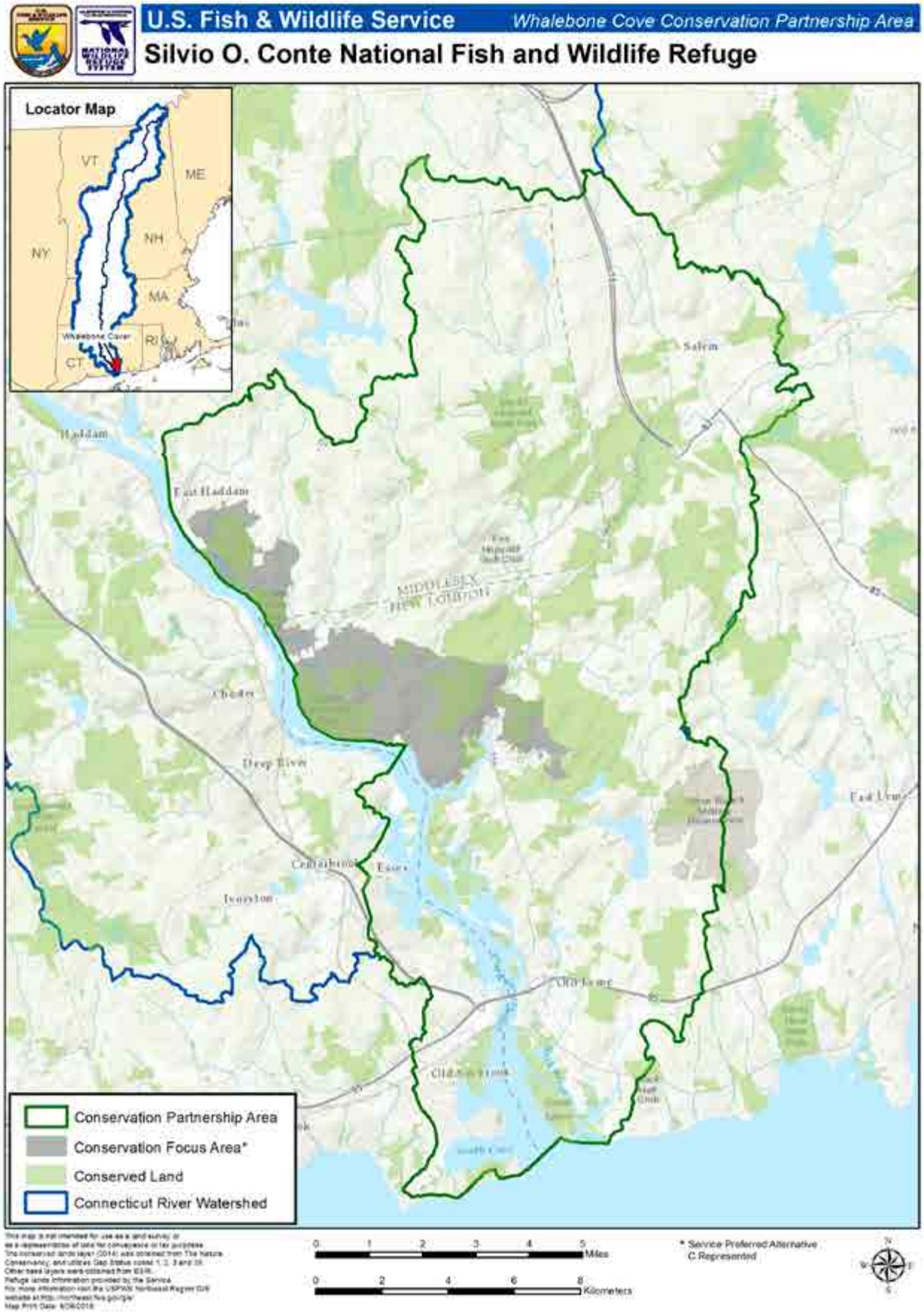
Map CI.37 Salmon River Conservation Partnership Area



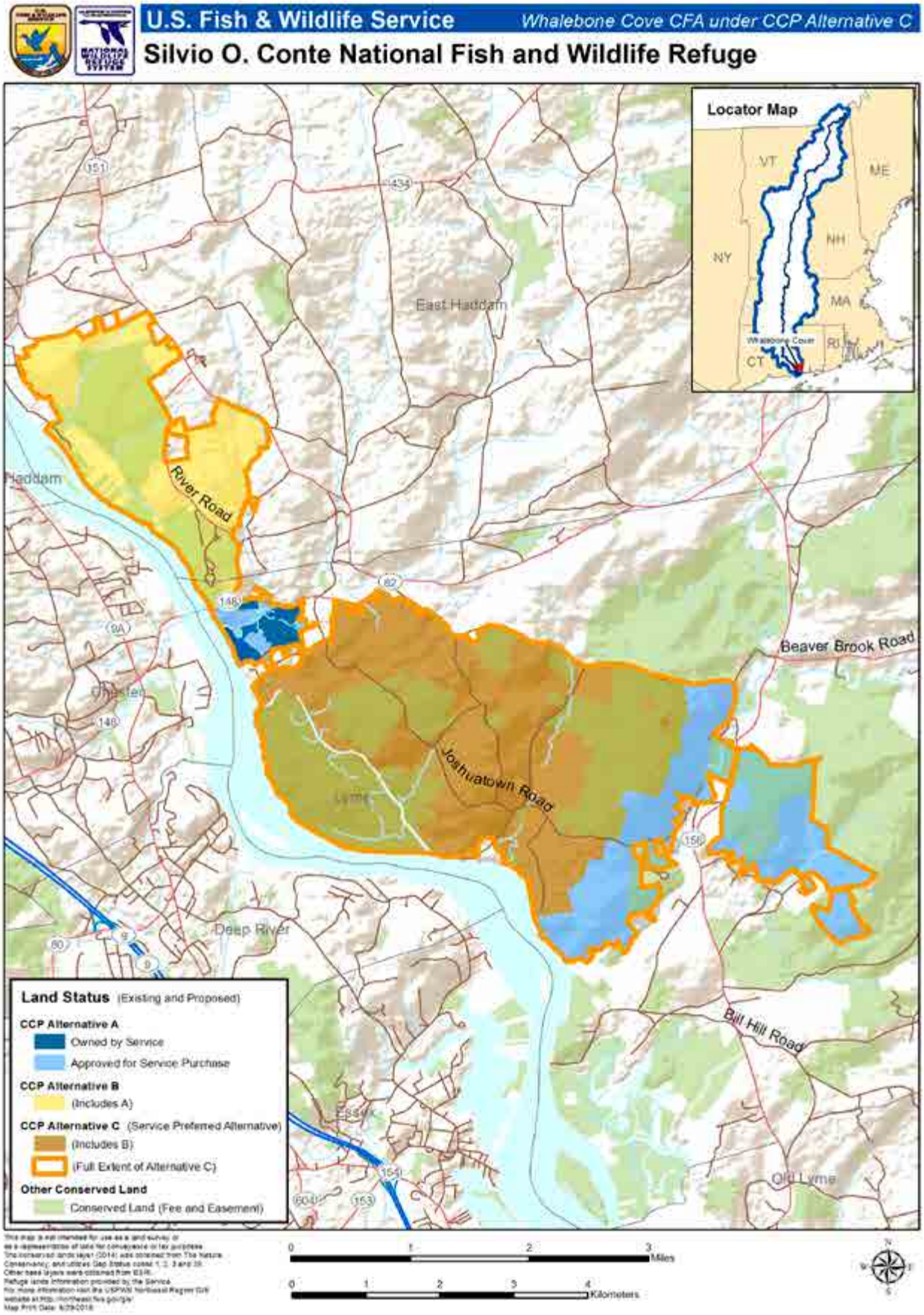
Map CI.38 Salmon River CFA under CCP Alternative C



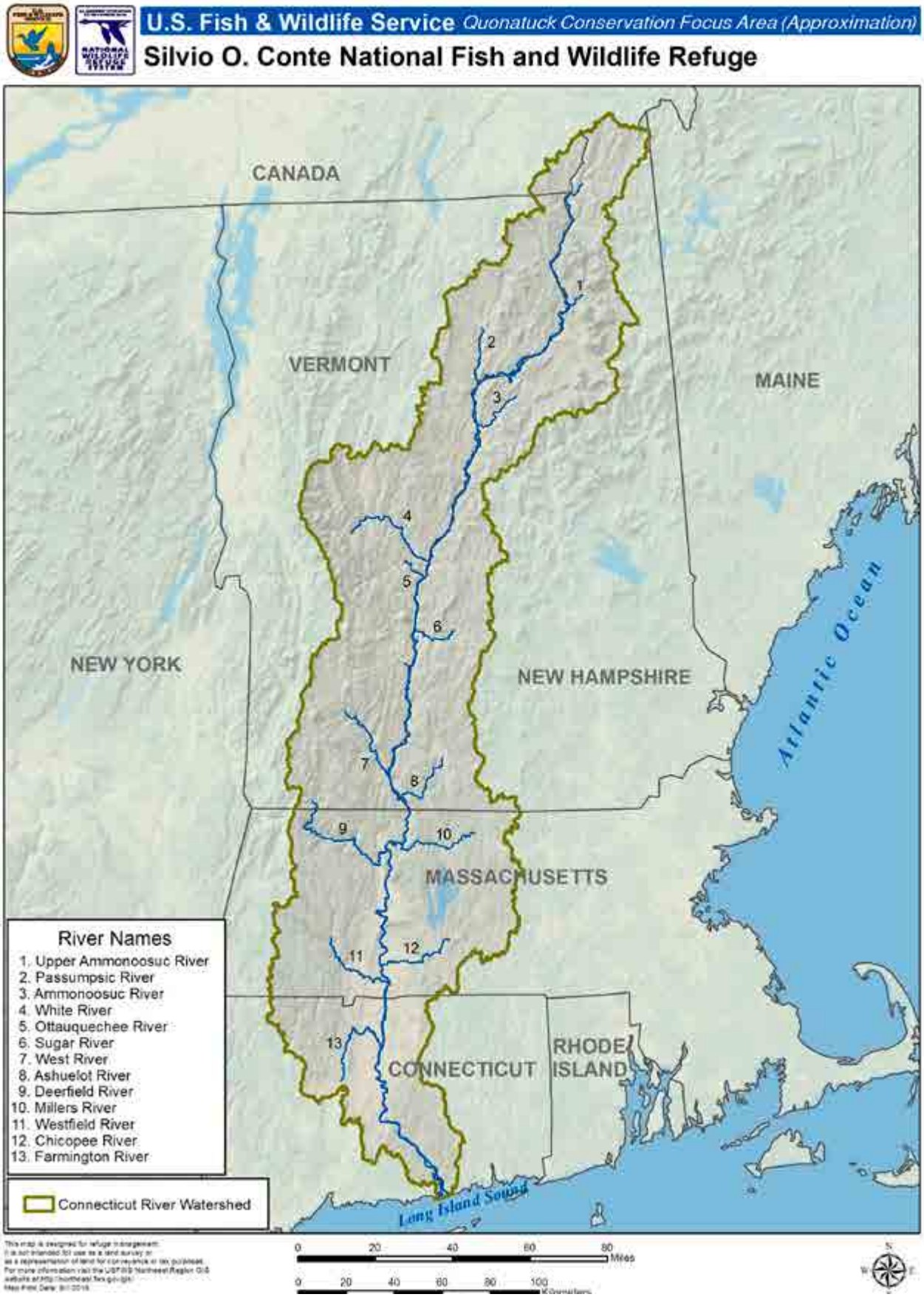
Map CI.39 Whalebone Cove Conservation Partnership Area



Map CI.40 Whalebone Cove CFA under CCP Alternative C



Map CI.41 Quonatuck Conservation Focus Area



Attachment II

Proposed Land Protection Plan for Silvio O. Conte National Fish and Wildlife Refuge Contributions of Plan to Waterfowl and other Migratory Bird Objectives

In this attachment, we provide estimates of the potential number of breeding birds that could be supported within the proposed Conte Refuge CFAs and the acres of potentially suitable breeding habitat within those proposed CFAs. These CFAs are included as part of the refuge's final CCP/EIS Service-preferred alternative C. We provide these estimates for six neotropical migrant species that are: (1) identified as Priority Refuge Resources of Concern; (2) are identified as priority species within BCR plans; and, (3) represent the range of upland and wetland habitat types within the CFAs. The six species are:

- Wood thrush.
- Canada warbler.
- Blackburnian warbler.
- Black-throated blue warbler.
- American woodcock.
- Bobolink.

Four of these six species (wood thrush, blackburnian warbler, American woodcock, and bobolink) have been identified as representative (also referred to as "surrogate") species by the NALCC. In addition to the breeding neotropical migrants, we identify potential contributions of the CFAs to waterfowl habitat, American black duck and wood duck breeding populations, and neotropical migrant stopover habitat.

We also present population estimates and acres of potentially suitable habitat contributed by existing conserved lands within the watershed. Looking at existing conserved lands provides perspective on what additional migratory bird benefits would be provided to the conservation estate by acquiring the proposed lands within the CFAs. We compare our estimates for the CFAs and conserved lands to population and habitat objectives that have been established at the BCR and State scales as reported in the BCRs 14 (Atlantic Northern Forest–*http://acjv.org/planning/bird-conservation-regions/bcr-14/* Accessed October 2016) and 30 (New England–Mid-Atlantic Coast - *http://www.acjv.org/BCR_30/BCR30_June_23_2008_final.pdf*. Accessed October 2016) or the Partners in Flight North American Landbird Conservation Plan(*http://www.partnersinflight.org/plans/landbird-conservation-plan/.Accessed* October 2016).

Bird population estimates were derived by applying published density estimates by habitat types (e.g., from the Birds of North America species accounts) to the acres of the different habitat types occurring within the CFAs. We have also included in our analyses the 8,000 acres of undesignated lands to be part of the Quonatuck CFA by assuming that these lands will represent 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. We typically used numbers at the lower end of the range of published density estimates because high densities usually reflect the most suitable habitat but we are trying to estimate populations across the landscape, which will include a range of habitat quality. We also acknowledge that the published bird population objectives typically reflect relatively low densities at landscape scales, and we wanted our estimates to be as comparable with those objectives as possible.

Summary of Proposed Conte Refuge Land Acquisition Contributions to Migratory Birds
The proposed land acquisition by Conte Refuge under the final CCP/EIS alternative C will make significant contributions to state-level breeding population objectives for several neotropical migrants and toward overall waterfowl habitat objectives as well as toward breeding habitat for two high priority waterfowl species. We evaluated the potential for this proposal to benefit four neotropical migrant birds. For the wood thrush and Canada warbler, the proposed acquisitions could potentially meet 2 to 11 percent of the four States' breeding population objectives. For the black-throated blue warbler, we estimate that the proposed land acquisition within the CFAs could potentially contribute 10 to 20 percent of the State's breeding population objectives. For the blackburnian warbler, our proposal could contribute between 4 to 12 percent of the State's objectives.

The proposed land acquisition would also make significant contributions to the habitat objectives for three waterfowl focus areas identified in the ACJV's Waterfowl Implementation Plan: the Connecticut River and Tidal Wetlands Complex Focus Area in Connecticut, the Connecticut River Focus Area in New Hampshire and Vermont, and the Lake Memphremagog Focus Area in northern Vermont. The proposed land acquisition will also protect significant breeding habitat for American black duck and wood duck, potentially supporting approximately 1,000 and 4,000 breeding pairs, respectively.

In addition, a study of neotropical migrant habitat use during migration suggests that habitat protection within the watershed will have significant benefits for supporting neotropical migrants during the spring migratory period, especially forest and shrub wetlands along the mainstem of the river.

A. Wood thrush

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide deciduous and mixed upland forests and forested wetlands representing potentially suitable habitat for wood thrush. With protection and appropriate management (to be specified in refuge habitat management plans), these lands have the potential to support an estimated wood thrush population of 31,180 birds. With protection and appropriate management within the network of conserved lands in the watershed, the network could potentially support an estimated wood thrush population of 273,145 birds on 1,362,025 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

Wood thrush	**BCR 14**[1] Population Objectives. = 1,462,100 Habitat Objectives = 9,031,900ac	**BCR 30**[2] Population Objectives = 825,000 Habitat Objectives = 6,875,000ac
Population Estimates (# of individuals)		
Estimated population on all **CFAs**	26,040	5,138
Percent (%) of BCR population objective contributed by all **CFAs**	1.8%	0.6%
Estimated population on all **Conserved Lands**	250,010	23,135
Percent (%) of BCR population objective contributed by all **Conserved Lands**	17%	2.8%
Acres of Habitat		
Acres of potentially suitable habitat on **CFAs**	112,085	43,365
Percent (%) of BCR habitat objective contributed by all **CFAs**	1.2%	0.6%
Acres of potentially suitable habitat on **Conserved Lands**	1,263,710	98,315
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	14%	1.4%

[1] *Population and habitat objectives from the BCR 14 Bird Conservation Plan.*

[2] *Population and habitat objectives from the BCR 30 Bird Conservation Plan.*

The proposed CFAs will provide a disproportionately large contribution to the BCR14 population and habitat objectives for wood thrush. The total proposed CFA acreage only represents 0.2 percent of total acres in BCR 14, but will contribute 1.2 percent of the BCR 14 wood thrush habitat objective and 1.8 percent of the BCR 14 wood thrush population objective. We also provide the following breakdown of these bird population and habitat numbers for wood thrush by state:

Wood thrush	**Connecticut** Population Objectives = 150,000 Habitat Objectives = 1,250,000ac	**Massachusetts** Populations Objectives = 155,000 Habitat Objectives = 957,510ac	**New Hampshire** Population Objectives = 200,910 Habitat Objectives = 1,241,120ac	**Vermont** Population Objectives = 242,390 Habitat Objectives = 1,497,365ac
Population Estimates (# of individuals)				
Estimated population on all **CFAs**	5,138	3,915	9,505	13,300
Percent (%) of BCR population objective contributed by all **CFAs**	3.4%	2.5%	4.7%	5.5%
Estimated population on all **Conserved Lands**	23,130	77,035	77,590	91,715
Percent (%) of BCR population objective contributed by all **Conserved Lands**	15%	50%	39%	38%
Acres of Habitat				
Acres of potentially suitable habitat on **CFAs**	43,365	19,565	47,170	65,865
Percent (%) of BCR habitat objective contributed by all **CFAs**	3.5%	2.0%	3.8%	4.4%
Acres of potentially suitable habitat on **Conserved Lands**	98,315	387,990	383,900	453,740
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	7.9%	41%	31%	30%

B. Canada warbler

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide upland forests, forested wetlands, and shrub wetlands representing potentially suitable habitat for Canada warbler. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated Canada warbler population of 4,790 birds. With protection and appropriate management within the conserved lands network in the watershed, the network could potentially support an estimated Canada warbler population of 42,170 birds on 1,656,725 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by

BCR and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

Canada warbler	**BCR 14**[1] Pop. Obj. = 272,600 Habitat Obj. = 11,937,630ac	**BCR 30**[2] Pop. Obj. = 6,000 Habitat Obj. = 235,720ac
Population Estimates (# of individuals)		
Estimated population on all **CFAs**	4,300	490
Percent (%) of BCR population objective contributed by all **CFAs**	1.6%	11%
Estimated population on all **Conserved Lands**	40,030	2,140
Percent (%) of BCR population objective contributed by all **Conserved Lands**	15%	48%
Acres of Habitat		
Acres of available habitat on all **CFAs**	165,800	44,050
Percent (%) of BCR habitat objective contributed by all **CFAs**	1.4%	22%
Acres of available habitat on all **Conserved Lands**	1,558,575	98,150
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	13%	50%

[1] *Population objective from the BCR 14 Bird Conservation Plan; habitat objective calculated based on estimated densities from published studies.*

[2] *Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies*

We also provide the following breakdown of these bird population and habitat numbers for Canada warbler by state:

Canada warbler	**Connecticut** Pop. Obj. = 4,500 Habitat Obj. = 197,065ac	**Massachusetts** Pop. Obj. = 12,000 Habitat Obj. = 473,289	**New Hampshire** Pop. Obj. = 30,000 Habitat Obj. = 1,178,600	**Vermont** Pop. Obj. = 28,500 Habitat Obj. = 1,119,675
Population Estimates (# of individuals)				
Estimated population on all **CFAs**	490	455	1,520	2,295
Percent (%) of BCR population objective contributed by all **CFAs**	11%	3.8%	5.1%	8.1%
Estimated population on all **Conserved Lands**	2,140	9,410	15,265	14,520
Percent (%) of BCR population objective contributed by all **Conserved Lands**	48%	78%	51%	51%

Canada warbler	**Connecticut** Pop. Obj. = 4,500 Habitat Obj. = 197,065ac	**Massachusetts** Pop. Obj. = 12,000 Habitat Obj. = 473,289	**New Hampshire** Pop. Obj. = 30,000 Habitat Obj. = 1,178,600	**Vermont** Pop. Obj. = 28,500 Habitat Obj. = 1,119,675
Acres of Habitat				
Acres of potentially suitable habitat on **CFAs**	44,050	20,175	58,470	87,155
Percent (%) of BCR habitat objective contributed by all **CFAs**	22%	3.8%	4.5%	7.0%
Acres of potentially suitable habitat on **Conserved Lands**	98,150	400,410	582,870	560,760
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	50%	85%	49%	50%

C. Blackburnian warbler

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide coniferous and mixed upland forests representing potentially suitable habitat for blackburnian warbler. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated blackburnian warbler population of 26,580 birds. With protection and appropriate management within the conserved lands network in the watershed, the network could potentially support an estimated blackburnian warbler population of 232,720 birds on 1,636,020 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

Blackburnian warbler	**BCR 14**[1] Pop. Obj. = 850,000 Habitat Obj. = 14,002,330ac	**BCR 30**[2] Pop. Obj. = 8,000 Habitat obj. = 494,200ac
Population Estimates (# of individuals)		
Estimated population on all **CFAs**	26,070	508
Percent (%) of BCR population objective contributed by all **CFAs**	3.1%	6.4%
Estimated population on all **Conserved Lands**	231,640	2,160
Percent (%) of BCR population objective contributed by all **Conserved Lands**	27%	27%

Blackburnian warbler	BCR 14[1] Pop. Obj. = 850,000 Habitat Obj. = 14,002,330ac	BCR 30[2] Pop. Obj. = 8,000 Habitat obj. = 494,200ac
Acres of Habitat		
Acres of potentially suitable habitat on all **CFAs**	139,285	43,240
Percent (%) of BCR habitat objective contributed by all **CFAs**	1.0%	8.7%
Acres of potentially suitable habitat on **Conserved Lands**	1,539,915	96,110
Percent (%) of BCR habitat objective contributed by **Conserved Lands**	11%	19%

[1] *Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.*

[2] *Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.*

The proposed CFAs will provide a disproportionately large contribution to the BCR14 population and habitat objectives for blackburnian warbler. The total proposed CFA acreage only represents 0.2 percent of total acres in BCR 14, but will contribute 1.0 percent of the BCR 14 wood thrush habitat objective and 3.1 percent of the BCR 14 wood thrush population objective.

We also provide the following breakdown of these bird population and habitat numbers for blackburnian warbler by state:

Blackburnian warbler	Connecticut Pop. Obj. = 8,000 Habitat Obj. = 494,200ac	Massachusetts Pop. Obj. = 80,000 Habitat Obj. = 1,317,870ac	New Hampshire Pop. Obj. = 170,000 Habitat Obj. = 2,800,470ac	Vermont Pop. Obj. = 110,000 Habitat Obj. = 1,812,070ac
Population Estimates (# of individuals)				
Estimated population on all **CFAs**	510	3,035	8,760	12,780
Percent (%) of BCR population objective contributed by all **CFAs**	6.4%	3.8%	5.2%	12%
Estimated population on all **Conserved Lands**	2,160	58,390	78,980	82,630
Percent (%) of BCR population objective contributed by all **Conserved Lands**	27%	73%	46%	75%

Blackburnian warbler	**Connecticut** Pop. Obj. = 8,000 Habitat Obj. = 494,200ac	**Massachusetts** Pop. Obj. = 80,000 Habitat Obj. = 1,317,870ac	**New Hampshire** Pop. Obj. = 170,000 Habitat Obj. = 2,800,470ac	**Vermont** Pop. Obj. = 110,000 Habitat Obj. = 1,812,070ac
Acres of Habitat				
Acres of potentially suitable habitat on **CFAs**	43,240	19,500	56,380	84,810
Percent (%) of BCR habitat objective contributed by all **CFAs**	8.7%	1.5%	2.0%	4.7%
Acres of potentially suitable habitat on **Conserved Lands**	96,110	392,615	564,870	543,725
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	19%	30%	20%	30%

D. Black-throated blue warbler

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide deciduous and mixed upland forests representing potentially suitable habitat for black-throated blue warbler. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated black-throated blue warbler population of 25,410 birds. With protection and appropriate management within the conserved lands network in the watershed, the network could potentially support an estimated black-throated blue warbler population of 216,940 birds on 1,478,170 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

Black-throated blue warbler	**BCR 14**[1] Pop. Obj. = 565,680 Habitat Obj. = 9,318,619ac	**BCR 30**[2] Pop. Obj. =5,000 Habitat Obj. = 308,875ac
Population Estimates (# of individuals))		
Estimated population on all **CFAs**	24,200	1,210
Percent (%) of BCR population objective contributed by all **CFAs**	4.3%	24%
Estimated population on all **Conserved Lands**	214,300	2,640
Percent (%) of BCR population objective contributed by all **Conserved Lands**	38%	53%

Black-throated blue warbler	BCR 14[1] Pop. Obj. = 565,680 Habitat Obj. = 9,318,619ac	BCR 30[2] Pop. Obj. =5,000 Habitat Obj. = 308,875ac
Acres of Habitat		
Acres of potentially suitable habitat on all **CFAs**	140,410	42,310
Percent (%) of BCR habitat objective contributed by all **CFAs**	1.5%	14%
Acres of potentially suitable habitat on **Conserved Lands**	1,381,430	96,740
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	15%	31%

[1] *Population objective from the BCR 14 Bird Conservation Plan; habitat objective calculated based on estimated densities from published studies.*

[2] *Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.*

The proposed CFAs will provide a disproportionately large contribution to the BCR14 and BCR 30 population and habitat objectives for black-throated blue warbler. The total proposed CFA acreage only represents 0.2 percent of total acres in BCR 14, but will contribute 1.5 percent of the BCR 14 black-throated blue warbler habitat objective and 4.3 percent of the BCR 14 black-throated blue warbler population objective. Similarly, the total proposed CFA acreage represents 0.1 percent of BCR 30, but will contribute 9.8 percent of the BCR 30 black-throated blue warbler habitat objective and 17 percent of the BCR 30 black-throated blue warbler population objective.

We also provide the following breakdown of these bird population and habitat numbers for black-throated blue warbler by state:

Black-throated blue warbler	Connecticut Pop. Obj. = 7,000 Habitat Obj. = 432,425ac	Massachusetts Pop. Obj. = 30,000 Habitat Obj. = 494,200ac	New Hampshire Pop. Obj. = 60,000 Habitat Obj. = 988,400	Vermont Pop. Obj. = 60,000 Habitat Obj. = 988,400
Population Estimates (# of individuals)				
Estimated population on all **CFAs**	1,210	3,035	8,175	11,740
Percent (%) of BCR population objective contributed by all **CFAs**	17%	10%	14%	20%
Estimated population on all **Conserved Lands**	2,640	58,295	65,475	76,740
Percent (%) of BCR population objective contributed by all **Conserved Lands**	38%	194%	109%	128%

Black-throated blue warbler	**Connecticut** Pop. Obj. = 7,000 Habitat Obj. = 432,425ac	**Massachusetts** Pop. Obj. = 30,000 Habitat Obj. = 494,200ac	**New Hampshire** Pop. Obj. = 60,000 Habitat Obj. = 988,400	**Vermont** Pop. Obj. = 60,000 Habitat Obj. = 988,400
Acres of Habitat				
Acres of potentially suitable habitat on **CFAs**	42,310	19,815	52,300	83,950
Percent (%) of BCR habitat objective contributed by all **CFAs**	9.8%	4.0%	5.7%	8.5%
Acres of potentially suitable habitat on **Conserved Lands**	96,745	394,035	438,455	509,535
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	22%	80%	44%	52%

E. American woodcock

Through the acquisition of the proposed lands within CFAs in the watershed, Conte Refuge lands would provide upland forest, forested wetland, and wet shrub habitat representing potentially suitable habitat for American woodcock. With protection and appropriate management (to be specified in habitat management plans), these acres have the potential to support an estimated American woodcock population of 4,565 birds. With protection and appropriate management within the network of conserved lands in the watershed, the network could potentially support an estimated American woodcock population of 38,080 birds on 1,496,670 acres of potentially suitable habitat for this species. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons:

American woodcock	**BCR 14**[1] Pop. Obj.* = 163,090 Habitat Obj. = 4,006,045ac	**BCR 30**[1] Pop. Obj.* = 46,268 Habitat obj. = 2,230,080ac
Population Estimates (# of individuals)		
Estimated population on all **CFAs**	3,655	910
Percent (%) of BCR population objective contributed by all **CFAs**	2.2%	2.0%
Estimated population on all **Conserved Lands**	36,045	2,035
Percent (%) of BCR population objective contributed by all **Conserved Lands**	22%	4.4%

American woodcock	BCR 14[1] Pop. Obj.* = 163,090 Habitat Obj. = 4,006,045ac	BCR 30[1] Pop. Obj.* = 46,268 Habitat obj. = 2,230,080ac
Acres of Habitat		
Acres of potentially suitable habitat on all **CFAs**	141,720	43,870
Percent (%) of BCR habitat objective contributed by all **CFAs**	3.5%	2.0%
Acres of potentially suitable habitat on **Conserved Lands**	1,398,520	98,150
Percent (%) of BCR habitat objective contributed by all **Conserved Lands**	35%	4%

[1] *Population objectives presented from the American Woodcock Conservation Plan (http://timberdoodle.org/sites/default/files/woodcockPlan_0.pdf; accessed October 2016) are expressed in terms of number of singing males to be added to the current breeding population and habitat objectives are expressed in terms of number of additional early succession acres needed to support those additional birds.*

Assessing Contribution of Potential Management Activities to Create Successional Habitat

Active habitat management to create successional habitat for American woodcock and other disturbance-dependent wildlife (e.g., NEC) is likely to be incorporated into the habitat management plans for various CFAs in the watershed. Three of the CFAs occur within NEC focus areas, where there are targets of maintaining 1,000 acres of early successional habitat within each NEC focus area. Conte Refuge lands would not be contributing all these acres to each NEC focus area, but for the purposes of this analysis, we assume that the refuge would plan to contribute about 25 percent of these acres, or 775 acres across the three NEC focus areas. In addition, we assume that following recent management history on the refuge, approximately 60 acres will be actively managed every 5 years within acquired forest land, for a total of 180 acres over the 15 year period of this CCP. On the acres to be actively managed for early successional habitat, we assume breeding woodcock densities to be twice the density in appropriate habitat types without active management. Under these assumptions for active habitat management for early successional habitat, a total American woodcock population of 4,610 could be supported within the CFAs, with BCR breakdowns as follows:

American woodcock	BCR 14 Pop. Obj. = 163,090 Habitat Obj. = 4,006,045ac	BCR 30 Pop. Obj. = 46,268 Habitat obj. = 2,230,080ac
Estimated population on all CFAs	3,665	945
Percent (%) of BCR population objective contributed by all CFAs	2.2%	2.0%
Acres of potentially suitable habitat on CFAs	141,900	44,645
Percent (%) of BCR habitat objective contributed by all CFAs	3.5%	2.0%

F. Bobolink

Under the final CCP/EIS alternative C, Conte Refuge would potentially acquire pasture, hay, grassland, and other lower quality agricultural lands within the watershed. As these lands are acquired, they will be assessed to determine what their best habitat contribution is and to decide if those in grassland habitat will continue to be maintained as grassland habitat.

The National Land Cover Dataset (NLCD 2006) suggests that approximately 50 percent of the pasture, hay, grassland, and agricultural lands within the Connecticut River Valley are typically maintained in grassland habitat (pasture, hay, or grassland) and about 50 percent are maintained in row crop agriculture. Based on this information, we anticipate that up to 4,105 acres of grassland habitat could be restored after the existing grassland, hay, and pasture is acquired under the draft CCP/EIS alternative C.

With protection and appropriate management (to be specified in habitat management plans) of these acres within the CFAs, Conte Refuge lands could potentially support an estimated bobolink population of 920 birds on 4,105 acres of potentially suitable grassland habitat. Breaking these bird population and habitat numbers down by BCRs and comparing them to established population and habitat objectives for BCRs 14 and 30 results in the following comparisons. We also provide estimates of bobolink populations and acres of potentially suitable habitat on the existing conserved lands network within the watershed for comparison with lands targeted by the proposed land acquisition.

Bobolink	**BCR 14**[1] Pop. Obj. = 1,535,965 Habitat Obj. = 3,795,370ac	**BCR 30**[2] Pop. Obj. = 30,000 Habitat obj. = 74,130ac
Population Estimates (# of individuals)		
Estimated population on all **CFAs**	555	365
Percent (%) of BCR population objective contributed by all **CFAs**	0.03%	1.2%
Estimated population on existing **Conserved Lands**	10,020	170
Percent (%) of BCR population objective contributed by **Conserved Lands**	0.7%	0.6%
Acres of Habitat		
Acres of potentially suitable habitat in **CFAs**	1,370	2,735
Percent (%) of BCR habitat objective contributed by all **CFAs**	0.03%	3.7%
Acres of potentially suitable habitat on existing **Conserved Lands**	24,765	1,285
Percent (%) of BCR habitat objective contributed by **Conserved Lands**	0.7%	1.7%

[1] *Population objective from the BCR 14 Bird Conservation Plan; habitat objective calculated based on estimated densities from published studies.*

[2] *Population objective from the PIF Landbird Conservation Plan and PIF population estimates database; habitat objective calculated based on estimated densities from published studies.*

G. Waterfowl habitat, American black duck, and wood duck

The ACJV has established habitat objectives within waterfowl focus areas for supporting the full suite of waterfowl occurring within the ACJV boundaries. Three of these focus areas exist within the watershed: (1) the Connecticut River and Tidal Wetlands Complex Focus Area along the lower Connecticut River in Connecticut,(2) the Connecticut River Focus Area, which runs along the Connecticut River in New Hampshire and Vermont, from the Massachusetts border to the river origin, and (3) the Lake Memphremagog Focus Area in Essex and Orleans County in northern Vermont.

American black duck is a high priority species for the NAWMP, the ACJV, BCR 14, and is the focus of the Black Duck Joint Venture. The ACJV is currently in the process of establishing breeding population objectives for this species, but they were not available yet at the time this document was written. We provide estimates of acres of potential black duck habitat within CFAs and the estimated number of breeding black duck pairs that could potentially be supported by this habitat. Comparisons with population objectives can be done when the breeding population objectives have been completed by the ACJV.

Wood duck is identified as a high priority species for the Atlantic Flyway Council and as a continentally high priority species for the NAWMP. BCR 14 is recognized by the NAWMP as a high priority region for breeding need and BCR 30 is considered a moderate priority region for breeding need for wood duck. While no regional population objectives have been established for wood duck, the regional priority rankings suggest that the watershed can make significant contributions to sustaining the Atlantic Flyway population at or above target levels for harvest management purposes.

By protecting additional freshwater wetlands and saltmarsh, contributions that the proposed land protection under draft CCP/EIS alternative C could be expected to make toward waterfowl habitat objectives within the ACJV waterfowl focus areas and toward supporting breeding populations of American black duck and wood duck are as follows:

ACJV Waterfowl Focus Area	ACJV Waterfowl Habitat Objective (acres)	Acres of wetland habitat in CFAs within Focus Areas	Percent (%) of Waterfowl Habitat Objective contributed by CFAs
Connecticut River and Tidal Wetlands Complex – in CT	1,157	1,700	147%
Connecticut River – in NH	3,200	3,100	97%
Connecticut River – in VT	250	1,240	496%
Lake Memphremagog –in VT	5,101	3,969	78%
Total for entire Atlantic Flyway	1,577,594	10,009	0.6%

State	Acres of Potential Wood Duck Breeding Habitat in all CFAs (including freshwater wetland and forested wetland)	Potential Breeding American Black Duck Population Supported within CFAs (# of breeding pairs, estimated at 0.1-0.05 pairs/ ha of potential habitat, depending on suitability[1])	Potential Breeding Wood Duck Population Supported within CFAs (# of breeding pairs, estimated at 0.25 pairs/acre of potential habitat[2])
CT	6,685	135	1,671
MA	2,590	520	648
NH	3,816	154	954
VT	3,378	137	845
Watershed Total	16,469	946	4,118

[1] *Based on estimates of breeding pair estimates from Maisonneuve, et al. 2006.* Journal of Wildlife Management. *70:450-459; and Merendinno and Ankney. 1994. Condor. 96:411-421.*

[2] *Based on estimates of cavity densities presented in Dugger and Fredrickson. 1992.* Life History and Habitat Needs of the Wood Duck *in* The Waterfowl Management Handbook. *Fish and Wildlife Leaflet 13. U.S. Fish and Wildlife Service, Washington, DC.* (*http://www.nwrc.usgs.gov/wdb/pub/wmh/13_1_6.pdf*; *Accessed October 2016)*

H. Migratory Stopover Habitat

An excerpt from a 2016 report (in review), commissioned by the Service's Northeast Region, which used Doppler radar data to assess densities of migratory birds in the Northeast during fall migration, highlights the significance of stop-over habitat to migratory birds (Buler et. al, 2016). According to this study, landbirds stop frequently during their migratory journey and spend upwards of ninety-five percent (95%) of their time resting and refueling at stopover sites rather than in actual migratory flight (Alerstam 2003; Hedenström and Alerstam 1997). The migratory phase could be a limiting period of the annual cycle in many of these species (Sillett and Holmes 2002, Newton 2006, Faaborg et al. 2010a, 2010b). For example, black-throated blue warblers (Setophaga caerulescens) sustain up to 85% of their total adult mortality during migratory movements. Thus, identifying important stopover sites is a critical step in development of comprehensive conservation plans for migratory landbirds (Hutto 2000, Rich et al. 2004, Mehlman et al. 2005, Sheehy et al. 2011). Furthermore, the Buler et. al study indicates that during 2008 to 2014, there was a 29% decline in stopover densities of migratory birds. They conclude, "This is alarming, but must be considered seriously as a sign that aggregate populations of migratory land birds that migrate through Region 5 are experiencing rapid declines in their post-breeding population sizes since the radars comprehensively measure 25% of the land area within Region 5 in a systematic, consistent, and quantitative way."

Three studies have been conducted in the watershed to assess its importance to migratory birds. The first study was conducted in the late 1990's, to assess spring stopover habitat use by migrant birds within the watershed. The study was conducted by Smith College through funding by Conte Refuge and the Service's Northeast Region–Migratory Bird Program. It provides indications of the importance of the watershed to spring migrating birds (*http://www.science.smith.edu/stopoverbirds/index.html; accessed October 2016*). Over three years (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 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 mainstem of the 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 mainstem 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.

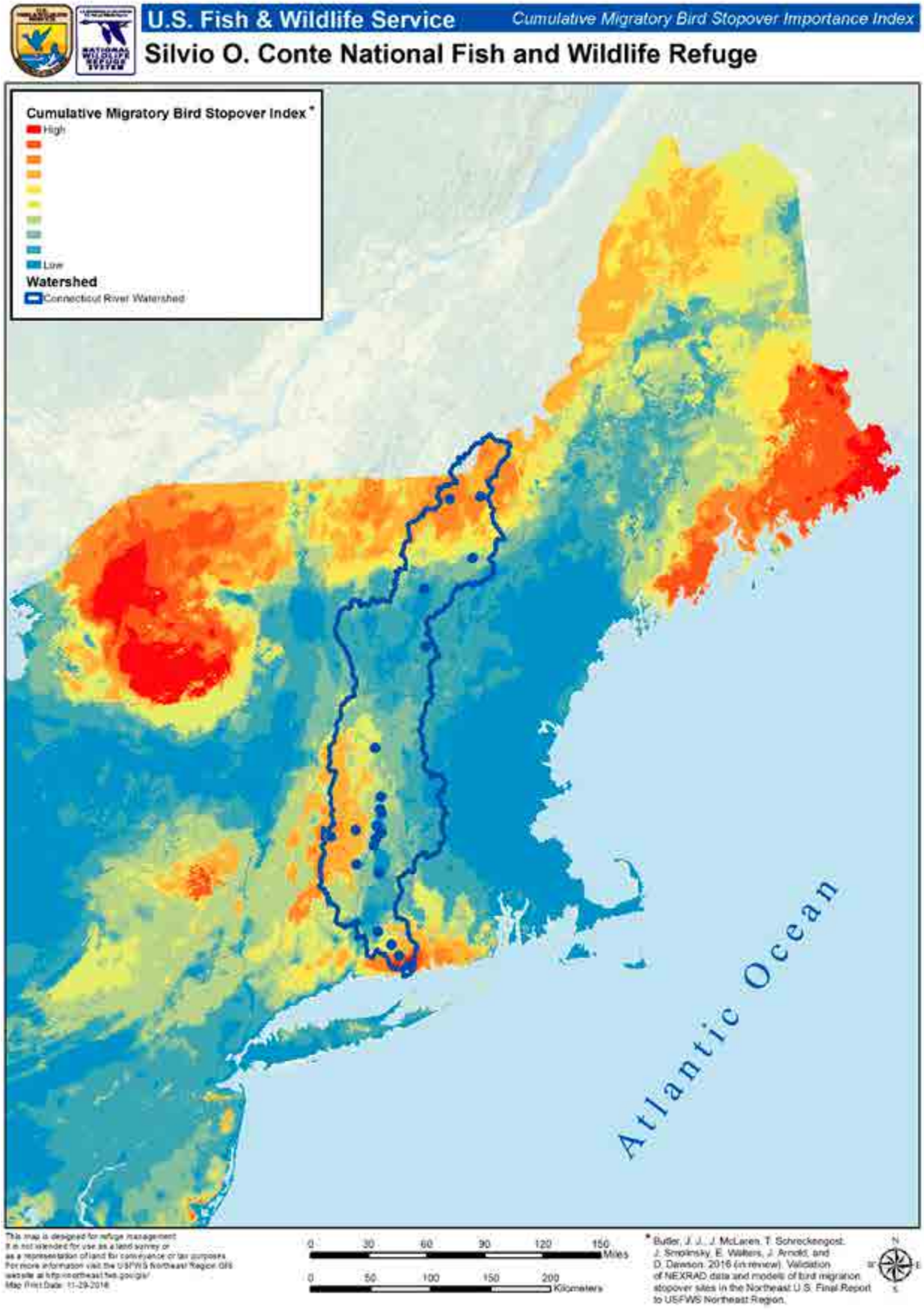
Overall density of birds observed decreased by about half from south to north, as birds dispersed away from the mainstem of the river as they moved north. The mouth and lower mainstem of the river may serve as a landscape feature used by many Eastern Flyway migrants to orient north after reaching the southern New England coast.

In 2015 and 2016, another study of migratory birds was conducted in the watershed using nanotags. A final report has not been drafted, but preliminary results shed light on several key aspects of migratory bird movement and stopover areas within the watershed: 1) migrants make extended stopovers (up to 2 weeks) within the watershed, 2) they do not move exclusively along the Connecticut River valley during either spring or fall migration; and, 3) the point count data collected on habitat associations of migrants, and the preliminary analyses, suggests that migrants concentrate along forest-shrubland edges during stopover (D. King, USFS, pers comm. 2016).

The most recent study was conducted by Buler et al from 2008 to 2014 using radar to assess migration routes and concentration areas throughout the Northeast. The specific purpose of the study was to identify the spatial distribution of important stopover sites for southbound (fall) migrating birds throughout the Northeast Region, and to gain a better ecological understanding of the relationships of migrants to stopover habitats through field surveys focused in the Mid-Atlantic Coastal Plain. The study used a national network of weather surveillance radars (WSR-88D) to detect birds in flight and then to map and study the spatial distribution of landbirds shortly after they leave daytime stopover sites to embark on nocturnal migratory flights. They also used the radar observations to develop models to predict potentially important stopover sites in areas where radar data is not available. These initial maps offer tremendous potential to inform conservation planning. Map CII.1 is a map from the 2016 report which portrays an index of the cumulative importance (indicated as high, medium, and low densities) of stop over areas with our proposed CFAs overlaid. The mouth of the Connecticut River and surrounding area, and the upper reaches of the watershed, are two of four general “hotspot” stopover areas used by fall-migrating landbirds in the Northeast.

The results of these studies suggest that habitat protection, particularly within the lower sections and upper reaches of the watershed, will have significant benefits for supporting neotropical migrants during migration, especially floodplain forest and shrub- wetland habitats along the mainstem of the Connecticut River and its mouth.

Map CII.1 Cumulative Migratory Bird Stopover Importance Index



Attachment III

Conservation Focus Area (CFA) Parcel Tables and Corresponding Parcel Maps

The following table (CIII.1) and map (CIII.1) provide an example of how the approximately 5,000 individual land parcels are detailed in our proposal. Access to CFA parcel maps and tier assignments that comprise the full project is available on our Website at *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html.*

The following example of table and corresponding map present the unique map identifier for each individual parcel, the parcel's official identifier in town or county records, its size in acres, whether it is currently in public or private ownership, our priority ranking for the parcel represented in tiers, the State it is in, the Town it is in, and whether it has any existing conservation status.

As detailed in Part IV of the LPP, we plan to only acquire either a full or partial interest in a parcel when willing sellers make them available and if funding is available. Due to our willing seller only policy and longstanding practice and other landowner preferences; approximately 10 percent of the parcels or 10 percent of the land included in the LPP will likely not be acquired by the Service. The following is a list of the definitions of each column heading:

CFA[1] Map Number	**Parcel[2] Label**	**Tax[3] Parcel ID**	**Acres[4]**	**Ownership Type[5]**	**Tier[6]**	**State[7]**	**Town[8]**	**Current Conservation Status, if any[9]**

[1] **CFA Map Number:** A three letter acronym provides a unique identifier for each respective CFA.

[2] **Parcel Label:** This number corresponds to the unique parcel identifier on the corresponding CFA map. Numbers may not be sequential due to recent updates.

[3] **Tax Parcel ID**: This numeric or alphanumeric code represents the official town or county tax identifier for the individual parcel

[4] **Acres**: This represents the size of the individual parcel in acres based on official tax records.

[5] **Ownership Type**: The indicates whether the current owner is a "Private" or "Public" entity

[6] **Tier**: Individual parcels are ranked as either being in Tier 1, Tier 2, or Tier 3 based on the presence and amount of important terrestrial habitat, presence and amount of important water and wetlands habitat, and its size. Tier 1 parcels include more and larger important habitat areas and are bigger in size. See Table C.9 in LPP and associated narrative for more information.

[7] **State**: This indicates the respective State the parcel lies in.

[8] **Town**: This indicates the respective Town the parcel lies in.

[9] **Conservation Status**: This indicates whether the parcel has any existing conservation status based on an interest from another conservation organization. If known, fee interest or easement interest is indicated. We would not pursue acquisition of land already in an existing, permanent conservation status, except under extenuating circumstances..

Table CIII.1. Example Parcel Table for Proposed Blueberry Swamp Conservation Focus Area (CFA) (full project can be accessed at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html)*

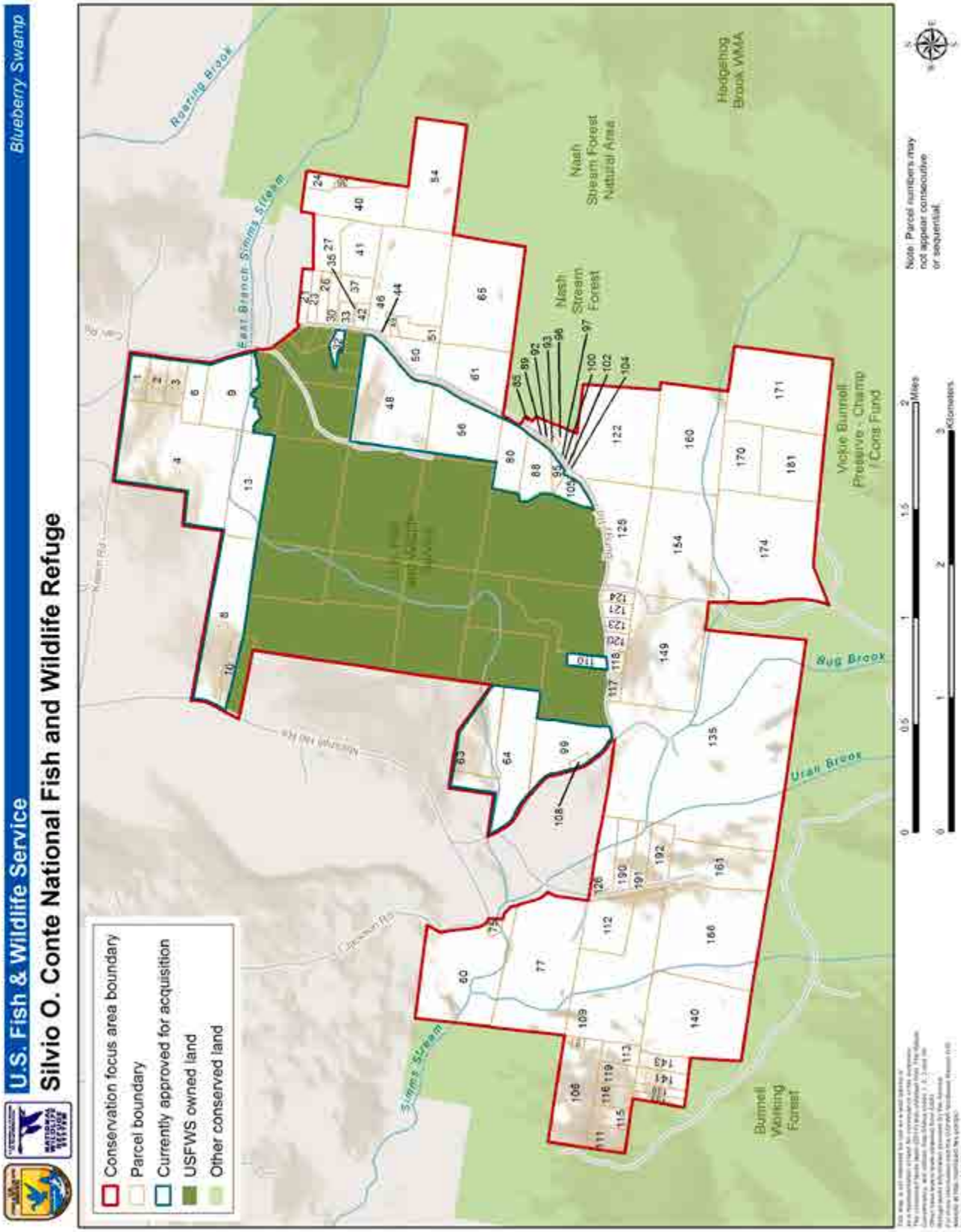
CFA Map Number	Parcel Label on CFA Map	Tax Map Number	Tax Lot Number	Parcel Acres	Tier	Parcel Town	Parcel State
BBS1	1	420	17	14.02	2	Columbia	NH
BBS1	2	420	16	12.36	3	Columbia	NH
BBS1	3	420	15	12.24	3	Columbia	NH
BBS1	4	420	18	143.93	2	Columbia	NH

CFA Map Number	Parcel Label on CFA Map	Tax Map Number	Tax Lot Number	Parcel Acres	Tier	Parcel Town	Parcel State
BBS1	6	420	14	17.84	3	Columbia	NH
BBS1	8	417	100.2	78.46	2	Columbia	NH
BBS1	9	420	13	51.93	2	Columbia	NH
BBS1	10	417	101	11.52	3	Columbia	NH
BBS1	13	420	8	52.86	2	Columbia	NH
BBS1	21	420	60	7.81	3	Columbia	NH
BBS1	23	420	61	6.96	3	Columbia	NH
BBS1	24	420	44	6.69	3	Columbia	NH
BBS1	26	420	62	7.31	3	Columbia	NH
BBS1	27	420	49	22.53	3	Columbia	NH
BBS1	30	420	63	7.18	3	Columbia	NH
BBS1	32	420	3.2	4.58	3	Columbia	NH
BBS1	33	420	65	5.29	3	Columbia	NH
BBS1	35	420	66	0.77	3	Columbia	NH
BBS1	36	420	45	5.4	3	Columbia	NH
BBS1	37	420	64	12.9	3	Columbia	NH
BBS1	40	420	46	46.52	2	Columbia	NH
BBS1	41	420	48	27.86	3	Columbia	NH
BBS1	42	420	67	4.8	3	Columbia	NH
BBS1	44	421	11	0.12	3	Columbia	NH
BBS1	46	421	12	97.12	1	Columbia	NH
BBS1	48	421	10	95.85	2	Columbia	NH
BBS1	49	421	14	2.95	3	Columbia	NH
BBS1	50	421	15	20.42	2	Columbia	NH
BBS1	51	421	16	10.01	3	Columbia	NH
BBS1	54	421	13	77.44	1	Columbia	NH
BBS1	56	421	8	61.19	2	Columbia	NH
BBS1	60	416	18	107.84	2	Columbia	NH
BBS1	61	421	17	51.62	2	Columbia	NH
BBS1	63	416	34	43.42	2	Columbia	NH
BBS1	64	416	53	76.94	2	Columbia	NH
BBS1	65	421	18	109.22	1	Columbia	NH
BBS1	75	416	17	3.05	3	Columbia	NH
BBS1	77	416	6	133.95	3	Columbia	NH
BBS1	80	421	7	25.99	3	Columbia	NH
BBS1	85	421	20.1	0.96	3	Columbia	NH
BBS1	88	421	6	23.27	3	Columbia	NH

CFA Map Number	Parcel Label on CFA Map	Tax Map Number	Tax Lot Number	Parcel Acres	Tier	Parcel Town	Parcel State
BBS1	89	421	21	0.27	3	Columbia	NH
BBS1	92	421	22	2.15	3	Columbia	NH
BBS1	93	421	24	1	3	Columbia	NH
BBS1	95	421	5	5.11	3	Columbia	NH
BBS1	96	421	28	11.71	3	Columbia	NH
BBS1	97	421	25	0.25	3	Columbia	NH
BBS1	99	416	55.2	47.03	3	Columbia	NH
BBS1	100	421	26	0.24	3	Columbia	NH
BBS1	102	421	28.1	0.22	3	Columbia	NH
BBS1	104	421	27	0.23	3	Columbia	NH
BBS1	105	421	3	10.86	3	Columbia	NH
BBS1	106	416	5	56.35	3	Columbia	NH
BBS1	107	416	4	2.03	3	Columbia	NH
BBS1	108	416	55.1	2.73	3	Columbia	NH
BBS1	109	416	46	119.58	3	Columbia	NH
BBS1	110	416	56.1	6.79	3	Columbia	NH
BBS1	111	411	2	12.36	3	Columbia	NH
BBS1	112	416	47	34.1	3	Columbia	NH
BBS1	113	416	3	11.1	3	Columbia	NH
BBS1	115	411	3	11.34	3	Columbia	NH
BBS1	116	416	1	11.51	3	Columbia	NH
BBS1	117	416	61	5.85	3	Columbia	NH
BBS1	118	416	60	5.58	3	Columbia	NH
BBS1	119	416	2	11.42	3	Columbia	NH
BBS1	120	416	59	5.7	3	Columbia	NH
BBS1	121	421	34	6.36	3	Columbia	NH
BBS1	122	421	29	104.66	3	Columbia	NH
BBS1	123	416	58	5.19	3	Columbia	NH
BBS1	124	421	32	5.06	3	Columbia	NH
BBS1	125	421	30	62.75	2	Columbia	NH
BBS1	126	416	43.1	22.27	2	Columbia	NH
BBS1	133	416	52	5.88	3	Columbia	NH
BBS1	135	416	62.1	422.27	2	Columbia	NH
BBS1	139	416	51	6.02	3	Columbia	NH
BBS1	140	416	48	108.8	3	Columbia	NH
BBS1	141	416	50	11.83	3	Columbia	NH
BBS1	143	416	49	11.15	3	Columbia	NH
BBS1	149	421	33	113.97	3	Columbia	NH

CFA Map Number	Parcel Label on CFA Map	Tax Map Number	Tax Lot Number	Parcel Acres	Tier	Parcel Town	Parcel State
BBS1	154	421	31	104.55	2	Columbia	NH
BBS1	160	421	31.01	97.54	2	Columbia	NH
BBS1	161	416	44	60.7	3	Columbia	NH
BBS1	166	416	45	132.48	2	Columbia	NH
BBS1	170	422	2.2	38.3	3	Columbia	NH
BBS1	171	422	3	105.51	3	Columbia	NH
BBS1	174	422	1	153.2	1	Columbia	NH
BBS1	181	422	2.1	58.24	2	Columbia	NH
BBS1	190	416	43.2	18.89	2	Columbia	NH
BBS1	191	416	43.3	14.77	2	Columbia	NH
BBS1	192	416	43.4	19.84	2	Columbia	NH
BBS1	126	416-43.1	22.3	Private	2	NH	Columbia
BBS1	133	416-52	5.9	Private	3	NH	Columbia
BBS1	135	416-62.1	422.3	Private	2	NH	Columbia
BBS1	139	416-51	6.0	Private	3	NH	Columbia
BBS1	140	416-48	108.8	Private	3	NH	Columbia
BBS1	141	416-50	11.8	Private	3	NH	Columbia
BBS1	143	416-49	11.2	Private	3	NH	Columbia
BBS1	149	421-33	114.0	Private	3	NH	Columbia
BBS1	154	421-31	104.6	Private	2	NH	Columbia
BBS1	160	421-31.01	97.5	Private	2	NH	Columbia
BBS1	161	416-44	60.7	Private	3	NH	Columbia
BBS1	166	416-45	132.5	Private	2	NH	Columbia
BBS1	170	422-2.2	38.3	Private	3	NH	Columbia
BBS1	171	422-3	105.5	Private	3	NH	Columbia
BBS1	174	422-1	153.2	Private	1	NH	Columbia
BBS1	181	422-2.1	58.2	Private	2	NH	Columbia
BBS1	190	416-43.2	18.9		2	NH	Columbia
BBS1	191	416-43.3	14.8		2	NH	Columbia
BBS1	192	416-43.4	19.8		2	NH	Columbia

Map CIII.1. Example Parcel Map for Proposed Blueberry Swamp Conservation Focus Area (CFA) (full project can be accessed at: *http://www.fws.gov/refuge/Silvio_O_Conte/what_we_do/conservation.html*



Attachment IV

Connect the Connecticut Landscape Conservation Design
Overview and Example of Three Data Products

Overview
The *Connect the Connecticut* LCD is intended to guide and focus conservation actions, including land protection, management, restoration, and general land stewardship, where it will likely do the most good towards conserving biodiversity within the Connecticut River watershed (watershed). The *Connect the Connecticut* LCD provides a watershed-based conservation design to complement or supplement conservation planning done at local or finer extents. Although the *Connect the Connecticut* LCD offers a way to strategically focus limited conservation resources, by itself it is not sufficient as a total solution to biodiversity conservation in the watershed. This design serves as a starting point that should be used in combination with other sources of information and tools to inform conservation decisions where a sense of role and place within a larger landscape is desirable. The *Connect the Connecticut* guidance report (Schwenk and Mallek 2016) provides a more extensive overview to the design, its methodology, and how it can be used as a conservation tool.

Connect the Connecticut is an example of the increasingly common approach to large-scale conservation termed *Landscape Conservation Design*. Landscape Conservation Design refers to a collaborative, holistic process among partners that results in shared conservation strategies at specified locations. *Landscape* conveys the idea that the process encompasses a large area such as an entire watershed. *Design* conveys the idea of a creative process to identify specific areas for priority action that collectively comprise an integrated, interrelated whole. *Connect the Connecticut* takes advantage of emerging capabilities to map, analyze, and forecast changes to natural resources to a degree never before possible. These innovations allowed the partners to develop a detailed, strategic conservation *design*. The design outlines a network of *core areas,* or intact, connected, and resilient places within the watershed. This design also includes connections and supporting landscapes that, along with the core areas, serve as a roadmap for conservation action.

Connect the Connecticut reflects a unified vision that considers the value of fish and wildlife species, and the ecosystems they inhabit, from Long Island Sound to the peaks of the White Mountains. Core areas include high quality, resilient examples of the full range of ecosystem types throughout the watershed, from spruce-fir forests to small streams to freshwater marshes. High quality habitat for a set of 20 fish and wildlife species—including American woodcock, wood thrush, and Eastern brook trout—is also a key component of the network of core areas. These species have been chosen to represent others that rely on similar habitats in the watershed.

In addition to the network of core areas, *Connect the Connecticut* provides a set of tools and information that resource managers, planners, and many others can use to prioritize effective conservation action to maintain and restore the natural resources of the watershed. It also provides information about how the watershed may change in future decades as human communities grow and climate changes. The information is intended to complement other state and local sources of knowledge and planning efforts. The partnership is committed to using these tools, learning from them and sharing these lessons back to the full partnership so that *Connect the Connecticut* can be a living document that informs conservation actions by the team and many others across the basin.

The innovative work of integrating the best available spatial and ecological scientific data into a unified conservation design, and of developing many of those components, was led by a team of scientists from the Department of Environmental Conservation at the University of Massachusetts Amherst. This effort, one part of the broader *Designing Sustainable Landscapes* project, was supported by the North Atlantic LCC and the Northeast Climate Science Center. UMass incorporated data and information from The Nature Conservancy, the U.S. Geological Survey, and state fish and wildlife agencies into the design process.

The partners who developed *Connect the Connecticut* are now using the design to guide decisions on implementing conservation actions as part of an ongoing learning process, which will be discussed in future meetings of the partnership. For example, partners at the Massachusetts Division of Fisheries and Wildlife plan to use the design to support ongoing efforts to identify the best habitat for rare species in the Commonwealth, and the Long Island Sound Regional Conservation Fund plans to use the design as a source of information to help identify priority locations for forest conservation.

The complete design package consists of a series of spatial datasets mapped for the Connecticut River watershed, which have been grouped into four main categories:

(1) The Core-Connector Network of the places most essential for conservation action, in both terrestrial and aquatic settings. Collectively, this network is intended to represent the areas most important for maintaining the benefits provided by the fish, wildlife, and ecosystems of the watershed. Components of the network include core areas, connectors, supporting landscapes, and aquatic buffers.

(2) Supporting Data used to create the Core-Connector Network. They can help in understanding and setting priorities within the interconnected network, but also can be used independently. Examples include datasets that depict ecological integrity and species habitat.

(3) Restoration Tools that can inform actions for re-connecting and enhancing the ecosystems of the watershed.

(4) Future Change Tools that provide context for making more strategic decisions in anticipation of future changes related to climate and land use

We profile three important Connecticut River Watershed LCD data products below and share an example map of how each data layer overlaps with three northern CFAs.

Terrestrial core-connector network (map CIV.1)
The *Connect the Connecticut* LCD was created by a group of stakeholders from different institutions, all united by the common cause of maintaining the fish, wildlife, and ecosystems of the Connecticut River watershed over the long term. Through an iterative and collaborative process, the partnership developed a framework for conservation action designed to achieve a set of shared goals. That framework is anchored by the terrestrial and aquatic Core-Connector Networks. These networks of high priority core areas for both terrestrial (including wetlands) and aquatic ecosystems represent a synthesis of ecological information and are designed to provide strategic guidance for conserving natural areas, and the fish, wildlife, and other components of biodiversity that they support, within the watershed.

In combination with the aquatic core area network, the terrestrial core-connector network spatially represents the ecological network developed by the Connecticut River watershed landscape conservation design partnership as part of the *Connect the Connecticut* LCD. Components of the terrestrial network include core areas, connectors, and supporting landscapes.

Across the network, the Tier 1 terrestrial core areas can be viewed as the best places to start for protection and management of lands and waters in their natural state. Connectivity needs for terrestrial species are met by linking Tier 1 terrestrial core areas through a defined set of connectors that represent the best available places for plants and animals to move across the landscape. While the Tier 1 terrestrial core areas are the highest priority for conservation, Tier 2 terrestrial core areas and supporting landscapes help confer value on their associated core areas and benefit from various stewardship activities (Figure 2). Tier 1 cores are nested within the Tier 2 cores, which are nested within the Supporting Landscapes. Supporting landscapes specifically provide practical boundaries within which to direct conservation actions when political or parcel boundaries are relevant, such as easement design or the implementation of forest management plans.

Core areas serve as the foundation of the conservation design. Spatial data and information used to create the core areas includes.

- Areas of relatively high ecological integrity across all terrestrial and wetland ecosystem types.
- Areas of relatively high resilience across the full spectrum of geophysical settings present in the watershed.
- Areas of relatively high current landscape capability for a suite of 14 representative terrestrial wildlife species.
- Areas of high potential for floodplain forest restoration along major rivers, emphasizing areas where geomorphic characteristics favor the development of floodplain forest.

- Areas of terrestrial rare natural communities that support unique biodiversity, regardless of their landscape context.

Connectors represent "corridors" that could facilitate the movement of plants and animals (i.e., ecological flow) between terrestrial core areas. These connectors increase the resiliency of the core area network to uncertain land use and climate changes.

Terrestrial Tier 2 Core Areas support the Tier 1 terrestrial cores. Like the Tier 1 core areas, Tier 2 core areas encompass a variety of intact ecosystems and high quality habitat for wildlife distributed across the watershed and constitute 25% of the land area of the watershed.

Supporting Landscapes are the lands surrounding Tier 1 and 2 core areas out to the nearest significant road or development. The inclusion of Supporting Landscapes recognizes the fact that the entire forest block or other natural area in which a terrestrial-based core area is located influences the integrity of and is potentially important to the maintenance of the ecological value in the core areas. Terrestrial core area boundaries are based on ecological value and may not follow recognizable jurisdictional or property boundaries, though they do not span major roads. Because Supporting Landscapes follow familiar road boundaries, conservation actions directed at core areas can be associated with convenient borders if desired.

There is a strong correlation with the Conte Refuge Conservation Focus Areas (CFAs) as defined in this LPP and the Tier 1 cores and connectors from *Connect the Connecticut* (see map CIV.1). Tier 1 cores and connectors have nearly 80% overlap with the identified CFAs (table 1). Those non-overlapping lands are generally targets for restoration. Virtually all of the land in CFAs is identified in the *Connect the Connecticut* design as a Tier 1 or Tier 2 core, a connector, or a Supporting Landscape. Of the non-secured lands within CFAs, 117,669 acres (5% of the currently non-secured Tier 1 cores and connectors) are also in Tier 1 cores or connectors. Acquisition of these acres would contribute toward the larger landscape core and connector goals outlined in *Connect the Connecticut.*

Table CIV.1. Acres of land in the Connecticut River watershed and variously defined sub-geographies.

Geography	Area in Acres
Connecticut River watershed	7,191,590
Secured Lands	1,794,316
Tier 1 Cores	1,783,164
Tier 1 Cores and Connectors combined	3,417,943
Secured land that intersects with Tier 1 Cores and Connectors	1,205,588
Secured land that intersects with Tier 1 Cores	775,741
Conte CFAs	213,558
Tier 1 core area intersects with CFAs	117,196
Connectors that intersect with CFAs	50,027
Secured land that intersects with CFAs	62,141
Non-secured land in CFAs *and* Tier 1 cores or connectors	117,669
Non-secured land in CFAs *and* Tier 1 cores	76,544
Non-secured land in the watershed *and* Tier 1 cores or connectors	2,212,812

Aquatic ecosystem-based core areas (map CIV.2)
The aquatic ecosystem-based core area was used to create the aquatic ecosystem-based cores. It is a continuous surface in which every cell is assigned a value based on its relative ecological integrity within each HUC6 watershed. In most places this index has the same value as the index of ecological integrity (IEI, another data product developed for the *Connect the Connecticut* LCD). However, where headwater streams occur the index is the average of the IEI and the USGS stream temperature tolerance index (another data product developed

for the *Connect the Connecticut* LCD). This layer can be used to understand the relative ecological contribution of aquatic cores and as information about the relative ecological value of areas surrounding the aquatic cores. The underlying data layers used to construct it can also be used independently.

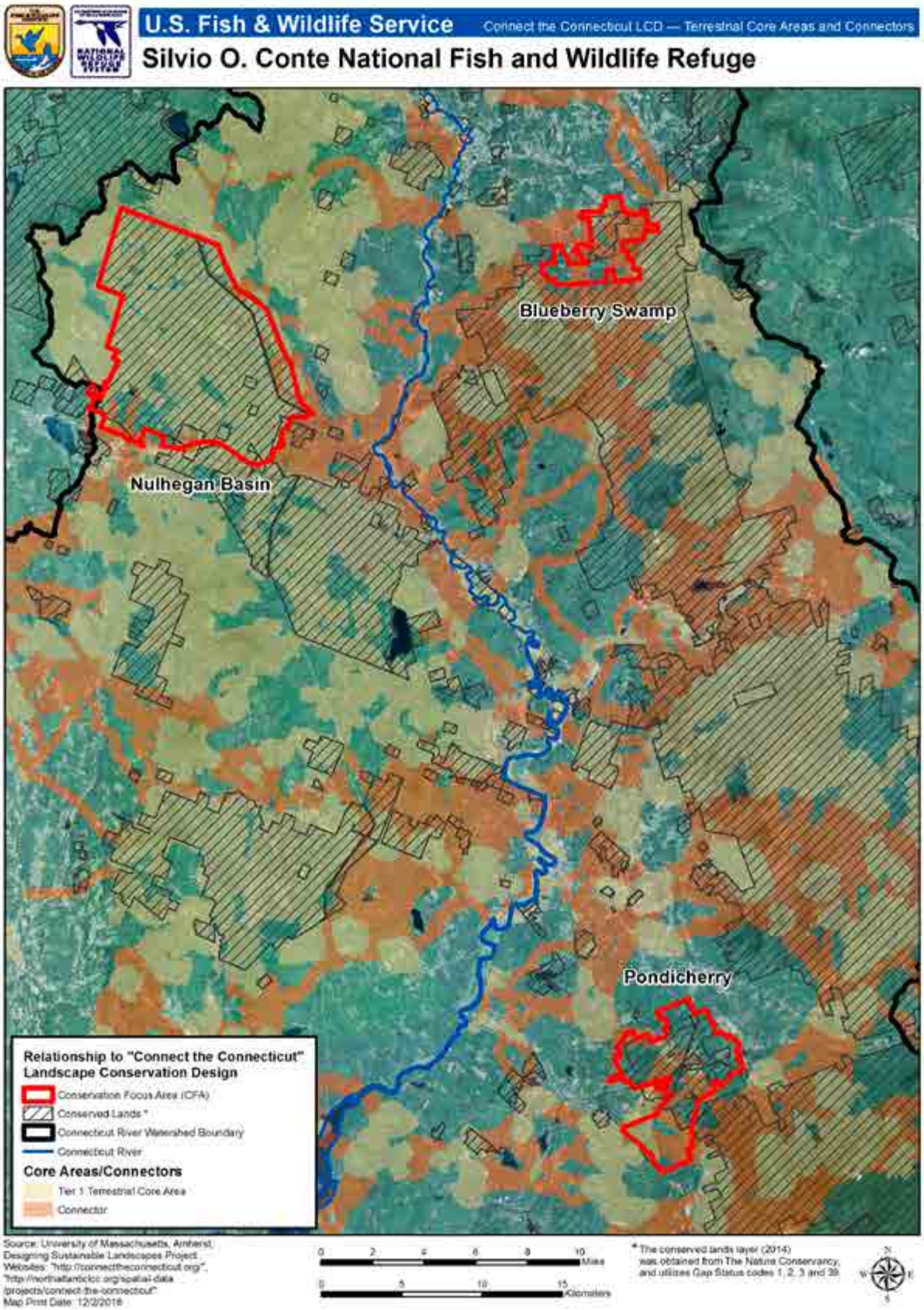
Species landscape capability (map CIV.3)
As a complement to the ecosystem-based approach for identifying conservation priorities, *Connect the Connecticut* also specifically considers the habitat needs of fish and wildlife. Because it is not possible to identify priority habitat locations for all of the hundreds of species that inhabit the watershed, *Connect the Connecticut* focuses on habitat needs for a carefully-selected set of 14 wildlife species (listed below). These were chosen to represent the habitat needs of a large number of species that share many of the same habitats. These "representative species" were also chosen because they are sensitive to landscape change, such as loss of habitat due to development, and because they are well studied, enabling researchers to map their habitats. Several are species of conservation concern.

Landscape capability is an integrated measure of habitat quality and ability to support a focal species, climate suitability, and existing data on occurrence and abundance. Landscape capability relates characteristics of the landscape to those places where populations are most abundant or successful. Each individual species' landscape capability is calculated from a model unique to that species. In addition, each species is considered a representative for a larger suite of species with similar ecological needs and uses. The following 14 species landscape capability models are available:

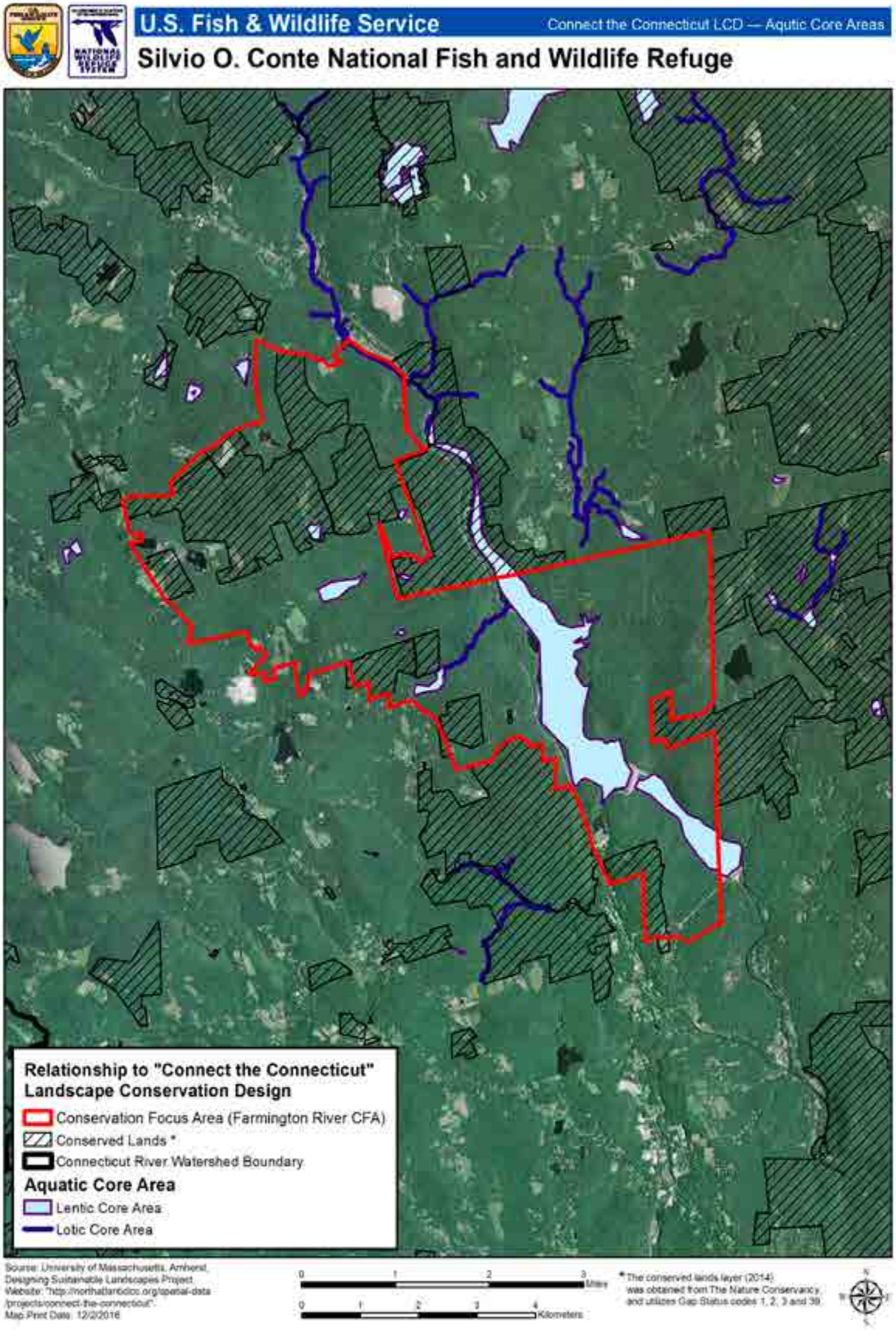
(1) American woodcock
(2) Black bear
(3) Blackburnian warbler
(4) Blackpoll warbler
(5) Eastern meadowlark
(6) Louisiana waterthrush
(7) Marsh wren
(8) Moose
(9) Northern waterthrush
(10) Prairie warbler
(11) Ruffed grouse
(12) Wood duck
(13) Wood thrush
(14) Wood turtle

These models were used as inputs during the creation of the species-based core areas. More detailed information about the representative species models is available from the species documentation from the UMass-maintained DSL project web page (*http://www.umass.edu/landeco/research/dsl/dsl.html*, accessed July 2016).

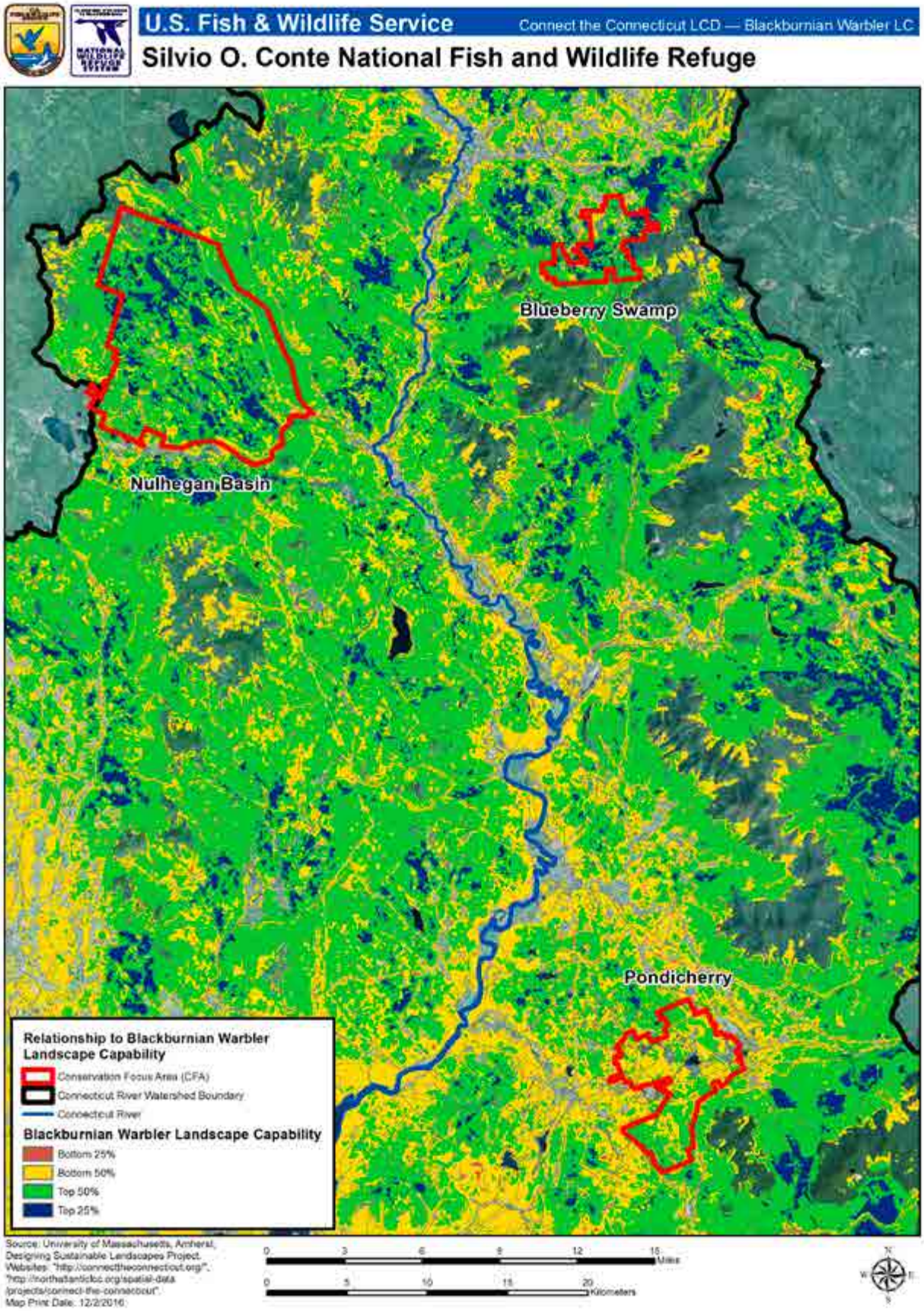
Map CIV.1. Example of How the Blueberry Swamp, Nulhegan Basin, and Pondicherry CFAs Overlap with the Connecticut River Watershed LCD Project's Terrestrial Core-connector Network Product.



Map CIV.2. Example of How the Farmington River CFA Overlaps with the Connecticut River Watershed LCD Project's Aquatic Core Areas.



Map CIV.3. Example of How the Blueberry Swamp, Nulhegan Basin, and Pondicherry CFAs Overlap with the Connecticut River Watershed LCD Project's Blackburnian Warbler Landscape Capability Index Product.



Bibliography

Atlantic Coast Joint Venture. 2008. New England-Mid-Atlantic Coast Bird Conservation Region (BCR 30) Implementation Plan. *http://www.acjv.org/BCR_30/BCR30_June_23_2008_final.pdf*. Accessed October 2016

Atlantic Coast Joint Venture. 2014. Atlantic Northern Forest BCR14. *http://acjv.org/planning/bird-conservation-regions/bcr-14/*. Accessed October 2016

Black Duck Joint Venture. 2008. Black Duck Joint Venture Strategic Plan 2008-2013. U.S. Fish and Wildlife Service, Laurel, Maryland; Canadian Wildlife Service, Ottawa, Ontario. 51 pp. *http://blackduck.cmi.vt.edu/docs/BDJV%20Strategic%20Plan%202008_2013.pdf*. Accessed October 2016

Buler, J. J., J. McLaren, T. Schreckengost, J. Smolinsky, E. Walters, J. Arnold, and D. Dawson. 2016 (in review). Validation of NEXRAD data and models of bird migration stopover sites in the Northeast U.S. Final Report to USFWS Northeast Region.

Carver, E. and J. Caudill, Ph.D. 2007. Banking on Nature 2006: the economic benefits to local communities of national wildlife refuge visitation. U.S. Fish and Wildlife Service, Division of Economics, Washington, DC. Accessed online October 2016 at: *http://www.fws.gov/refuges/about/bankingonnature.html*

Carver, E. and J. Caudill, Ph.D. 2013. Banking on Nature: the economic benefits to local communities of national wildlife refuge visitation. U.S. Fish and Wildlife Service, Division of Economics, Washington, DC. *http://www.fws.gov/refuges/about/refugereports/pdfs/BankingOnNature2013.pdf* . Accessed October 2016.

Caudill, J., Henderson, E. 2003. Banking on Nature, 2002—The economic benefits to local communities of National Wildlife Refuge visitation: Washington D.C., U.S. Department of the Interior, Fish and Wildlife Service, Division of Economics.

Connecticut Department of Energy and Environmental Protection (CTDEEP). 2005. Connecticut's Comprehensive Wildlife Conservation Strategy. Accessed October 2016 online at: *ftp://ftp.state.ct.us/pub/dep/wildlife/cwcs/CWCSIntro.pdf*

DeGraaf, R. M., and M. Yamasaki. 2001. New England wildlife: habitat, natural history, and distribution. University Press of New England.

Dreyer, G. and M. Caplis eds. 2001. Living Resources and Habitats of the Lower Connecticut River. Connecticut River Arboretum, New London, CT.

Fuller, S., and A. Tur. 2012. Conservation strategy for the New England cottontail (*Sylvilagus transitionalis*). Page 143. New England Cottontail Technical Committee.

Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. *Completion of the 2006 National Land Cover Database for the Conterminous United States*, PE&RS, Vol. 77(9):858-864. National Land Cover Data. 2006.

Hatfield, R., Jepsen, S., Thorp, R., Richardson, L. & Colla, S. 2015. Bombus terricola. The IUCN Red List of Threatened Species 2015: e.T44937505A46440206. *http://dx.doi.org/10.2305/IUCN.UK.2015-2.RLTS.T44937505A46440206.en*. Downloaded on 23 November 2016.

Ingraham, M.W., and S.G. Foster. 2008. The value of ecosystems provided by the U.S. National Wildlife Refuge System in the contiguous U.S. *Ecological Economics* 67(4): 608-618.

Massachusetts Division of Fisheries and Wildlife. 2006. Commonwealth of Massachusetts Comprehensive Wildlife Conservation Strategy. Accessed October 2016 online at: *http://www.mass.gov/eea/docs/dfg/dfw/habitat/cwcs/mass-cwcs-final.pdf*

National Land Cover Data (NLCD). Fry, J., Xian, G., Jin, S., Dewitz, J., Homer, C., Yang, L., Barnes, C., Herold, N., and Wickham, J., 2011. *Completion of the 2006 National Land Cover Database for the Conterminous United States*, *PE&RS*, Vol. 77(9):858-864.

National Oceanic and Atmospheric Administration (NOAA) Fisheries, Office of Protected Resources. 2014. *http://www.fisheries.noaa.gov/pr/species/fish/atlantic-sturgeon.html.* Accessed October 2016

Nedeau, E. 2009. Distribution, threats, and conservation of the dwarf wedgemussel (*Alasmidonta heterodon*) in the Middle and Northern Macrosites of the Upper Connecticut River. Page 42. Biodrawversity, LLC., Amherst, MA.

New Hampshire Fish and Game Department (NHFG). 2015. New Hampshire Wildlife Action Plan. Concord, New Hampshire. Accessed October 2016 online at: *http://www.wildlife.state.nh.us/wildlife/wap.html*

van Dijk, P.P. & Harding, J. 2016. Glyptemys insculpta. The IUCN Red List of Threatened Species 2016: e.T4965A97416259. Downloaded on 23 November 2016.

Partners in Flight. 2016. Partners in Flight Landbird Conservation Plan. *http://www.partnersinflight.org/plans/landbird-conservation-plan/*. Accessed October 2016

Schwenk, S. and M. Mallek. 2016. Connect the Connecticut: A roadmap for conserving the Connecticut River Watershed for future generations. North Atlantic Landscape Conservation Cooperative. Hadley, MA.

Smith College. 2006. The Silvio O. Conte National Fish & Wildlife Refuge Neotropical Migrant Bird Stopover Habitat Survey. *http://www.science.smith.edu/stopoverbirds/index.html*. Accessed October 2016

U.S. Census Bureau. 2013. American Factfinder. Accessed online October 2016 at: *http://factfinder2.census.*gov/faces/nav/jsf/pages/*index.xhtml*

U.S. Fish and Wildlife Service (USFWS). 1989b. Jessup's milkvetch (*Astragalus robbinsii var. jesupii*) Recovery Plan. 1989. Hadley, Massachusetts.

____. 1992. Small whorled pogonia *(Isotria medeoloides)* Recovery Plan. Hadley, Massachusetts.

____. 1993a. Dwarf Wedge Mussel *(Alasmidonta heterdon)* Recovery Plan. 1993. Hadley, Massachusetts. 30 pp.

____. 1993b. Puritan Tiger Beetle *(Cicindela puritan)* Recovery Plan. Hadley, Massachusetts. 45 pp.

____. 1993c. Northeastern bulrush *(Scirpus ancistrochaetus)* Recovery Plan. 1992. Hadley, Massachusetts.

____. 1995a. Final Action Plan and Environmental Impact Statement for Implementing the Silvio O. Conte National Fish and Wildlife Refuge Act in the Connecticut River Watershed of Connecticut, Massachusetts, Vermont, and New Hampshire Region 5, Hadley, Massachusetts

____. 2005. Canada lynx (*Lynx canadensis*) Recovery Outline. *http://www.fws.gov/mountain-prairie/species/*mammals/lynx/final%20lynx*%20RecoveryOutline9-05.pdf.* Accessed October 2016.

____. 1996. The status of migratory fish passage and barriers to passage in the Connecticut River watershed. Connecticut River Coordinator's Office, Sunderland, MA.

____. 2006. Northeastern bulrush (*Scripus ancistrochaetus*). *http://www.fws.gov/northeast/pdf/bulrush.pdf.* Accessed October 2016

____. 2008. Northeastern bulrush (*Scirpus ancistrochaetus*) 5-year review: summary and evaluation. U.S. Fish and Wildlife Service, Pennsylvania Field Office, State College, PA. *https://www.fws.gov/ecos/ajax/docs/five_year_review/doc2618.pdf* Accessed October 2016

____. 2008b. Jesup's milk-vetch (*Astragalus robbinsii var. jesupii*). 5-Year Review. *https://www.fws.gov/ecos/ajax/docs/five_year_review/doc2581.pdf* Accessed October 2016

____. 2009. Canada lynx. *http://www.fws.gov/mountain-prairie/species/mammals/lynx/*. Accessed October 2016.

____. 2009b. Jesup's milk-vetch (*Astragalus robbinsii var. jesupii*). Spotlight Species Action Plan. *http://www.fws.gov/northeast/endangered/pdf/Jessup%27s%20milk-vetch%20SSAP.pdf*. Accessed October 2016.

Vermont Fish and Wildlife Department. 2016. Vermont state wildlife action plan. Accessed online October 2016 at: *http://www.vtfishandwildlife.com/UserFiles/Servers/Server_73079/File/About%20Us/Budget%20and%20Planning/WAP_2015draft/VT%20Wildlife%20Action%20Plan%20Draft%2010-1-2015.pdf*

Von Oettingen, Susi. Personal communications. 2010. U.S. Fish and Wildlife Service, Wildlife Biologist, Ecological Services, New England Field Office.