



Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

February 11, 2013

Ken Smith
President, Becket Land Trust
PO Box 44
Becket, MA 01223

RE: New England Cottontail habitat management at the Becket Land Trust Historic Quarry and Forest property, Becket

Dear Ken,

Thank you for your interest in New England Cottontail (*Sylvilagus transitionalis*) habitat management at the ~304 acre Historic Quarry and Forest property on Quarry Rd. The U.S. fish and Wildlife Service (USFWS) designated New England Cottontail as a candidate for federal Endangered Species Act protection identifying habitat loss and fragmentation as an imminent threat to them. As part of a Rangewide New England Cottontail Initiative with a goal to avert federal listing, the Massachusetts Division of Fisheries & Wildlife (DFW), USFWS, Wildlife Management Institute, and Natural Resources Conservation Service (NRCS) are working to implement habitat management in New England Cottontail focal areas. The Historic Quarry and Forest property occurs within the Southern Berkshire Focal Area (Figure 1). Under the Rangewide Initiative, NRCS is offering funding assistance to private landowners for habitat management and the USFWS Partners for Fish and Wildlife Program (PFW) can offer a locally-based Partners Program field biologist to work one-on-one with private landowners and other partners to plan, implement, and monitor their habitat management projects.

Habitat is defined as an area which, due to its physical or biological features, protects or provides important elements for the growth and survival of plants or animals such as food, shelter, or living space, and includes without limitation, breeding, feeding, resting, migratory, or wintering areas. New England Cottontail is a habitat specialist and requires young forest/shrubland areas that provide dense, woody vegetation 3 to 15 feet in height. Blocks of 25 acres or more are ideal, as this is the minimum amount of habitat thought to sustain cottontail populations. Since New England Cottontails experience low survival in habitat patches less than 12 acres, the most valuable areas under management will be at least this size.


In the Massachusetts State Wildlife Action Plan (SWAP) New England Cottontail is identified as one of 257 animal Species in Greatest Need of Conservation. The SWAP

www.mass.gov/masswildlife

uses a habitat based approach, linking these animals to one or more of 22 habitat types that are essential for their survival. Habitat restoration and management is one of seven strategies outlined in the SWAP to conserve the biodiversity of the Commonwealth and the Species in Greatest Need of Conservation. Habitat managed for New England Cottontail can also benefit other Species in Greatest Need of Conservation dependent on Young Forest/Shrubland habitat.

After visiting the Quarry property in the fall and winter of 2012/2013 with you, Ted Kendziora (USFWS Partners for Fish and Wildlife Program), Lincoln Fish (Bay State Forestry) and Tom Ryan (Department of Conservation and Recreation Service Forester), I am proposing habitat management for New England Cottontail that includes creating up to 40 acres of young forest/shrubland and enhancing habitat in a previously managed location to benefit New England Cottontail. Management activities could be completed with funding assistance provided through an NRCS contract and with assistance under a Landowner Agreement with PFW. Please contact me to further coordinate habitat management activities for New England Cottontail.

Sincerely,



Marianne Piché
NRCS Partner Biologist

Cc:

Kate Parsons, NRCS District Conservationist
Ted Kendziora, USFWS Partners for Fish and Wildlife Program
Lincoln Fish, Bay State Forestry
Tom Ryan, Department of Conservation and Recreation Service Forester

Please refer to these attached figures

Figure 1: Location of the Becket Land Trust Historic Quarry and Forest Property within the New England Cottontail Southern Berkshire Focal Area

Figure 2: Location of the Becket Land Trust Historic Quarry and Forest Property within the *BioMap 2* Landscape Block

Figure 3: Proposed New England Cottontail habitat management units

Figure 4: Location of Certified and Potential Vernal Pools on the property

Creation of Young Forest/Shrubland Habitat for New England Cottontail within a Large Landscape Mosaic

The Division of Fisheries & Wildlife Natural Heritage & Endangered Species Program released *BioMap2* in November 2010. It is designed to guide strategic biodiversity conservation in Massachusetts over the next decade by focusing land protection and stewardship on the areas that are most critical for ensuring the long-term persistence of rare and other native species and their habitats, exemplary natural communities, and a diversity of ecosystems. *BioMap2* is also designed to include the habitats and species of conservation concern identified in the State Wildlife Action Plan.

The Historic Quarry and Forest property occurs within an ~11,435 acre *BioMap2* Landscape Block (Figure 2). These are large areas of high quality intact and predominately natural vegetation. Large intact landscapes provide diverse habitats at a scale necessary to sustain healthy populations of wide-ranging species like Moose, Black Bear, and Bobcat. These animals travel great distances and have large home ranges (the areas where an animal lives and travels over the course of a year). The integrated patchwork of wetlands, uplands, and rivers that are found in unfragmented landscapes allows animals to move freely among habitats, supporting daily movements, migration, dispersal, and colonization of new habitats. Intact landscapes also facilitate shifts in the geographic distribution of species, a process that is likely to accelerate in response to climate change in the coming decades.

The dynamic nature of landscapes, which can only occur in large intact areas, results in a mosaic of habitat types and patches that in turn support a wide array of species. For example, disturbances such as blowdowns, ice storms, tornadoes, and other weather events result in patches of young forest embedded within larger patches of older forest. Many species depend on these younger forests for breeding and foraging habitat. Another example of dynamic natural processes is the flooding of low-lying forests resulting from Beaver dams, converting former closed canopy forests into open canopy wetlands.

Habitat type descriptions:

“**Large landscape mosaics**” refers to the aggregation of habitat patches, corridors, and matrices of adequate size and connectivity to support residency and long-term viability of wildlife populations, particularly those of wide-ranging mammals such as Bobcat (*Lynx rufus*), Black Bear (*Ursus americanus*), and Moose (*Alces alces*) which may serve as focal species for landscape level habitat assessments. Similarly, but on a smaller overall scale, Blanding’s (*Emydoidea blandingii*) and Spotted Turtles (*Clemmys guttata*) move considerable distances (up to 2 km for Blanding’s) among feeding, nesting, estivating, and over-wintering habitats, incurring increased vehicular mortality as a result. The relatively large home ranges and varied habitat requirements of these animals extend beyond habitat patches to landscape mosaics that are comprised of a mix of ecosystems on a scale of kilometers.

Young forests and shrublands are collectively referred to as “thicket” habitats (Litvaitis 2003), and provide important resources for several wildlife species of conservation concern. Young forest habitats are typically dominated by rapidly growing trees and shrubs, and generally occur when a mature forest canopy is disrupted, allowing sunlight to stimulate the growth of herbaceous and woody vegetation on the forest floor. Shrublands are defined here as relatively ephemeral, upland habitats that are dominated by low woody vegetation (generally <3 m tall), with varying amounts of herbaceous vegetation and sparse tree cover. Shrublands primarily include abandoned field sites and power line corridors that would ultimately revert to forest absent some human or natural disturbance (e.g., mowing or burning), and abandoned beaver flowages along forested stream courses, which typically succeed from wet meadow to drier herb/shrub habitat, and eventually revert to forest in the decades following abandonment.

Species benefits: The Forest Management Plan prepared by Lincoln Fish indicates that practices will be carried out in order to reach goals such as improving wildlife habitat and increasing biological diversity by increasing the amount of early successional forest throughout the property. Creating an additional 20 acres or more of young forest/shrubland habitat and enhancing existing regenerating young forest/shrubland habitat will increase habitat diversity and contribute to species diversity on the property. Different species utilize regenerating young forest/shrubland habitat during varying stages of succession (change in vegetative community over time) and this habitat type would be utilized by a variety of species for up to twenty years. During this time, young forest/shrubland habitat would be beneficial to those indicated in bold in the following tables.

Species of Greatest Conservation Need in Young Forests and Shrublands

Taxon Grouping	Scientific Name	Common Name	*State Status
Reptiles	<i>Elaphe obsoleta</i>	Eastern Ratsnake	Endangered
	<i>Coluber constrictor</i>	Black Racer	None
	<i>Heterodon platirhinos</i>	Eastern Hognose Snake	None
Birds	<i>Bonasa umbellus</i>	Ruffed Grouse ☉	None
	<i>Colinus virginianus</i>	Northern Bobwhite	None

	<i>Buteo platypterus</i>	Broad-Winged Hawk	None
	<i>Falco sparverius</i>	American Kestrel	None
	<i>Scolopax minor</i>	American Woodcock	None
	<i>Caprimulgus vociferus</i>	Whip-poor-will	Special Concern
	<i>Empidonax traillii</i>	Willow Flycatcher	None
	<i>Toxostoma rufum</i>	Brown Thrasher	None
	<i>Vermivora pinus</i>	Blue-winged Warbler	None
	<i>Vermivora chrysoptera</i>	Golden-Winged Warbler	Endangered
	<i>Dendroica discolor</i>	Prairie Warbler	None
	<i>Oporornis philadelphia</i>	Mourning Warbler	Special Concern
	<i>Pipilo erythrophthalmus</i>	Eastern Towhee	None
	<i>Spizella pusilla</i>	Field Sparrow	None
	<i>Zonotrichia albicollis</i>	White-throated Sparrow	None
Mammals	<i>Synaptomys cooperi</i>	Southern Bog Lemming	Special Concern
	<i>Sylvilagus transitionalis</i>	New England Cottontail	None
Lepidoptera	<i>Hadena ectypa</i>	A Noctuid Moth	None

Species of Greatest Conservation Need in Large Unfragmented Landscape Mosaics

Taxon Grouping	Scientific Name	Common Name	*State Status
Reptiles	<i>Clemmys guttata</i>	Spotted Turtle	Delisted
	<i>Emydoidea blandingii</i>	Blanding's Turtle	Threatened
Mammals	<i>Alces alces</i>	Moose	None
	<i>Lynx rufus</i>	Bobcat	None
	<i>Ursus americanus</i>	Black Bear	None

© Two individuals observed by PFW and DFW staff November 16, 2012.

* For the most updated information on state-listed species visit the Natural Heritage & Endangered Species Program web page.

<http://www.mass.gov/dfwele/dfw/nhesp/nhesp.htm>

Moose use a mosaic of habitats for both food and protection. There are seasonal differences in the food intake of moose, but they seek highly nutritious, low-toxin foliage and browse. Early successional forests provide important foraging habitat for the moose throughout the year, while submerged aquatic vegetation can be utilized during the summer months. Dense conifer stands provide thermal cover during the clear and cold winter months.

Bobcats in North America occupy a wide range of habitats from boreal forests to deserts, and rocky mountains to humid bottomlands. However, they typically prefer rugged country interspersed with dense cover supporting an abundance of medium-sized prey and which allows hunting by ambush or stalking. Typical bobcat habitat in western Massachusetts includes regenerating forest, small hardwood stands, and other early successional habitats. In winter, bobcat also often select cliffs and dense stands of spruce or hemlock-hardwoods. These choices undoubtedly reflect availability of and access to prey. Dense understory vegetation and rocky ledges are important structural components of bobcat habitat.

Black bears are forest animals. However, they have the ability to exploit a wide array of physiographic and vegetative associations. These may vary in climate, soils, and topography, which consequently affect the quantity, quality, and availability of food, which is the primary determinant of black bear home range size, movements, and habitat use. Suitable black bear habitat is characterized by mature forest interspersed with small openings and tracts of early successional forest. The eastern deciduous forests, with their abundance and variety of foods—including acorns and other nut crops—yield the greatest black bear growth rates. In Massachusetts, wetlands are important to black bears in spring and summer, early successional and berry-producing areas in summer, and hardwood ridges in autumn.

Ruffed Grouse occupy a variety of different habitats in Massachusetts. They prefer early-successional mixed deciduous-coniferous forest, but inhabit mature deciduous mixed forest in the western part of the state and scrub oak forest on Cape Cod. Drumming logs are important for male breeding displays. Early-successional hardwood forest with high stem densities and good visibility at ground level is important for male drumming sites.

Broad-winged Hawks occupy continuous hardwood and mixed conifer/hardwood forests with canopy openings, such as small clearings, lakes, ponds, or marshes (DeGraaf and Yamasaki 2001). They are generalist predators, catching amphibians, young birds, insects, and, especially, small mammals, by hunting from perches often located at the forest edge or in openings. Broad-winged Hawks construct nests in trees of many different species, but usually choose to nest in the most abundant locally available tree species (Goodrich et al 1996). Nests are built of twigs and sticks, usually at the main crotch of a deciduous tree, or on a platform of horizontal branches against the trunk of a conifer.

American Woodcock require a variety of habitat types each one to three acres in size with foraging habitat within 0.5 miles of nesting habitat. Old farms reverting to forest generally provide optimum habitat for woodcock. Singing grounds and roost sites are situated in forest openings, old pastures, brushy fields, or bogs. Nests are generally found close by in young open woodlands. Daytime feeding habitat includes areas with poorly drained soils such as alder swales near old fields, or second-growth hardwoods mixed with aspen, birch and alder, with rich, moist soils near ponds, streams, or wet areas.

Eastern Towhee is an edge-associated generalist that occupies varied mesic and xeric habitats characterized by dense shrub-small tree cover and a well-developed litter layer. This species occupies mid-to-late stages of secondary succession with the greatest densities occurring in open field thickets and later stages of second growth, but it is sometimes present in climax forest where the understory is well developed. In Massachusetts, Eastern Towhees are most numerous in the scrub-oak and second-growth forests of Plymouth County, Cape Cod and the Islands. They particularly favor areas where moorland is succeeding to scrub-oak barrens; however, as the oaks mature, towhee numbers decline. Elsewhere the species is found throughout the state wherever there is secondary growth or forest openings.

White-throated Sparrow breed in coniferous and mixed forests, especially those with low, dense vegetation. They are particularly attracted to areas of second growth, such as beaver meadows, open bogs, forests affected by logging, fire, or insect damage, and areas of low, dense trees near the tree line. Nest sites are generally on or near the ground under dense vegetation along the edge of a clearing. In Massachusetts, White-throated Sparrows are found in the coniferous and mixed forests of the western counties, and in the east, can occasionally be found breeding in Red Maple and White Cedar swamps.

New England Cottontail is an early successional or thicket-dwelling species. Suitable habitat can be found in both forests and shrublands, where there is a dense understory with food and cover in close association. Typical habitats include native shrub associations, beaver flowages, old fields and pastures, and early successional forests. They may also be found in laurel thickets.

Proposed habitat management scenario: Manage up to 55 acres of habitat for New England Cottontail in three management units (Figure 3) by clearing canopy trees, decreasing competition from American Beech to increase the diversity of regenerating trees/shrubs, and building brush piles.

Management Options:

Unit 1: Create 12 to 20 acres of young forest/shrubland habitat

Current conditions: This unit occurs within Stand 1 of the Forest Management Plan; a northern hardwoods stand overstocked with mostly low value material. The overstory is dominated by Beech, Red Maple, Sugar Maple, Black Birch, and Red Oak with White Pine, Black Cherry, and Hemlock associated.

Proposed management:

- Create a 12 to 20 acre patch of young forest/shrubland habitat by harvesting all trees greater than 3 inches in dbh unless being retained as seed trees for natural regeneration. Allow the patch to regenerate naturally into dense cover of young trees and shrubs. Clearing woody vegetation in the dormant season will encourage vigorous regrowth the following growing season. Leave tree parts < 6" in diameter (slash) on site to provide cover and winter food, nutrient replenishment to the site and prevent deer browse of regenerating trees. Tops should be lopped not to exceed 4 feet in height where slash can exceed 2 feet above the ground.

NRCS 2013 WHIP Working Lands for Wildlife core practice scenarios applicable to management:

Core Practice 647 Early Successional Habitat Development/Management; Heavy Mechanical-Low Intensity: Woody vegetation greater than 4" DBH is cut using mechanical equipment to create early successional habitat. Area has low saw timber value and limited firewood capability and low stocking rates.

AND/OR

Core Practice 647 Early Successional Habitat Development/Management; Heavy Mechanical-High Intensity: Woody vegetation greater than 6" DBH is cut using mechanical equipment to create early successional habitat. Area has low saw timber value and limited firewood capability.

NRCS 2013 WHIP Working Lands for Wildlife supporting practice scenarios applicable to management:

Supporting Practice 666 Forest Stand Improvement; Tree Marking: The marking of a forest stand by a professional forester, in accordance with recommendations in an approved Forest Management or Conservation Plan, to improve the health, productivity and vigor of the stand, and improve wildlife habitat. The cost for this scenario is based on the labor for a professional forester or wildlife biologist to provide timber marking to ensure that the treatment is silviculturally sound and damage to the residual stand is minimized. There is no cost of the wood removal since a commercial logger will be doing the work.

- To decrease competition from Beech and increase the diversity of young trees and shrubs providing a variety of food sources for New England Cottontail, chemically treat Beech prior to tree canopy removal. Cut and stump-treat with glyphosate one out of every ten mid-size (3"-6" dbh) Beech stems. The objective is not to eliminate Beech from the stand, but to make some holes in the solid mat of Beech roots that exist in that area. If untreated, the Beech roots will aggressively sprout and crowd out nearly all other species. With control, a diverse mix of tree species, along with shrubs and herbaceous plants will be able to regenerate in areas where Beech roots have been controlled. Treatment will decrease competition from sprouting Beech roots and increase the diversity of regenerating shrub/tree species providing a greater variety of food sources available throughout the growing season.

NRCS 2013 WHIP Working Lands for Wildlife supporting practice scenarios applicable to management:

Supporting Practice 666 Forest Stand Improvement; TSI-singe stem treatment: Altering the composition and stocking of a stand of trees by means of individual stem treatment such as basal bark spraying or stem injection. The trees to be retained are marked by a consultant forester.

- Pre or post harvest, construct one or two brush piles per acre. Make these 6' -12' long on each side and no more than 4 feet high. Begin with a bottom layer of logs spaced 10"-12" apart and a second layer also 10"-12" apart but perpendicular to the first; top the pile with smaller limbs and branches. Periodically add new limbs and branches to extend the longevity of the pile.



NRCS 2013 WHIP Working Lands for Wildlife core practice scenarios applicable to management:

Core Practice 645 Upland Wildlife Habitat Management; Brush Piles: Brush piles will be created from trees on site and will be constructed by piling brush in loose branches on top of a base frame comprised of large logs.

- Mark ~6,250 feet along the perimeter of the property on the northern and western sides with paint (at 100 foot intervals) and signs at points of ingress.

NRCS 2013 WHIP Working Lands for Wildlife supporting practice scenarios applicable to management:

Supporting Practice 472 Access Control; Property Access: Restricting human access to a field/farm/property through use of signage and other markings. Cost assumes signs installed every 750 feet in addition to tree painting.

Unit 2: Create 12 to 20 acres of young forest/shrubland habitat

Current conditions: Unit 2 occurs primarily within Stand 4 of the Forest Management Plan; a northern hardwoods stand with codominant Beech, Red Maple, Sugar Maple, White Ash, Black Birch, Yellow Birch, Red Oak, Black Oak, and Black Cherry. Beech within this stand is damaged and suppressed by disease and seed production is reduced. Red Maple, Sugar Maple, and Black Birch are also infected with fungal disease. Part of this proposed management unit also occurs in Stand 1, described above.

Proposed management:

- Create a 12 to 20 acre patch of young forest/shrubland habitat by harvesting all trees greater than 3 inches in dbh unless being retained as seed trees for natural regeneration. Allow the patch to regenerate naturally into dense cover of young trees and shrubs. Clearing woody vegetation in the dormant season will encourage vigorous regrowth the following growing season. Leave tree parts < 6" in diameter (slash) on site to provide cover and winter food, nutrient replenishment to the site and prevent deer browse of regenerating trees. Tops should be lopped not to exceed 4' in height where slash can exceed 2 feet above the ground. There

is an ~0.16 acre Department of Environmental Protection Shrub Swamp within this unit and tree clearing here should adhere to the extent that can be permitted under a Forest Cutting Plan. If it appears that this wetland is functioning as a vernal pool, limit cutting to no more than 50% of the trees within 50 feet of it.

NRCS 2013 WHIP Working Lands for Wildlife core practice scenarios applicable to management:

Core Practice 647 Early Successional Habitat Development/Management; Heavy Mechanical-Low Intensity: Woody vegetation greater than 4" DBH is cut using mechanical equipment to create early successional habitat. Area has low saw timber value and limited firewood capability and low stocking rates.

AND/OR

Core Practice 647 Early Successional Habitat Development/Management; Heavy Mechanical-High Intensity: Woody vegetation greater than 6" DBH is cut using mechanical equipment to create early successional habitat. Area has low saw timber value and limited firewood capability.

NRCS 2013 WHIP Working Lands for Wildlife supporting practice scenarios applicable to management:

Supporting Practice 666 Forest Stand Improvement; Tree Marking: The marking of a forest stand by a professional forester, in accordance with recommendations in an approved Forest Management or Conservation Plan, to improve the health, productivity and vigor of the stand, and improve wildlife habitat. The cost for this scenario is based on the labor for a professional forester or wildlife biologist to provide timber marking to ensure that the treatment is silviculturally sound and damage to the residual stand is minimized. There is no cost of the wood removal since a commercial logger will be doing the work.

- To decrease competition from Beech and increase the diversity of young trees and shrubs providing a variety of food sources for New England Cottontail, chemically treat beech prior to tree canopy removal. Cut and stump-treat with glyphosate one out of every ten mid-size (3"-6" dbh) beech stems. The objective is not to eliminate beech from the stand, but to make some holes in the solid mat of beech roots that exist in that area. If untreated, the beech roots will aggressively sprout and crowd out nearly all other species. With control, a diverse mix of tree species, along with shrubs and herbaceous plants will be able to regenerate in areas where beech roots have been controlled. Treatment will decrease competition from sprouting beech roots and increase the diversity of regenerating shrub/tree species providing a greater variety of food sources available throughout the growing season.

NRCS 2013 WHIP Working Lands for Wildlife supporting practice scenarios applicable to management:

Supporting Practice 666 Forest Stand Improvement; TSI-singe stem treatment: Altering the composition and stocking of a stand of trees by means of individual stem treatment such as basal bark spraying or stem injection. The trees to be retained are marked by a consultant forester.

- Pre or post harvest, construct one or two brush piles per acre. Make these 6' -12' long on each side and no more than 4 feet high. Begin with a bottom layer of logs spaced 10"-12" apart and a second layer also 10"-12" apart but perpendicular to the first; top the pile with smaller limbs and branches. Periodically add new limbs and branches to extend the longevity of the pile.



NRCS 2013 WHIP Working Lands for Wildlife core practice scenarios applicable to management:

Core Practice 645 Upland Wildlife Habitat Management; Brush Piles: Brush piles will be created from trees on site and will be constructed by piling brush in loose branches on top of a base frame comprised of large logs.

Unit 3: Enhance ~15 acres of regenerating young forest/shrubland for New England Cottontail

Current conditions: This unit occurs in Stand 6 of the Forest Management Plan. This stand was described as northern hardwoods with codominant Beech, Black Cherry, Red Maple, Sugar Maple, and Birch with Hemlock and White Pine associated. Previous management within this unit under a Wildlife Habitat Incentive Program contract was completed to restore and conserve rare or declining native vegetated communities. A mix of low quality trees were removed and residual overstory Black Cherry, Red Oak, and Sugar Maple remain.

Proposed management:

- Enhance habitat by creating brush piles where ~15 acres of tree canopy clearing previously occurred.



NRCS 2013 WHIP Working Lands for Wildlife core practice scenarios applicable to management:

Core Practice 645 Upland Wildlife Habitat Management; Brush Piles: Brush piles will be created from trees on site and will be constructed by piling brush in loose branches on top of a base frame comprised of large logs.

All units:

- Invasive species prevention: Invasive species are recognized as one of the greatest threats to the integrity of natural communities and also as direct threats to the survival of many indigenous species. Some invasive exotic plants now dominate native communities and can alter ecological relationships. If any equipment used in management is brought on site from other locations, The Massachusetts Division of Fisheries & Wildlife Best Management Practices for Controlling the Spread of Invasive Plants should be followed. This involves thoroughly cleaning the exterior, undercarriage, and tires/tracks of equipment with a high pressure washer prior to arriving on the property to reduce the risk of invasives being carried on site from other locations.
http://www.mass.gov/dfwele/dfw/habitat/grants/lip/pdf/bmp_invasives.pdf
- Assess clearings within the first growing season post-harvest for invasive species treatment. Plan future harvest rotations to maintain a minimum of 10 to 25 acres in the less than 15-year old age class at all times.
- In the Wildlife Habitat Assessment of the Becket Land Trust's Historic Quarry prepared by Molly Hale in 2004, bear claw marks on trees along the Vista Trail in Stand 1 and along the Old Moon Loop Trail in Stand 4 were noted. Black bears are keenly aware of other bears nearby and communicate by sound, scent, or by marking trees. These actions may conceivably convey gender, reproductive status, hierarchy, identity, and other information, even though the animals are not in immediate contact. In Massachusetts, adult females use home ranges averaging 9 to 10 mi² while adult males may have ranges exceeding 120 mi². "Territory" is that part of the home range that is defended against intruders or competitors. Territories may be passed on from one generation to the next. Care should be taken not to remove trees bears have marked.

- Two Certified Vernal Pools (#'s 2036 and 2037) and one potential vernal pool (#1748) occur on the property (Figure 4) and it is possible that other potential vernal pools also occur. The Department of Environmental Protection and local Conservation Commissions have regulatory authority for the protection of vernal pools. The Wetland Protection Act (310 CMR 10.00) and Forest Cutting Practices Act (304 CMR 11.00) regulations also provide protection to vernal pools that have not been certified if their occurrence is adequately documented during permit review. The Massachusetts Forest Cutting Practices Act Regulations protect Certified Vernal Pools from certain forestry impacts. Harvesting requirements limit cutting to no more than 50% of the trees within 50 feet of a Certified Vernal Pool. They also require that trees or tree tops not be felled in Certified Vernal Pools, and restrict the use of pools as staging areas or skidder trails. Guidelines, similar to the regulations, are established for activities planned near uncertified vernal pools identified by consulting foresters. The current proposed management activities will occur nearly 400 feet from the Potential Vernal Pool and 800 feet Certified Pools and should not require any restrictions.

Regulatory Requirements

Massachusetts Forest Cutting Practices Act

The Massachusetts Forest Cutting Practices Act regulates the cutting of timber throughout the state. Filing requirements under the Act are based on volume, cutting area, and the use of timber products. All landowners must comply with this Act.

<http://www.mass.gov/dcr/stewardship/forestry/service/cutprac.htm>

Massachusetts Wetlands Protection Act

Under the Massachusetts Wetlands Protection Act work conducted in and near jurisdictional resource areas including wetlands and perennial streams may require a permit from the local Conservation Commission and Department of Environmental Protection.

<http://www.mass.gov/dep/water/laws/regulati.htm#wl>

Following are descriptions of additional State Wildlife Action Plan habitat types on the property and Species in Greatest Need of Conservation (in bold) they may support based on species ranges within Massachusetts. State-listed species not documented on the property are not noted. For the most updated information on state-listed species visit the Natural Heritage & Endangered Species Program webpage:

http://www.mass.gov/dfwele/dfw/nhsp/species_info/mesa_list/mesa_list.htm

Vernal Pools

Habitat type description: Vernal pools are ephemeral wetlands that fill annually from precipitation, runoff, and rising groundwater. Usually vernal pools in Massachusetts fill in the spring, and most years they become completely dry later in the season, losing water over the summer to evaporation and transpiration. This wet-dry cycle – a vernal pool’s hydroperiod – prevents fish from becoming established permanently in these seasonal wetlands, and thus presents a fish-free, if temporary, habitat for many species. Fish can and do eat many of the species in vernal pools, if given the chance.

Species of Greatest Conservation Need in Vernal Pools

Taxon Grouping	Scientific Name	Common Name	*State Status
Amphibians	<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	Special Concern
	<i>Ambystoma laterale</i>	Blue-Spotted Salamander	Special Concern
	<i>Ambystoma opacum</i>	Marbled Salamander	Threatened
	<i>Hemidactylium scutatum</i>	Four-Toed Salamander	Delisted
	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Threatened
Reptiles	<i>Clemmys guttata</i>	Spotted Turtle	Delisted
	<i>Emydoidea blandingii</i>	Blanding’s Turtle	Threatened
Mammals	<i>Sorex palustris</i>	Water Shrew	Special Concern
Crustaceans	<i>Eubbranchipus intricatus</i>	Intricate Fairy Shrimp	Special Concern
	<i>Eulimnadia agassizii</i>	Agassiz’s Clam Shrimp	Endangered
	<i>Caenestheriella gynecia</i>	Feminine Clam Shrimp	None
Snails	<i>Physa vernalis</i>	Vernal Physa	None
Beetles	<i>Hygrotus sylvanus</i>	Sylvan Hygrotus Diving Beetle	None

Jefferson, Blue-spotted, and Marbled Salamanders, Eastern Spadefoots, and Intricate Fairy Shrimp are obligate breeders in vernal pools, which means they must have vernal pools in which to breed successfully. Additionally, vernal pools support breeding common vertebrates, such as Wood Frogs (*Rana sylvatica*) and Spotted Salamanders (*Ambystoma maculata*), and invertebrates, such as fairy shrimp (*Eubbranchipus* spp.). Many other common and rare animals use vernal pools for some aspect of their life history (feeding, breeding, over-wintering, estivating, hydrating, etc.), including Blanding’s Turtles (Threatened), Spotted Turtles (Delisted 2006), Four-toed Salamanders (Delisted 2006), Eastern Box Turtles (Special Concern), Wood Turtles (Special Concern), Spring Peepers, Gray Treefrogs, Green Frogs, Leopard Frogs, Pickerel Frogs, American Toads, Fowler’s Toads, Red-spotted Newts, Painted Turtles, Snapping Turtles, diving beetles, water scorpions, dragonflies and damselflies, dobsonflies, whirligig beetles, caddisflies, leeches, fingernail clams, and amphibious air-breathing snails. In particular, two damselflies, Emerald Spreadwing (*Lestes dryas*) and Lyre-tipped Spreadwing (*Lestes unguiculatus*), both of which are thought to be uncommon in Massachusetts and often found at vernal pools and interdunal swales, may be dependent on these fish-free water bodies for successful reproduction. However, the natural history of these two odonates is not well known.

Potential vernal pools in Massachusetts were identified through the use of aerial photographs. The Natural Heritage & Endangered Species Program "certifies" the

occurrence of vernal pools based on documentation of the pool's use by one or more groups of species that rely on vernal pools. The Natural Heritage & Endangered Species Program administers the state's official vernal pool certification program.

Natural Heritage & Endangered Species Program staff do not routinely survey and monitor vernal pools outside of rare species work and special vernal pool projects, but accepts certain biological and physical documentation submitted by outside scientists, resource managers, and other interested individuals and organizations as the basis for the possible certification of vernal pool habitat. Official certification provides a vernal pool, and up to 100 feet beyond its boundary in some cases, certain protection under several state and federal laws.

Two Certified Vernal Pools (#'s 2036 and 2037) and one potential vernal pool (#1748) occur on the property (Figure 4). The pools were certified on June 26, 2000 based on submission of biological indicators accepted by the Natural Heritage & Endangered Species Program (NHESP). These included documentation of Wood Frog and Mole Salamander egg masses. While rare species were reported in pool #2036, due to lack of sufficient documentation (photographs) they were not accepted by NHESP as part of the biological evidence used in certification. Continued monitoring for rare species is encourage and any data collected can be submitted to the Natural Heritage & Endangered Species Program using rare animal observation forms available at:

http://www.mass.gov/dfwele/dfw/nhesp/species_info/report_rare_species.htm

The Certified Vernal Pools layer is available on MassGIS:

<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/cvp.html>

Upland Forest

Habitat type description: Upland forest is land dominated by tree cover where soils are not saturated by water for extensive portions of the growing season. Two general types of upland forest occur in Massachusetts, namely northern hardwood (beech, birch, maple) forest (in western and north-central Massachusetts), and central hardwood (oak/hickory) forest (in eastern and south-central Massachusetts). Within each of these two general types, two “sub-types” occur, including northern hardwood, hemlock, white pine and spruce-northern hardwood, along with oak-hickory/white pine/hemlock and pitch pine-oak.

Species of Greatest Conservation Need in Upland Forests

Taxon Grouping	Scientific Name	Common Name	*State Status
Amphibians	<i>Ambystoma jeffersonianum</i>	Jefferson Salamander	Special Concern
	<i>Ambystoma laterale</i>	Blue-Spotted Salamander	Special Concern
	<i>Ambystoma opacum</i>	Marbled Salamander	Threatened
	<i>Hemidactylium scutatum</i>	Four-Toed Salamander	Delisted
	<i>Scaphiopus holbrookii</i>	Eastern Spadefoot	Threatened
Reptiles	<i>Terrapene carolina</i>	Eastern Box Turtle	Special Concern
	<i>Carphophis amoenus</i>	Eastern Wormsnake	Threatened
	<i>Elaphe obsoleta</i>	Eastern Ratsnake	Endangered

	<i>Agkistrodon contortrix</i>	Copperhead	Endangered
	<i>Coluber constrictor</i>	Black Racer	None
	<i>Crotalus horridus</i>	Timber Rattlesnake	Endangered
Birds	<i>Accipiter striatus</i>	Sharp-Shinned Hawk	Special Concern
	<i>Asio otus</i>	Long-Eared Owl	Special Concern
	<i>Buteo platypterus</i>	Broad-Winged Hawk	None
	<i>Hylocichla mustelina</i>	Wood Thrush	None
	<i>Parula americana</i>	Northern Parula	Threatened
	<i>Dendroica striata</i>	Blackpoll Warbler	Special Concern
	Lepidoptera	<i>Erora laeta</i>	Early Hairstreak
<i>Rhodoecia aurantiago</i>		Orange Sallow Moth	Threatened
<i>Satyrium favonius</i>		Oak Hairstreak	Special Concern
<i>Pieris virginianensis</i>		West Virginia White	None
Mammals	<i>Lasionycteris noctivagans</i>	Silver-haired Bat	None
	<i>Lasiurus borealis</i>	Eastern Red Bat	None
	<i>Lasiurus cinereus</i>	Hoary Bat	None

Forested Swamp

Habitat type description: Forested swamps are wetlands where trees dominate the vegetation and there is generally little buildup of peat. Soils are saturated for much of the growing season, often with standing water in the spring. Forested swamps are the most abundant types of all wetlands in the northeastern United States (Golet et al. 1993). They usually occur as patches or large patches within the surrounding upland matrix forest. They follow patterns of differences similar to the upland forests: in the northern hardwood zone of western and north-central Massachusetts, forested swamps are cold and often conifer dominated. In the warmer southern and eastern sections of the state and in the central hardwood area, forested swamps are dominated by red maple or Atlantic white cedar. As habitat, swamps are strongly affected by the type of tree, evergreen or deciduous, that forms the canopy.

Species of Greatest Conservation Need in Forested Swamps

Taxon Grouping	Scientific Name	Common Name	*State Status
Reptiles	<i>Clemmys guttata</i>	Spotted Turtle	Delisted
	<i>Thamnophis sauritus</i>	Eastern Ribbon Snake	None
Birds	<i>Parula americana</i>	Northern Parula	Threatened
Mammals	<i>Sorex palustris</i>	Water Shrew	Special Concern
Crustaceans	<i>Synurella chamberlaini</i>	Coastal Swamp Amphipod	Special Concern
Lepidoptera	<i>Callophrys hesseli</i>	Hessel's Hairstreak	Special Concern
	<i>Callophrys lanoraieensis</i>	Bog Elfin	Threatened
	<i>Catocala pretiosa pretiosa</i>	Precious Underwing Moth	Endangered
	<i>Lithophane viridipallens</i>	Pale Green Pinion Moth	Special Concern
	<i>Pieris oleracea</i>	Eastern Veined White	Threatened

Shrub Swamp

Habitat type description: Shrub swamps are shrub-dominated wetlands occurring on mineral or mucky mineral soils that are seasonally or temporarily flooded or saturated. They often occur as a successional area between freshwater marsh and forested swamp

(Mitsch & Gosselink 2000) and occur in association with other wetland types in wetland complexes. These wetland shrub thickets are generally flooded in spring and early summer, with water levels dropping below the soil surface by late summer or early fall. Shrubs are perennial woody plants that have multiple stems and are generally less than 20 feet tall. There are usually at most scattered trees in shrub swamps, and the shrubs themselves produce at least 25% ground cover.

Species of Greatest Conservation Need in Shrub Swamps

Taxon Grouping	Scientific Name	Common Name	*State Status
Reptiles	<i>Clemmys guttata</i>	Spotted Turtle	Delisted
	<i>Clemmys muhlenbergii</i>	Bog Turtle	Endangered
	<i>Emydoidea blandingii</i>	Blanding's Turtle	Threatened
Lepidoptera	<i>Catocala pretiosa pretiosa</i>	Precious Underwing Moth	Endangered
	<i>Cingilia catenaria</i>	Chain Dot Geometer	Special Concern
	<i>Hemaris gracilis</i>	Slender Clearwing Sphinx Moth	Special Concern
	<i>Lithophane viridipallens</i>	Pale Green Pinion Moth	Special Concern
	<i>Metarranthis pilosaria</i>	Coastal Swamp Metarranthis	Special Concern
	<i>Papaipema stenocelis</i>	Chain Fern Borer	Threatened
	<i>Papaipema sulphurata</i>	Water-Willow Stem Borer	Threatened
Birds	<i>Anas rubripes</i>	American Black Duck	None
	<i>Buteo platypterus</i>	Broad-Winged Hawk	None
	<i>Butorides virescens</i>	Green Heron	None
	<i>Scolopax minor</i>	American Woodcock	None

Wildlife Monitoring: Documentation of state-listed species is essential to keeping the Natural Heritage & Endangered Species Program database updated and associated habitat for them protected. Monitoring for state-listed species is encouraged and any plants or animals observed can be reported to the Natural Heritage & Endangered Species Program using Rare Species Observation Forms available at:

http://www.mass.gov/dfwele/dfw/nhosp/species_info/report_rare_species.htm

In addition, Species in Greatest Need of Conservation utilizing habitat created or maintained through NRCS funded projects can be reported to the local NRCS office to be documented in the contract file and shared with the DFW Private Lands Program.

Resources and References

Conservation Strategy for the New England Cottontail (*Sylvilagus transitionalis*)

A Landowner's Guide to New England Cottontail Habitat Management

<http://www.newenglandcottontail.org/>

Massachusetts State Wildlife Action Plan

http://www.mass.gov/dfwele/dfw/habitat/cwcs/cwcs_background.htm

BioMap2

http://www.mass.gov/dfwele/dfw/nhosp/land_protection/biomap/biomap_home.htm

Massachusetts Audubon Society State of the Birds

<http://www.massaudubon.org/StateoftheBirds/>

Black Bears in Massachusetts Natural History, Distribution, and Status

http://www.mass.gov/dfwele/dfw/wildlife/living/living_with_bears.htm