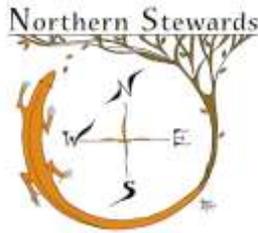


# Habitat Assessment for Hartford Town Forest and Hurricane Forest Wildlife Refuge

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September 26, 2011

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**Summary**

I developed this habitat assessment from a 2 day site visit and a thorough literature analysis. Current habitat conditions support wildlife using mid-late successional red oak northern hardwoods, small streams and small wetlands. The forest resources are in excellent condition and will continue to mature and develop into late successional conditions. Early successional habitat is lacking and the property does not have a diversity of food or cover resources available for species that prefer or depend on conditions found from early successional hardwoods. Recreational use of the property is likely reducing the use of available habitat as wildlife will avoid humans in all forms of recreation. Off trail excursion and recreation around wetlands are most detrimental.

Recommendations for habitat management include:

- careful designation for target habitat improvements
- the creation of early successional habitat in patches >1 acre and at a minimum 5.5 acres in perpetual early successional growth.
- The immediate implementation of recreational recommendations found within including but not limited to:
  - Trail closures around Lower Reservoir and modifications at Wright Reservoir to prohibit trails encircling the wetland
  - Discuss the temporal closing of trails in target habitat areas from March 1<sup>st</sup>- June 15<sup>th</sup>
- Incorporation of recommendations into forest management plan and during every harvest including
  - the designation of No-harvest management areas
  - Red oak regeneration methods
  - No foliar chemical application, if any

## Introduction

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I spent August 8<sup>th</sup> and 12<sup>th</sup> visiting the Hartford Town Forest (HTF) and Hurricane Forest Wildlife Refuge (HFWR) and conducting a qualitative habitat assessment. I traversed the property on a 200m/200m grid and allowed for frequent off grid excursions to target habitats. I collected qualitative information regarding forest habitat types, age classes, frequencies of habitat features like snags or down woody debris. Throughout the two day period I documented bird observations for a preliminary bird inventory.

### *Habitat features*

Found on page 9 the habitat feature section is designed to describe available macro habitat features found on the property that are known to be important to wildlife and that we as managers can impact for better or worse. Micro habitat features like soil ph, microbial interactions, fungus associations, noise impacts, or insect abundance that management may indirectly affect are not discussed here.

For each habitat feature the feature's quality is valued, a condition is described, forest management recommendations are given, recreational consideration are provided, and wildlife known to associate with the given feature are listed. This section should be used to direct future management decisions to target specific habitat features and wildlife associated with those features.

### *Species Accounts*

This section (page 16) summarizes habitat needs, habitat suitability, and probability of occurrence on the HTF & HFWR based on available habitat of the HTF & HFWR for Vermont's High Priority Species of Greatest Conservation Need, state listed as Species of Concern (SC), threatened (T) or endangered (E), and federally listed as T or E. Some of these lists overlap, although not entirely (for example: the blue-spotted salamander is a *Medium priority* species but is state listed as a SC, and thus is included) between these classifications and the species included in this report will be referred to as Species of Greatest Conservation Need or SGCN. Habitat preferences are based on extensive literature reviews and experience. Habitat availability, suitability, and probability of occurrence are based on extensive experience with habitats and GIS land use/land cover maps.

This report summarizes habitats for 35 species and each concludes with recommendations specific to the species based on population status, habitat preferences, and habitat availability.

Species whose range or preferred habitat does not overlap with the HTF & HFWR are not included in the report to forego allocating energy managing for species we can confidently say, will not occur within the HTF & HFWR. This includes species like the blue-winged warbler or rat snake whose range expansion into the HTF & HFWR is unlikely and depends on multiple factors independent of current habitat suitability, availability, or management activities on the HTF & HFWR.

This section should be used to identify habitat, monitoring, and management needs of SGCN's that are expected to occur within the HTF & HFWR. Specifically, this section should: be reviewed by the Town of Hartford and used to prioritize monitoring efforts for the future, be considered prior to conducting forest management activities, and work to insure it's compatibility with other plans

I only included species and assessed their habitats if known ranges overlapped the HTF and HFWR and known habitat occurred, or could occur at the HTF and HFWR.

***Goals***

This report was prepared to assess habitat and to provide recommendations for the town of Hartford to

1. To describe realistic habitat conditions and features for species that do or with the potential to occur on the property
2. To describe habitat requirements for target species
3. To describe habitat management strategies designed to improve conditions for
  - a. The greatest number of species
  - b. Target wildlife species
4. To provide forest management recommendations to be incorporated into the Forest plan
5. To provide recommendations for wildlife in conjunction with recreational activities.

My hope is that the Town of Hartford will absorb this report over the years to design effective strategies of the property and include wildlife and wildlife habitat in its management.

Thanks very much and good luck!

Sincerely

Allan Thompson  
Wildlife Biologist and Forester

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## Habitat Assessment

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### *Scale and habitat diversity*

The HTF and HFWR is part of a roughly 4000 acre contiguous forest only slightly fragmented by roads and scattered houses. This area is delineated roughly by I89, I91, North Hartland Lake, and route 4. The landscape habitat is not considered remote or unfragmented, but is part of a forest ecosystem capable of supporting long ranging wildlife. This landscape is a mosaic of forest, field, residential and commercial development, and habitat permitting, capable of supporting Vermont's most secretive and sensitive wildlife.

Wildlife requires many different habitats during the course of a year and will occupy areas that provide those needs. Appropriately, wildlife will be absent from areas that do not provide those needs. The HTF and HFWR will provide forest habitat, currently, primarily mature forest habitat typical of Red Oak Northern hardwoods. Within the HTF and HFWR, forest conditions are relatively homogeneous. Soil types are similar throughout, loamy till existing on slopes, and you would expect similar forest conditions on similar soils. Where forest conditions differ, the historic disturbances (hurricane 1938), slope, and aspect are the predominate factors.

Habitats provided within the HTF and HFWR are primarily forest and aquatic habitats. Within either, there exists little diversity. Similar forest types are found throughout with mid to late successional structural conditions. Small streams, temporary pools, and reservoirs offer habitat are buffered closely by forest conditions and their limited size will reduce the amount of "wetland" habitat available.

From the perspective on long-ranging wildlife, the HTF and HFWR should only expect to be *part* of moose, bobcat deer and bear's home range. Given that the HTF and HFWR offer suitable habitat features during a portion of a species annual requirements. The other end of the spectrum you could expect that home ranges for species like spotted salamander, ruffed grouse or deer mouse would be found entirely within this area given available habitats. Decisions of how the HTF and HFWR should be managed for wildlife are important.

### *Goals*

- Define habitat objectives based on realistic targets: soils, wildlife ranges, and human disturbance
- Promote habitats that will benefit the greatest number of species
- Promote habitats that are infrequent within the landscape

### Human

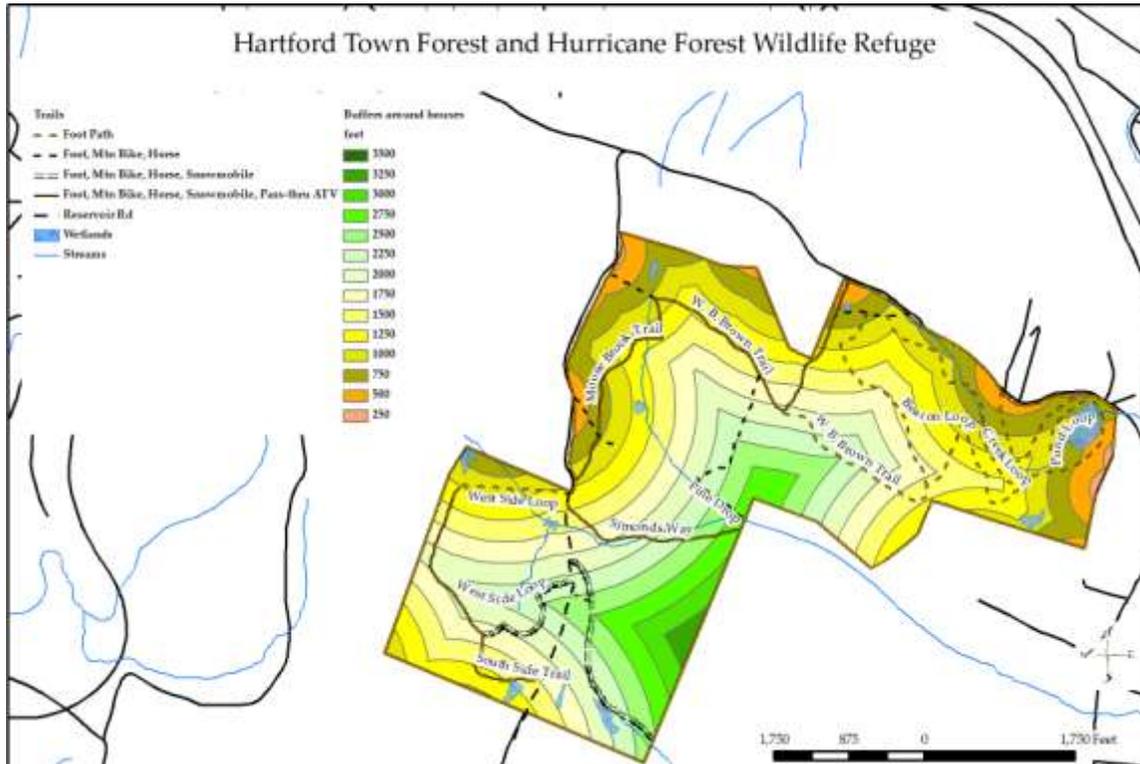
#### *Limiting human factors contributing to wildlife presence and habitat use*

Human use of an area will alter habitat use and allocate energy to activities involved in avoiding humans. Houses, roads, and recreation will impact how wildlife utilize the HTF and HFWR. How a species responds to humans depends on a number of factors: species, habitat, type of interaction, time of year. Because there are very few species that respond positively to human interaction, most of the responses will be negative, in the form of avoidance. Wildlife over time will pattern activities to avoid humans; travel or feeding routes, nesting areas, or activity periods.

**Houses**

Residential impacts are likely to be long lasting and patterned. Cumulative residential wildlife impacts will eventually create unsuitable conditions for many sensitive species by either reducing wildlife habitat under a threshold or isolate populations. Areas furthest from houses are Neal’s hill, south slope of Beacon hill, and south central portions of the HTF. These areas are most likely to support core habitats for sensitive wildlife.

**Distance from houses as determined from 2009 aerial photo. .**



### *Recreation and Wildlife*

Recreation considered in this section and at the HTF and HFWR can be described as non-consumptive recreation: not hunting, and includes hiking, biking, snowshoeing, skiing, riding ATVs or snowmobiles.

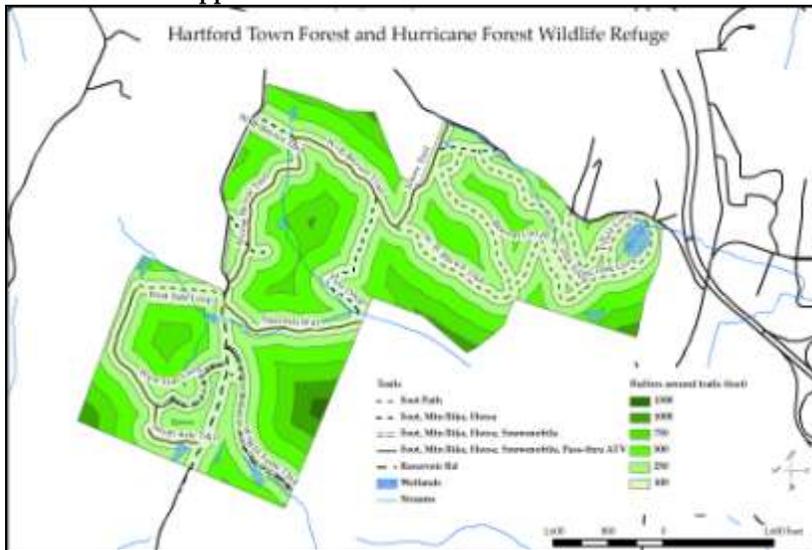
The impact recreation has on wildlife at the HTF and HFWR is intuitive. Wildlife avoids humans. To what extent is unknown. Response of wildlife to humans depends on the species, habitat, time of year, type of encounter, and type of recreation.

From available literature we know that ATV's have greater impacts on wildlife than hikers and bikers (Naylor et. al. 2008.). Hikers and bikers have equal impacts on wildlife (Taylor and Knight 2003, Pease et. al. 2005 Naylor et. al. 2008). Hikers with dogs have greater impacts than hikers without and hikers that go off trail will have greater impacts on wildlife than if hikers stay on trails (Miller et. al. 2001). Birds are more likely to nest away from trails and nest success is higher away from trails (Miller et. al. 1998). Bobcats, coyotes and foxes avoid areas with high recreation (George and Crooks 2006, Reed and Merenlender 2008). Deer will avoid humans but are more likely to alter use of habitat than avoid habitat (George and Crooks 2006). Other inferences can be made from experience. For example, it is likely that large bodied wildlife are likely more impacted by humans, than small bodied ones, and is likely correlated to sensory differences, energy required for avoidance, and perceptions of humans. Also, impacts from humans are more detrimental during reproductive periods, or crucial feeding and areas.

### *Existing recreation and wildlife issues*

- Off trail excursions will cause more disruption on wildlife than if users stayed on existing trails. Satisfying recreationalists and providing a refuge for wildlife are primary objectives but in many ways are exclusive. The result if off-trail excursions continue is to decrease the use of habitats by wildlife. The following locations have high off-trail activities
  - Lower reservoir
  - Off Reservoir Rd
  - Off Wright Farm Trail
  - Off South side trail
  - Off Symonds way
  - Around Beacon Hill
  - South of W.B. trail
- The Wright reservoir has extremely high recreational use. Trails encircle the pond leaving nowhere for wildlife to find refuge.
- Recreation around the Saddle Pool

**Distance from mapped trails within the HTF and HFWR**



It is unclear to what extent habitat is available to the variety of different species that use the HTF and HFWR given the frequency and types of recreation. However, it is clear that the area is dramatically reduced and large bodied wildlife, long ranging wildlife will avoid areas with higher recreation.

- Changing types of recreation allowed on trails because of wildlife is likely to not change use of wildlife to a great extent.
- Target habitat management for species sensitive to disturbance away from trails and houses.
  - Bear
  - Deer
  - Grouse
  - Woodcock
  - Bobcat
- Temporary trail closures from March-June 1<sup>st</sup> may increase available breeding habitat for many mammals and birds.
- Trail closures around target wildlife habitat particularly at lower reservoir and at Wright Reservoir so that trails do not encircle water bodies.
- Collaborate with bike community groups to help policy off trail activity and to offer and define opportunities suitable for the bike community.
- Public education of recreational impacts on wildlife

**Acreege of available habitat at distances from houses and trails**

Acres	Distance from Trail (ft)	Acres	Distance from House (ft)
168	0-100	521	500+
375	100+	403	1000+
205	250+	254	1500+
66	500+	123	2000+
14	750+		
2	1000+		

George, S>L. and Crooks, K.R. 2006. Recreation and large mammal activity in an urban nature reserve. Biological Conseravation. 133.107-117.

Miller, S.G, Knight, R.L., and Miller, C.K. 1998. Influence of recreational trails on breeding bird communities. Ecological Applications. 8: 162-169.

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- Pease, M.L., Rose, R.K., Butler, M.J.. 2005. Effects of human disturbances on the behavior of wintering ducks. *Wildlife Society Bulletin*. 33 (1)103-112.
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Habitat Assessment for HTF and HFWR

Habitat features and recommendations

Habitat Features	Quality	Condition	Management Recommendation	In conjunction with Forest management	Recreation impacts/ considerations	Selected Wildlife using features likely to use property
<b>Mid-Late successional White pine oak mixed hardwood conditions</b>	Excellent, throughout	Large diameter trees are present. Variable midstory structure: dense in places from beech poles, open midstory available as well. Frequent snags are present. However, even aged conditions persist throughout. Overtime, natural turnovers if allowed to occur will increase diameters, and range of structural diversity. Uneven aged conditions will develop and down woody debris will increase	Identify areas to allow natural maturation and turnover. Further, within managed landscapes identify areas to manage for mature forest conditions: large diameter trees, high frequencies of snags, cavity trees, roost trees, down woody debris	No management in areas identified for natural succession. Within areas to be managed for mature forest conditions: use uneven age techniques, insure at least 6 roost trees/acre, 10 snags/acre and retain 10 potential live cavity trees /acre. Trees should include all size ranges 10"-24"+ of hardwood and softwood. Retain canopy cover average >75% throughout. Where infrequent increase coarse woody debris by pushing or dropping trees ( live hardwood 12"+)	None	Red bellied snake, turkey vulture, broad-winged hawk, red-tailed hawk, Cooper's hawk, wild turkey, black billed cuckoo, ruby-throated hummingbird, pileated woodpecker, Blackburnian warbler, oven bird, scarlet tanager, Canada warbler, gray fox, gray squirrel, <i>Peromyscus</i> mice, American black bear, white-tailed deer, white-tailed deer, American black bear.
<b>Hemlock</b>	Adequate, patchy, throughout.	Hemlock is present throughout the property on north facing slopes, and in drainages. Roughly 100 year old, though of variable diameters 12-20" dbh. Hemlock regeneration exists in wetter portions and along streams. Mostly even aged elsewhere	Identify hemlock cover habitats. Retain and promote dynamic softwood cover. With dense vertical and horizontal structure. Increase growth of seedlings and saplings while retaining >70% canopy cover. .	Irregular group shelterwood with reserves using small <0.25 groups. 120ft <sup>2</sup> residual. Avoid thinning between groups. <b>Scarify soil.</b> Within and where appropriate between groups.	Trails should avoid hemlock cover habitats.	Northern saw-whet owl, blue-headed vireo, red-breasted nuthatch, winter wren, hermit thrush, black throated green warbler, red squirrel, deer mouse, gray fox, fisher, white-tailed deer
<b>Early Successional hardwoods (0-10 years old)</b>	Lacking, Developing	Exists in small patches of no more than 8 acres (1.5%) of developing shrubby, early successional habitat exists. Upper and Lower Reservoirs and wind damaged SW slopes constituting 7 acres of developing early successional. Beacon hill 1 acre of grassland and pole hardwoods.	Target of 1% (5.50 acres) of property to be in early successional growth. Insure 5.5 acres are in early successional forest growth.	Create patches >1 acre up to 5.5 acre patches in proximity to other early successional conditions. In at least half of the operation area, do not use whole tree harvest, leave tops whole, intentional drop or push over whole live trees (12"+) Target openings for aspen regen. Can expand on existing openings.	Early successional habitats can be created adjacent to trails, but trails should not encircle or travel through habitats.	Ruffed grouse, American woodcock, vesper sparrow, chestnut-sided warbler, cuckoos, brown thrasher, Nashville, warbler, morning warbler, common yellowthroat, field sparrow, snowshoe hare, voles, foxes, bobcat, White-tailed deer, American black bear
<b>Early Successional softwoods (0-10 years old)</b>	Absent	Pine saplings are present scattered throughout. Hemlock cover habitat is present in small quantities in eastern portion of property and scattered throughout where canopy openings exist	Improve hemlock cover			

Habitat Assessment for HTF and HFWR

Habitat features and recommendations

<b>Snags</b>	Present, excellent	The majority are beech followed by pine and red maple. Very little oak, aspen, hemlock, snags. Available in all sizes though primarily large diameter 12-36". This resources will improve as the forest matures	Retain and promote in forests managed for mid-late successional habitats	Conduct safe operations without damaging this resource. Foliar cover around snags used for cavities is important to hide entrance. Snags used by bats; canopy cover (not clutter around snag) at the roost site is necessary within 40'. Conduct harvests that retain mature forest characteristics at every entry.	No recommendations Snags used by wildlife will likely be further away from trails.	See cavity trees and roost trees
<b>Live Cavity Trees</b>	Present, excellent	Abundance difficult to measure. Successful cavities will be located in inconspicuous locations. Pileated woodpecker damage is abundant and throughout. Available in all sizes including large diameter 24"+. This resources will improve as the forest matures	Retain and promote in forests managed for mid-late successional habitats. Identify cavity resources based on tree condition and potential to <i>become</i> a cavity tree, not just the presence of cavity	Locate and retain 1. Potential cavity trees. (trees with a or where a dead or dying branch is present, obvious heart rots, or exterior rot or other damage and 2. Where cavities exist. Conduct harvests that retain mature forest characteristics at every entry.	No recommendations. Cavity trees used by wildlife will likely be further away from trails.	Wood peckers and sapsuckers, red squirrel, grey squirrel, eastern screech owl, barred owl, white-breasted nuthatch, southern flying squirrel, <i>peromyscus</i> mice, porcupine, short-tailed weasel
<b>Dead Cavity Trees</b>	Present, adequate	Abundance difficult to measure. Successful cavities will be located in inconspicuous locations. Pileated woodpecker damage is abundant and throughout. Available in all including large diameter 24"+. This resources will improve as the forest matures	Retain and promote in forests managed for mid-late successional habitats. Identify cavity resources based on tree condition and potential to <i>become</i> a cavity tree, not just the presence of cavity	Locate and retain all snags . Retain low quality trees likely to not survive next cutting cycle. Conduct harvests that retain mature forest characteristics at every entry.	No recommendations . Cavity trees used by wildlife will likely be further away from trails.	Wood peckers, southern flying squirrel, eastern screech owl, northern saw-whet owl, white-breasted nuthatch, winter wren, brown creeper, short-tailed weasel,
<b>Bat Roost Trees (bole)</b>	Present, Excellent	Large diameter dead or dying trees with cracks, crevices or exfoliating bark at least 20' high, exposed to the sun, and within a mature forest condition with open midstory are abundant	Retain and promote in forests managed for mid-late successional habitats. Roost trees are often found adjacent to streams, trails, forest openings, or within forests with open midstories	Conduct safe operations without damaging this resource. Retain canopy cover around roost trees. Conduct harvests that retain mature forest characteristics at every entry.	None	Little brown bats, northern long-eared bats, eastern small-footed bats, silver-haired bats
<b>Bat Roost Trees (Foliage)</b>	Present Excellent	Large diameter co or super dominant red oak, white oak, white pine and eastern hemlock trees with large canopies and open midstory conditions are abundant.	Retain and promote in forests managed for mid-late successional habitats. Roost trees are often found adjacent to streams, trails, forest openings, or within forests with open midstories	Thinning or individual tree selection that removes midstory and increase tree diameters. Are excellent. Conduct harvests that retain mature forest characteristics at every entry.	No recommendations. roost trees used by bats will likely be further away from trails.	Eastern red bat, hoary bats,

Habitat Assessment for HTF and HFWR

Habitat features and recommendations

Habitat Assessment for HTF and HFWR			Habitat features and recommendations			
<b>Mast trees</b>		Year round mast resources will increase use of a habitat by wildlife.	Identify individuals and areas to target for improvements	Retain, promote, or regenerate mast resources	Target mast areas should be located away from trails	
<b>American beech</b>	Inadequate, and expected Improvements desired	Mature beech are in decline from <i>Nectria</i> fungus. Beech poles (root suckers) are abundant throughout. Mature productive beech are most abundant South side of management unit F.	1. Identify target beech mast areas. Improve frequencies of mature healthy ( <i>nectria</i> tolerant) beech with high mast productivity	Identify and release healthy beech: crop tree selection, thinning, singletree or small group (<0.25 acres).	Beech nuts will be used most frequently in areas away from trails.	Woodpeckers, ruffed grouse, turkey, blue jay, opossum, <i>peromyscus</i> , voles, jumping mouse, foxes, fisher, American black bear, White-tailed deer, white-breasted nut hatch, squirrels,
<b>Northern red oak</b>	Excellent, Improvements desired	Mature, mast producing oak are extremely abundant. Oak regeneration is virtually absent.	Retain high quality oak production, insure oak regeneration and turnover	Site preparation is important for oak regeneration; controlled burns, soil scarification and turning to bury acorns and disturb competing root systems likely to resprout.. Time with acorn production	Target mast areas should be located away from trails	Woodpeckers, ruffed grouse, turkey, blue jay, opossum, <i>peromyscus</i> , voles, jumping mouse, foxes, fisher, American black bear, White-tailed deer, white-breasted nut hatch, squirrels, Woodpeckers, ruffed grouse, turkey, blue jay, opossum, <i>peromyscus</i> , voles, jumping mouse, foxes, fisher, American black bear, White-tailed deer, white-breasted nut hatch, squirrels,
<b>White oak</b>	Adequate, expected, Improvements desired	Mature white oak are scattered and sparse. No regeneration is observed	1. Identify and release target white oak	Crop tree release, single tree, small groups that release oaks, thinning.		Woodpeckers, ruffed grouse, turkey, blue jay, opossum, <i>peromyscus</i> , voles, jumping mouse, foxes, fisher, American black bear, White-tailed deer, white-breasted nut hatch, squirrels,
<b>Bitternut Hickory</b>	Adequate, expected	Pole-small sawtimber are scattered and sparse	1. Identify and release target hickories	Crop tree release, single tree, small groups that release oaks, thinning.		
<b>Aspen</b>	Adequate, and expected. Improvements desired.	Mature aspen is abundant and ubiquitous. Most abundant in Stand 2 (HFWR, 1998 forest plan, Management Unit F). Aspen saplings or poles are absent. Target mature aspen can be managed to improve young aspen resources.	1. Identify target aspen regeneration areas. 2. Retain mature aspen in places while promoting aspen regeneration	Locate groups to remove mature aspen in groups >0.25acres . Where groups are created retain a few mature healthy aspen at edge of groups. Mature aspen are retained elsewhere at every aspen removal entry	Locate groups away from trails.	(considered for food only) Ruffed grouse, Moose, white-tailed deer, American black bear, snowshoe hare.
<b>Black cherry</b>	Inadequate, expected	Mature cherry are infrequent, likely reflective of mature forest conditions	1. Identify target black cherry individuals for retention of all sizes. .	Release black cherry of all sizes	Target mast areas should be located away from trails	Wood thrush, hermit thrush, black throated blue warbler, black throated green warbler, scarlet tanager, squirrels, ruffed grouse, wild turkey, cuckoos, wood peckers, phoebe, white-breasted nuthatch, brown creeper, cedar waxwing, <i>Peromyscus</i> mice, voles, woodland jumping mouse, foxes
<b>Serviceberry</b>	Present,	Young forest obligates, and shade intolerant. These are scattered throughout and exist primarily where forests are 0-50 years old.	1. Identify areas to improve soft mast. 2. release or create conditions to improve growth	1. Crop tree release or 2. Groups >0.25 acres adjacent to seed source		
<b>Pin cherry</b>	Inadequate, and expected					
<b>Dogwood</b>						
<b>Early successional</b>	Inadequate, Improvements	Virtually absent, exists in small openings within forest, at edges, beacon hill and	Increase frequencies of soft mast by creating forest	1. groups or patches >0.5 acres. Shelterwoods that reduce basal		

Habitat Assessment for HTF and HFWR

Habitat features and recommendations

<b>soft mast</b> <i>(Including species listed above)</i>	desired	reservoirs.	openings.	area below 50ft <sup>2</sup>	fisher, raccoon, American black bear, white-tailed deer
<b>Temporary Pools</b>	Present	Small, and scattered. 3 temporary pools will support pool breeding amphibians. The NW pool. Saddle pool and the Eastern pool. These pools are small and have shallow sphagnum moss layers. All three are embedded with a mature mixedwood environment with dense canopy cover. Very little coarse woody debris is available around the ponds.	Avoid logging activity and recreation within 250' from pools. Retain or promote canopy cover >75% within 650' from pools. Do not use foliar chemical sprays. Retain and improve coarse woody debris within 250' of pools	No activity within 250' from pools. Use only single tree selection or thinning within 650' from pools to manage for large diameter hardwood conditions. Retain "reserves" at rotation. Uneven aged management preferred. Do not compact coarse woody debris. Within 250' from pools, push over or drop live hardwoods over (12"+) to be used as coarse woody debris.	Restrict spring-fall off trail excursions to investigate pools  Wood frog, spotted salamander, eastern American toad, northern spring peeper. Gartersnakes (feeding) Northern waterthrush, Canada warbler (nesting, feeding)  Potential: Jefferson salamander Unlikely: Blue-spotted salamander, four-toed salamander.
<b>Wright Reservoir</b>		3.0 acres of standing water. Narrow band (0-20') of emergent shrubby vegetation on south western shores. Trails encircle pond with frequent use. Mature pine hardwood forest directly adjacent to reservoir.	Reduce recreation around pond. Modify trails to close loop, preferably retain east side loop, closing west side.	Follow AMP's. Protect from invasives. No recommendations or restrictions. Any forest management will be beneficial, including allowing to mature.	Reduce recreation around pond. Modify trails to close loop, preferably retain east side loop, closing west side. Modify Monument trail to connect to Creek Loop south of Reservoir.  Song sparrow, Canada warbler, Northern waterthrush, eastern phoebe, American black duck, mallard, pickerel frogs, green frogs, bull frogs, spring peepers, grey tree frogs, wood frogs, spotted salamanders, eastern newts
<b>Upper and Lower Reservoirs (water associated resources)</b>		Each 0.25 acres of standing water (2011). Conditions excellent for slow regeneration. Poor soil conditions will result in early successional shrubby landscape. For the next 20 years.	Allow natural regeneration to occur. Promote improvements to soil nutrients. A	Monitor closely for invasives. Any cuttings of non invasives leave as much material on site to replenish soil nutrients. Avoid foliar chemical spray within drainages.	Reduce recreation at Lower Reservoir. Close trail on dam.  Gartersnakes, American mink, Great blue heron, belted kingfisher,
<b>Streams</b>		Unnamed streams flow into and out of each of the 3 reservoirs.	Protect water quality for wildlife	Maintain canopy cover >75% around all streams.	None  Northern two-lined salamander, northern dusky salamander, American mink, raccoon

## Species Excluded from the HTF &amp; HFWR report

Scientific Name	Common Name	State Rank	State Status	Federal Status	Reasons for report exclusion
<i>Apalone spinifera</i>	Spiny Softshell turtle	S1	T		Preferred habitat not available: Large river systems
<i>Clemmys guttata</i>	Spotted Turtle	S1	E		Population not known to exist in Vermont
<i>Graptemys geographica</i>	Northern Map Turtle	S3	SC		Range Limited to Champlain Lowlands
<i>Sternotherus odoratus</i>	Common Musk Turtle	S2	SC		Vermont Range limited to Champlain lowlands
<i>Plestiodon fasciatus</i>	Common Five-lined Skink	S1	E		Range limited to southwestern Vermont
<i>Coluber constrictor</i>	Eastern Racer	S1	T		Range limited to southeastern Vermont
<i>Pantherophis alleghaniensis</i>	Eastern Ratsnake	S2	T		Range limited to southwestern Vermont
<i>Pseudacris maculata</i>	Boreal Chorus Frog	S1	E		Range limited to Northwestern Vermont
<i>Necturus maculosus</i>	Mudpuppy	S2	SC/PT		Habitat not present; large river systems
<i>Falcapennis canadensis</i>	Spruce Grouse	S1B	E		Range limited to Northeastern Vermont
<i>Childonias niger</i>	Black Tern	S2B, S2N	E		Preferred habitat not available: Lake Champlain
<i>Sterna hirundo</i>	Common Tern	S1, S2B, S2N	E		Preferred habitat not available: Lake Champlain
<i>Gavia immer</i>	Common Loon	S3B			Preferred habitat not available: Large isolated still water bodies
<i>Ardea alba</i>	Great Egret	S1B			Preferred habitat not available: Lake Champlain
<i>Podilymbus podiceps</i>	Pied-billed grebe	S2S3B	SC		Preferred habitat no available: large marshes, ponds
<i>Ixobrychus</i>	Least bittern	S2B	SC		Preferred habitat no available: large marshes, ponds
<i>Buteo lineatus</i>	Red-shouldered hawk	S2B			Preferred habitat no available: large wetlands
<i>Falco sparverius</i>	American kestrel	S4B	SC		Preferred habitat no available: large open fields
<i>Asio otus</i>	Long-eared owl	S1B			Shrubby habitat adjacent to open fields
<i>Chordeiles minor</i>	Common nighthawk	S1B	PESC		Preferred habitat no available: Open areas
<i>Chaetura pelagica</i>	Chimney swift	S4B	SC		Preferred habitat no available: Chimneys
<i>Melanerpes erythrocephalus</i>	Red-Headed Woodpecker	S1S2B	SC		Range limited to southern Vermont
<i>Picoides arcticus</i>	Black-Backed Woodpecker	S2B, S2N	SC		Range limited to Northeastern Vermont and boreal forests
<i>Picoides dorsalis</i>	Three-toed woodpecker	S1			Range limited to northeastern Vermont and high elevation spruce/fir
<i>Contopus cooperi</i>	Olive-sided flycatcher	S4B	SC		Habitat not available; softwood, open wetlands
<i>Lanius ludovicianus</i>	Loggerhead Shrike	SHB	E		Vermont populations not recognized

<i>Perisoreus canadensis</i>	Gray Jay	S1S2B51S2N	SC		Range limited to Northeastern Vermont
<i>Progne subis</i>	Purple martin	S3B	SC		Range limited to Champlain lowlands
<i>Poecile hudsonica</i>	Boreal chickadee	S2	SC		Range limited to high elevation
<i>Cistothorus platensis</i>	Sedge wren	S2B	E		Range limited to lowland sedge wetlands
<i>Catharus bicknelli</i>	Bicknell's thrush	S2B	SC		Range limited to high elevation
<i>Dendroica cerulea</i>	Cerulean Warbler	S1B	SC		Range Limited to Champlain Lowlands
<i>Dendroica discolor</i>	Prairie warbler	S3B	SC		Habitat limited to lowland open habitats
<i>Dendroica striata</i>	Blackpoll warbler	S4B	SC		Habitat limited to northern Vermont
<i>Vermivora chrysoptera</i>	Tennessee warbler	S1B			Range limited to Northeastern VT
<i>Vermivora pinus</i>	Blue-winged warbler	S3B	SC		Limited range in Champlain lowlands, habitat limited to open brushy habitats.
<i>Wilsonia pusilla</i>	Wilson's Warbler	S1B	SC		Range limited to Northeastern Vermont
<i>Ammodramus henslowii</i>	Henslow's Sparrow	S2B	E		Breeding in Vermont has not been recorded in last 20 years.
<i>Ammodramus savannarum</i>	Grasshopper sparrow	S1B	T		Habitat restricted to grasslands
<i>Dolichonyx oryzivorus</i>	Bobolink	S5B	SC		Habitat restricted to grasslands
<i>Euphagus carolinus</i>	Rusty Black Bird	S3B	SC		Range limited to Northeastern Vermont and Green Mountain Boreal Habitats.
<i>Sturnella magna</i>	Eastern meadowlark	S4B	SC		Habitat limited to grasslands
<i>Sorex dispar</i>	Long-tailed Shrew	S2	SC		Preferred habitat not available: high elevation rock talus
<i>Microtus chrotorrhinus</i>	Rock Vole	S2	SC		Preferred habitat not available: upper elevation moist rock talus
<i>Myotis sodalis</i>	Indiana Bat	S1	E	E	Range Limited to Champlain Lowlands
<i>Lynx canadensis</i>	Canada Lynx	S1?	E	LT	No known populations in Vermont (transient individuals only)
<i>Puma Concolor</i>	Eastern Mountain Lion	SH	E	LE	No known populations in Vermont
<i>Martes americana</i>	American Marten	S1?	E		Range limited to Northeastern Vermont
<i>Sylvilagus transitionalis</i>	New England Cottontail	SH	PESC	C	Populations thought to be extirpated
<i>Synaptomys borealis</i>	Northern Bog Lemming	SU			No known populations in Vermont
<i>Synaptomys cooperi</i>	Southern bog lemming	S2			Habitat limited to large wetland complexes.

### Species Account Overview and Outline

**Scientific Name:**

**Common Name:**

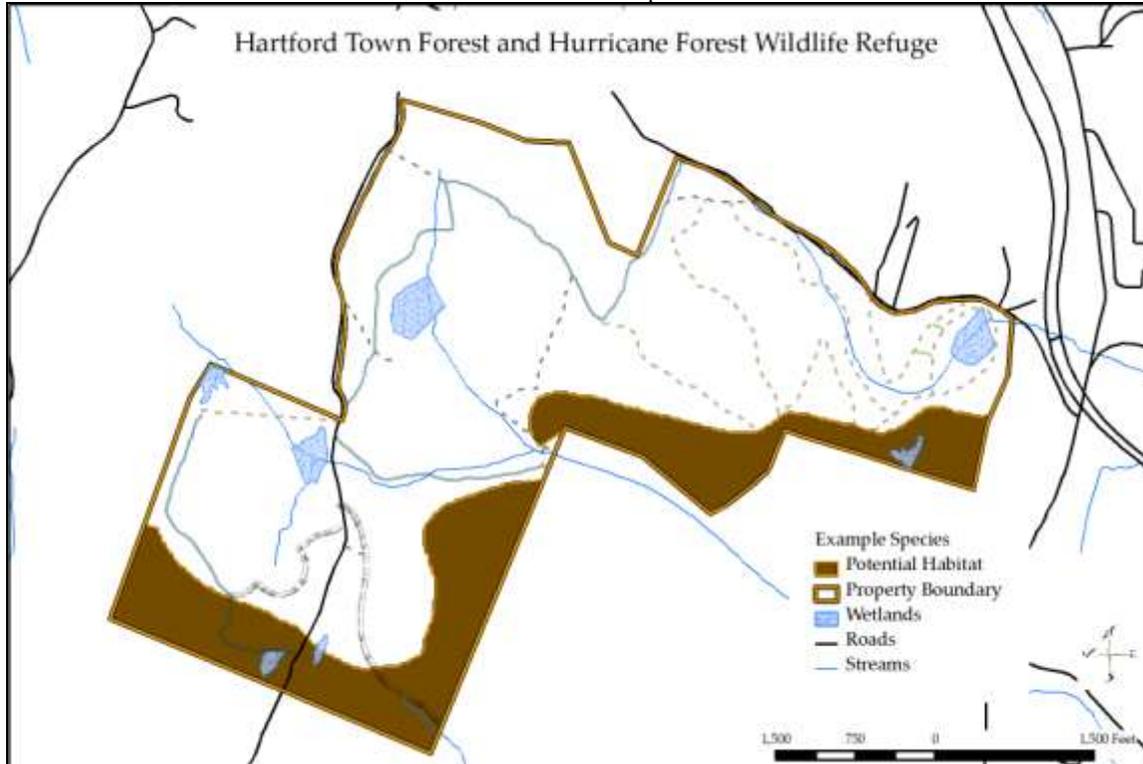
**State Priority Level:** As defined by Vermont's Wildlife Action Plan (Kart et. al 2005)

**State Rank:** Value that best describes abundance (B = breeding status)

**State Status:** Legal State Protection Level

**Federal Listing:** Legal Federal Protection Level

**General Habitat Preferences in Vermont:** Known habitat preferences within Vermont



**Population Status:** Status of populations in Vermont

**Habitat Suitability:** Characterizes the suitability of habitat within the HTF & HFWR as it pertains to each species

**Probability of Occurrence:** Based on habitat suitability, availability, range, population status within Vermont and the HTF & HFWR

**Habitat Availability within the HTF & HFWR:** Locations of a species preferred habitat on the HTF & HFWR.

**Recommendations for Land Uses:**

**Priority Levels:**

**High:** Target wildlife populations will only improve once recommendations are met.

**Moderate:** Target wildlife populations may improve once recommendations are met. Populations are stable or are in part controlled by other factors.

**Low:** Target wildlife populations are likely not to change as a result of recommendations. Populations stable or controlled mostly by other factors.

**Forest Habitat Management:** Describes recommendations to improve/retain/or promote habitat conditions

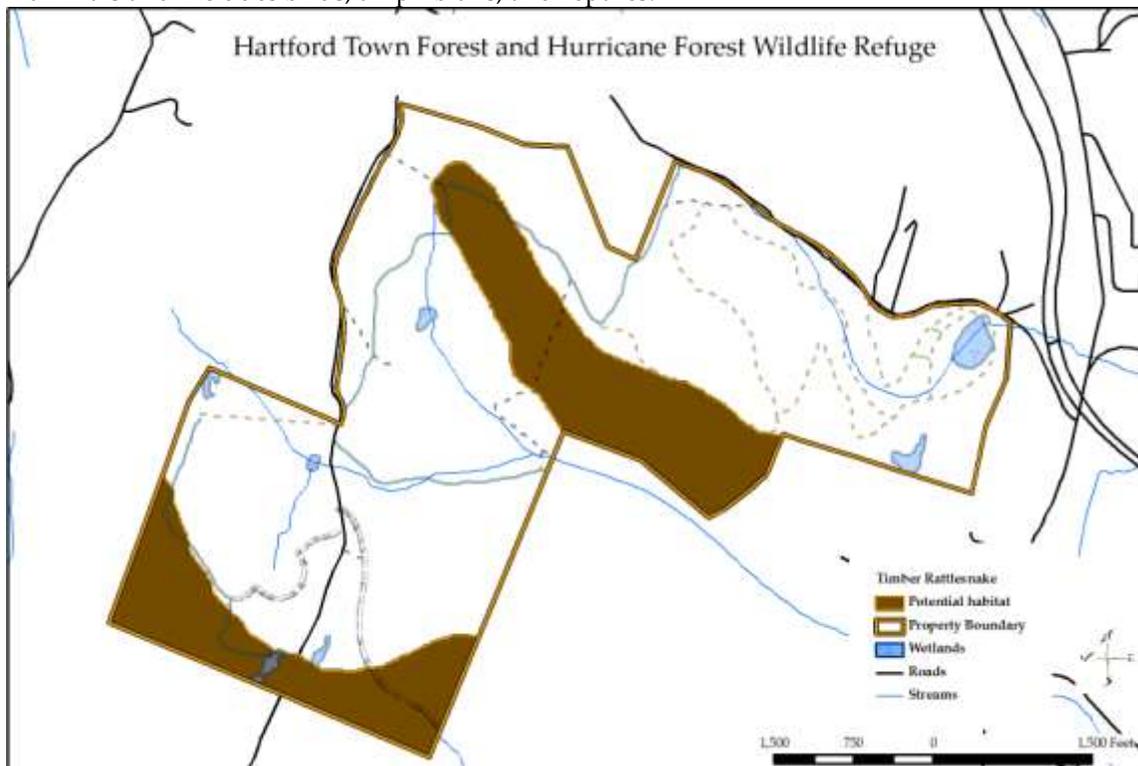
**Timber Management:** Describes how timber management can integrate habitat recommendations .

**Recreation:** Describes impacts of recreation and recommendations to reduce negative consequences.

**Educational:** Describes how to engage public with these considerations.

**Scientific Name:** *Crotalus horridus*  
**Common Name:** Timber Rattlesnake  
**State Priority Level:** High Priority  
**State Rank:** S1  
**State Status:** E  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The timber rattlesnake is closely associated with rocky talus warm, dry slopes and adjacent forested habitat. Timber rattlesnakes require rocky areas for basking, mating and hibernating. During the summer, south facing forested slopes of oak and hickory are used frequently for foraging and resting. Open, dry, sandy, or rocky areas serve well for basking areas (Reinhart 1984). In Vermont stable populations are associated with rocky forest habitat with areas shrubby dry oak forests (personal obs.) This species is sometimes found in remote areas either by preference or its elimination from human populated areas (Hunter 1999). Diet includes primarily small mammals and includes birds, amphibians, and reptiles.



**Habitat Suitability:** Low

**Probability of Occurrence:** Very Low

Records exist for Southern Champlain Valley, Windsor and towns further south on the Connecticut River Valley (Andrews 2008).

**Habitat Availability within the HTF & HFWR:**

Habitat quality is low for. No suitable rock features are present to provide habitat within the HTF & HFWR. South facing warm dry slopes exist but independent of rocky substrates. There does not appear to be suitable habitat within 1 mile of the forests. Habitat availability is likely within the town of Hartford

and if ever populations were to become as abundant as they once were, The HTF & may provide summer forest habitat primarily used for feeding.

Specific Locations: South facing slopes: on Beacon Hill and Neal's Hill

**Recommendations for Land Uses:**

*Forest Habitat Management:* Little can be done to improve rocky soil conditions, which will be the primary indicator for suitability. Forest habitat is typically controlled by soil conditions that provide for canopy openings, shallow rocky soils and talus that provide hibernation, basking, cover and prey resources. Snake habitat must have feeding and hibernation areas within a short distance for a population to be present. Where populations exist, habitat can be improved by providing ground conditions that allow for basking, cover, and prey populations. Removing overstory patches that leave or promote structural ground cover like branches, shrubs, logs or rocks. **Priority:** low

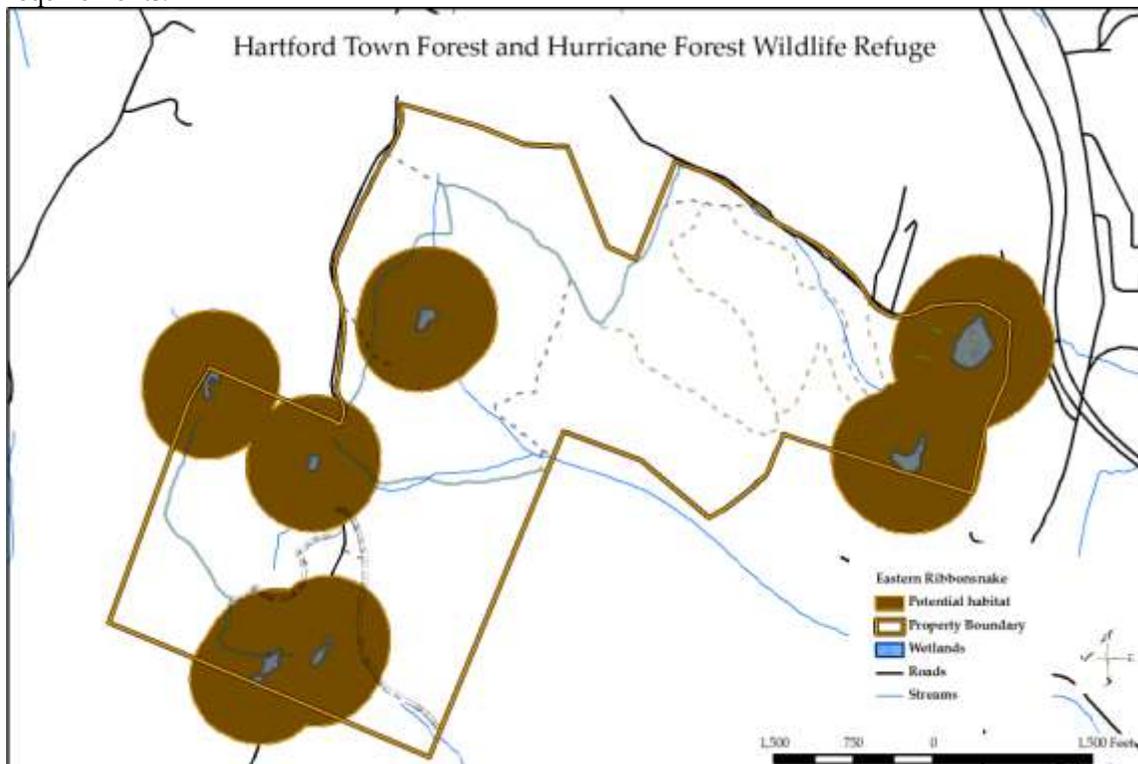
*Timber Management:* All timber management strategies can be designed to include the above habitat management strategies, including clear cutting or not cutting at all. In all cases work for oak regeneration. **Priority:** low

*Recreation:* none

*Educational:* Provide educational opportunities that improve the image of and portray snakes as valuable part of functioning forest ecosystems. **Priority:** low

**Scientific Name:** *Thamnophis sauritus*  
**Common Name:** Eastern Ribbonsnake  
**State Rank:** S3  
**State Status:** SC  
**State Priority Level:** Medium Priority  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The eastern ribbonsnake is almost always found in association with wetland habitats with ample sources of amphibians and invertebrates for prey (Bell et. al. 2007 and Lortie 1999). The ribbonsnake requires herbaceous cover as shrubs, sedges, or goldenrod (Lortie 1999). Home ranges are very small during summer months (5-10m) and later may travel up to 500' (Bell et. al. 2007). The snake forages around wetland edges where primary food source is amphibians (carpenter 1952). Ponds, slow moving streams, bogs, and seasonal pools are used. Snakes require hibernacula beneath frost line in rock crevices, rotted stumps, or root tunnels, though little is known about this species requirements.



**Population status/threats:** Population status is unknown (Kart et. al 2005). Ribbonsnakes are uncommon throughout their range and Hartford is at the northern limited of this species range. Their sedentary lifestyle makes them susceptible to disturbances.

**Habitat Suitability:** Moderate

**Probability of Occurrence at HTF & HFWR:** Low;

One record exists for Putney, VT. Most populations are found in the Champlain Valley where conducive wetlands and amphibians are more abundant. Populations are low within Vermont, and presence is limited by more than habitat availability.

**Habitat Availability within HTF & HFWR:**

Wright Reservoir is the most suitable location for this species for its prey availability. However, the wetland is relatively small, and limited foraging habitat is available. The forest comes right to the edge of the water as with many upland reservoirs. This characteristic provides only limited areas for cattails, sedges and spirea: the nature of a reservoir. Upper and Lower Reservoirs have recently been drained that will reduce their potential to provide habitat to large populations of preferred prey. In the near future, foraging habitat will be excellent, where these areas revert to early successional shrubby habitats (aspen/birch/red maple),

**Recommendations for Land Uses:**

**Forest Habitat Management:** Habitat recommendations that improve amphibian abundance will be the most productive in providing quality management. Avoid using chemical on the property. **Priority: Medium**

**Timber Management:** Where wetlands occur, avoid timber management that reduces canopy cover below 70%. Activities in winter to reduce . Within 1000' or between vernal pools, single tree or small group selection. Groups of up to 0.25 acres. Avoid compaction of down woody debris. Where cover is lacking, drop trees whole to provide cover. NO chemical use in or around wetlands. Refer to the Hartford Amphibian Inventory (Faccio, 2010). **Priority: Medium**

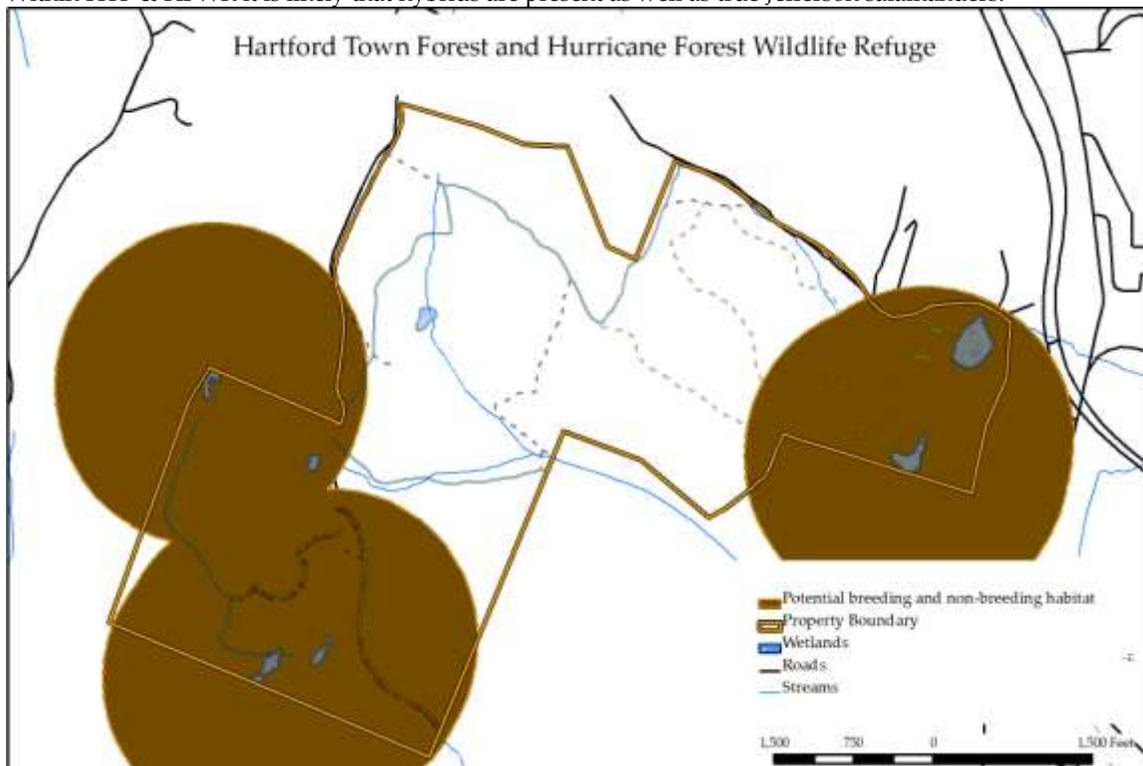
**Recreation:** Snakes will utilize trails and open areas for basking and foraging. Stay alert to avoid snakes. **Priority: Low**

**Educational:** Provide educational opportunities that improve the image of and portray snakes as valuable part of functioning forest ecosystems. **Priority: Low**

**Scientific Name:** *Ambystoma Jeffersonianum*  
**Common Name:** Jefferson Salamander  
**State Priority Level:** High Priority  
**State Rank:** S2  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The Jefferson salamander is found in well shaded mature deciduous upland forests (Degraaf and Yamasaki 2001). Faccio (2003) found Vermont Jefferson salamanders most associated with thick leaf layer, dense shrub layer, down woody debris, stumps, rotting logs, and canopy cover. Jefferson salamanders are typically associated with upland environments with soils and rocky substrates that provide subnivean cover (personal obs). Jefferson salamanders breed and will deposit eggs in vernal pools or fishless ponds during February-April (Degraaf and Yamasaki 2001). Post breeding adults and juvenile salamanders will emigrate from pools to deciduous forests with moist leaf litter. The salamanders can be found using subterranean small mammal tunnels where they spend the rest of the season foraging and then hibernating. In late winter-early spring Jefferson salamanders will travel back to breeding locations typically before ice off or snow melt.

Note: Hybrids between the Jefferson salamander and blue spotted salamander exists making true identification difficult without genetic analysis. The author makes no distinction between hybrids or true Jefferson salamanders. Within HTF & HFWR it is likely that hybrids are present as well as true Jefferson salamanders.



**Population status/threats:** Population status is unknown but thought to be in decline (Kart et. al 2005). The Jefferson salamander has never been common and detection is difficult due to their cryptic and early spring breeding cycle. These salamanders require unfragmented forest landscape with high quality temporary pools or ponds.

**Habitat Suitability:** Moderate**Probability of Occurrence:** Moderate

Will be difficult to find. Current records exist at this site (town of Hartford) and records exist for all surrounding Vermont towns Andrews (2008).

**Habitat Availability within the HTF & HFWR:**

Three temporary ponds are present and will provide suitable habitat for vernal pool breeders. Faccio found and reported two pools (Faccio 2010); the NW vernal pool and the Saddle Vernal pool. The third pool; the eastern pool found in the eastern portions of the HFWR will provide suitable breeding habitat for many temporary pool breeders, including the Jefferson salamander. While less suitable, the reservoirs may also be used for breeding and egg sites. All wetlands have conducive forest structure to support upland habitats.

**Specific Locations:** See map.

1. NW pool and associated forests
2. Saddle pool and associated forests
3. Eastern pool and associated forests.

**Management Recommendations:**

1. Use Best Management Practices for wetland habitat specifically vernal pools. This includes buffer zones (600-1000ft). Limit activities to late summer, limit forest fragmentation, limit overstory canopy removal. Contact author or refer to *Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern United States* (2006) for details regarding BMP's

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Avoid chemical use

**Timber Management:** See Amphibian Inventory (Faccio, 2010) for details. Where timber harvests occur, avoid cutting trees or using machinery with 250' of wetlands. With 1200' of wetlands do not reduce canopy below 75% and retain or promote ground cover objects (large diameter down logs, rocks). Winter Harvests are preferred to reduce compaction of soils. Overall, promote and retain mature forest characteristics. Avoid chemical use within potential habitat. **Priority: High**

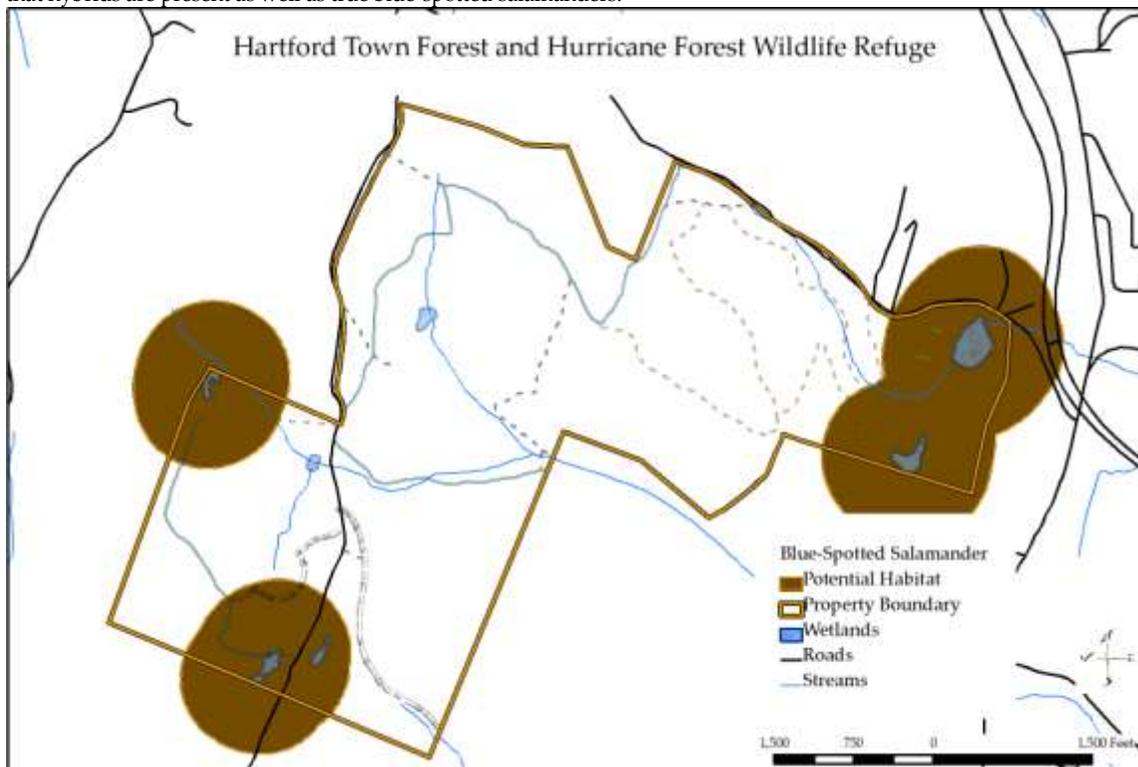
**Recreation:** None

**Educational:** Provide educational opportunities that educate the public on identification of species. Using visitor information will be valuable. **Priority: Low**

<b>Scientific Name:</b>	<i>Ambystoma laterale</i>
<b>Common Name:</b>	Blue-spotted salamander
<b>State Rank:</b>	S3
<b>State Status:</b>	SC
<b>State Priority Level:</b>	Medium
<b>Federal Listing:</b>	Unlisted

**General Habitat Preferences in Vermont:** The blue-spotted salamander is found in the Champlain and Connecticut Valleys (southern and south of Vermont) in well shaded, lowland, mature deciduous forests (Degraaf and Yamasaki 2001, personal obs. ) associated with wetlands. Blue-spotteds require fishless shallow water bodies for breeding. Typically these are vernal pools but can be beaver ponds, ditches, red maple swamps or other ponds. Post breeding adults and juvenile salamanders will emigrate out of the pools to deciduous forests with moist leaf litter. In Massachusetts, Regosin et. al. (2005) found the majority of blue spotted salamanders more than 100m from the breeding pond. Terrestrially blue-spotteds are associated with thick leaf layer, dense shrub layer, down woody debris, stumps, rotting logs, and canopy cover.

Note: Hybrids between the Jefferson salamander and blue spotted salamander exists making true identification difficult without genetic analysis. The author makes no distinction between hybrids or true Jefferson salamanders. Within HTF & HFWR it is likely that hybrids are present as well as true blue-spotted salamanders.



**Population status/threats:** Population status is unknown (Kart et. al 2005). The blue-spotted is more tolerant of disturbance than the Jefferson. Threats include habitat fragmentation, impacts to wetlands.

**Habitat Suitability:** Low

**Probability of Occurrence:** Low

**Habitat Availability within the HTF & HFWR:**

Mature deciduous forests and suitable pools and reservoirs are present and seemingly are suitable for the blue spotted salamander. However its associated and presumed preference for lowland pool and floodplain wetlands may preclude the presence of the blue spotted.

**Specific Locations:** See map.

1. NW pool and associated forests
2. Saddle pool and associated forests
3. Eastern pool and associated forests.
4. Wright Reservoir

**Management Recommendations:**

1. Use Best Management Practices for wetland habitat specifically vernal pools. This includes buffer zones (600-1000ft). Limit activities to late summer, limit forest fragmentation, limit overstory canopy removal. Contact author or refer to *Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern United States* (2006) for details regarding BMP's

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Avoid chemical use

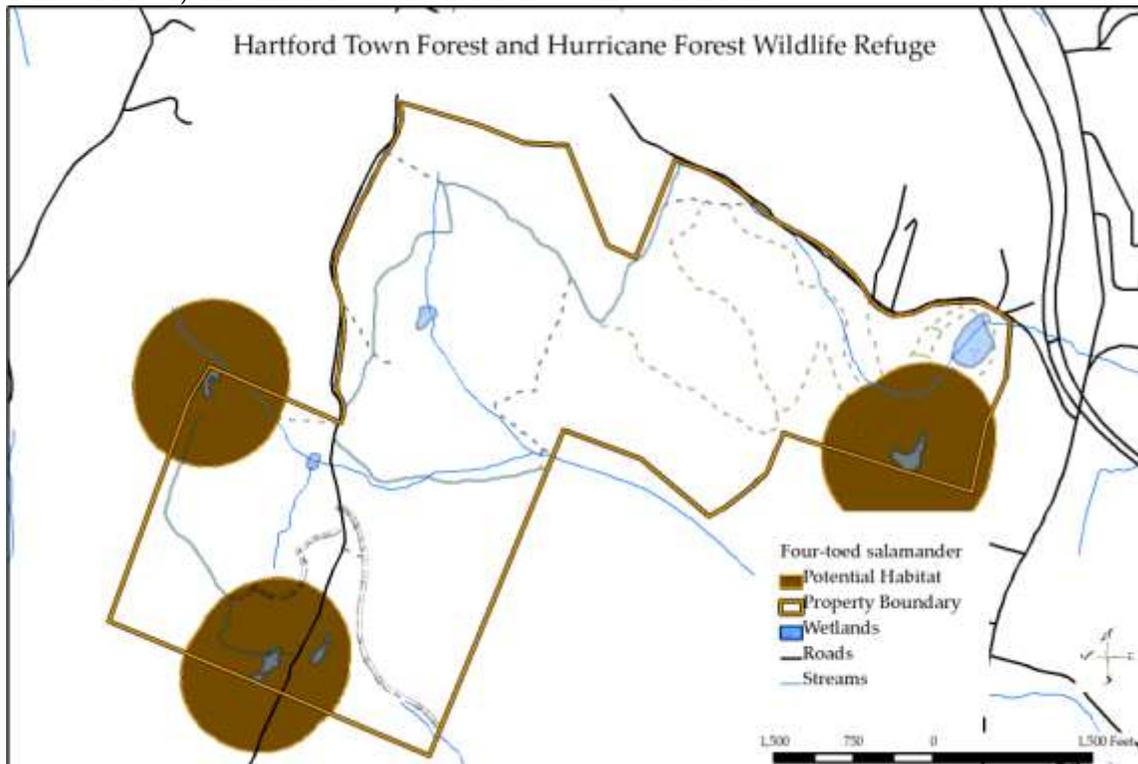
**Timber Management:** See Amphibian Inventory (Faccio, 2010) for details. Where timber harvests occur, avoid cutting trees or using machinery with 250' of wetlands. With 1200' of wetlands do not reduce canopy below 75% and retain or promote ground cover objects (large diameter down logs, rocks). Winter Harvests are preferred to reduce compaction of soils. Overall, promote and retain mature forest characteristics. Avoid chemical use within potential habitat. **Priority: High**

**Recreation:** None

**Educational:** Provide educational opportunities that educate the public on identification of species. Using visitor information will be valuable. **Priority: Low**

<b>Scientific Name:</b>	<i>Hemidactylium scutatum</i>
<b>Common Name:</b>	Four-toed Salamander
<b>State Priority Level:</b>	Medium Priority
<b>State Rank:</b>	S2
<b>State Status:</b>	SC
<b>Federal Listing:</b>	Unlisted

**General Habitat Preferences in Vermont:** Four-toed salamanders are entirely terrestrial during juvenile to adult phases. Found primarily in the Champlain Basin and scattered records in the Connecticut River valleys within Vermont (Andrews 2008), four-toeds are associated with wetlands or woodland swamps. Reproductive adult females choose wetlands with sphagnum moss, still or slowly moving water, and steep shore lines or elevated substrates above water (Chalmers and Loftin 2006). Vernal pools are used less often than other water bodies. Sphagnum mosses are the most predictable feature of nesting sites (Burgason, 1999, Chalmers and Loftin 2006). In Virginia, Wood (1955) describes nests under bark, logs, and pine needles in addition to the preferred moss covered nests. In Maine, Chalmers and Loftin (2006) describes nests on top of moss covered roots, logs, earth, tree trunks, and other vegetation that overhang slowly moving water. Reproductive sites are positively correlated with coniferous canopy cover and absence of sheep laurel (Chalmers and Loftin 2006) and are present in wetlands with no canopy (Degraaf and Yamasaki 2001). Communal nesting has been reported (Harris and Gill 1955) and although benefits are debated (Harris et. al. 1995) these populations may be more susceptible to disturbances. Adults spend most of the summer terrestrially under moist leaf litter, rotting stumps, or mosses (Degraaf and Yamasaki 2001). Hibernation occurs under these same conditions.



**Population status/threats:** Population status is described as unknown (Kart et. al. 2005). Fragmentation is a threat to this species, and degradation of water quality. Road mortality is high around known breeding sites with roads.

**Habitat Suitability: Moderate****Probability of Occurrence: Low**

No known records of the four-toed salamander for Hartford. Within the Connecticut River Valley, four-toed salamanders have been reported in Fairlee, Newfane, Brattleboro, and Vernon.

**Habitat Availability within the HTF & HFWR:**

Reservoirs here are unlikely to provide habitat. The 3 temporary pools offer marginal habitat conditions. Mossy substrates are available but limited and shallow in places. Soils here are well drained and only moderately acidic. Water depth may be 0.5-1.5' deep during early spring thaw, and not flowing in all tree pools.

**Specific Locations:** See map.

1. NW pool and associated forests
2. Saddle pool and associated forests
3. Eastern pool and associated forests.

**Management Recommendations:**

1. Use Best Management Practices for wetland habitat specifically vernal pools. This includes buffer zones (600-1000ft). Limit activities to late summer, limit forest fragmentation, limit overstory canopy removal. Contact author or refer to *Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern United States* (2006) for details regarding BMP's

**Recommendations for Land Uses:**

**Forest Habitat Management:** Avoid chemical use.

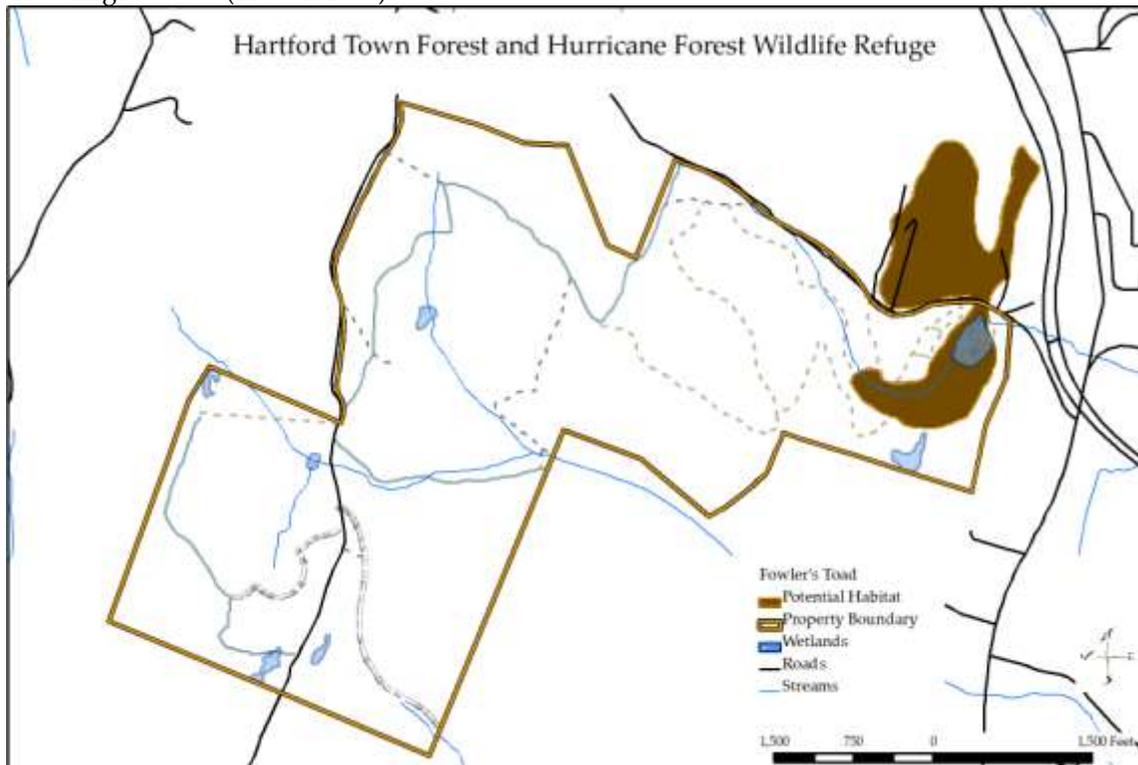
**Timber Management:** See Amphibian Inventory (Faccio, 2010) for details. Where timber harvests occur, avoid cutting trees or using machinery with 250' of wetlands. With 1200' of wetlands do not reduce canopy below 75% and retain or promote ground cover objects (large diameter down logs, rocks). Winter Harvests are preferred to reduce compaction of soils. Overall, promote and retain mature forest characteristics. Avoid chemical use within potential habitat. **Priority: High**

**Recreation:** The South Side Trail is directly adjacent to the Saddle pool. As a result, users will investigate the pool more often and indeed has resulted in portions of the edges being compacted. The four-toed salamander utilizes these mossy edges for nests and compaction of mossy edges sites will create negative consequences for the potential habitat use of the four-toed salamander. **Priority: High**

**Educational:** Provide educational opportunities that prevent off-trail wetland investigation. **Priority: High**

**Scientific Name:** *Anaxyrus fowleri*  
**Common Name:** Fowler's Toad  
**State Priority Level:** High  
**State Rank:** S1  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The Fowler's toad is most associated with sandy or gravelly soils (Dobbyn; 2005, Clarke; 1974, Breden; 1987). In Vermont these suitable soils are found at shores, around flood plains, alluvial or lowland glaciofluvial deposits. Strings of eggs are laid in a variety of wetland types; from rivers, lakes, ponds and temporary pools. Activities are crepuscular to nocturnal seeking warm substrates. Hibernation occurs in the ground likely in burrows or tunnels in sandy substrates. Often found on the warmest substrates within its range (Clarke 1974). Ranges for a 10 day period were no more than .75 acres (Clarke 1974). Rarely found in forested conditions (Dobbyn; 2005, Clarke; 1974, Breden; 1987). Like most amphibians, most Fowler's toads return to breed in the same ponds they were born in (Breden 1987). However there are always a small percentage of every population that emigrates out (Breden 1987)



**Population status/threats:** Population status is described as unknown (Kart et. al. 2005). Fragmentation is a threat to this species, and degradation of habitat from development and water quality. Road mortality is high around known breeding sites with roads.

**Habitat Suitability:** Low  
**Probability of Occurrence:** Low

**Habitat Availability within the HTF & HFWR:** Sandy loose soils are limited to eastern portions in the lowest elevations. Even here, these soils are not as ideal as lower sites along the White or Connecticut River. Those rivers are 1.0 miles from the Wright Reservoir and may offer suitable habitat.

**Specific Locations:** See map.  
Wright Reservoir.

Management Recommendations:

2. Use Best Management Practices for wetland habitat specifically vernal pools. This includes buffer zones (600-1000ft). Limit activities to late summer, limit forest fragmentation, limit overstory canopy removal. Contact author or refer to *Habitat Management Guidelines for Amphibians and Reptiles of the Northeastern United States* (2006) for details regarding BMP's

**Recommendations for Land Uses:**

**Forest Habitat Management:** Keep Wright Reservoir full of water. Avoid chemical use.

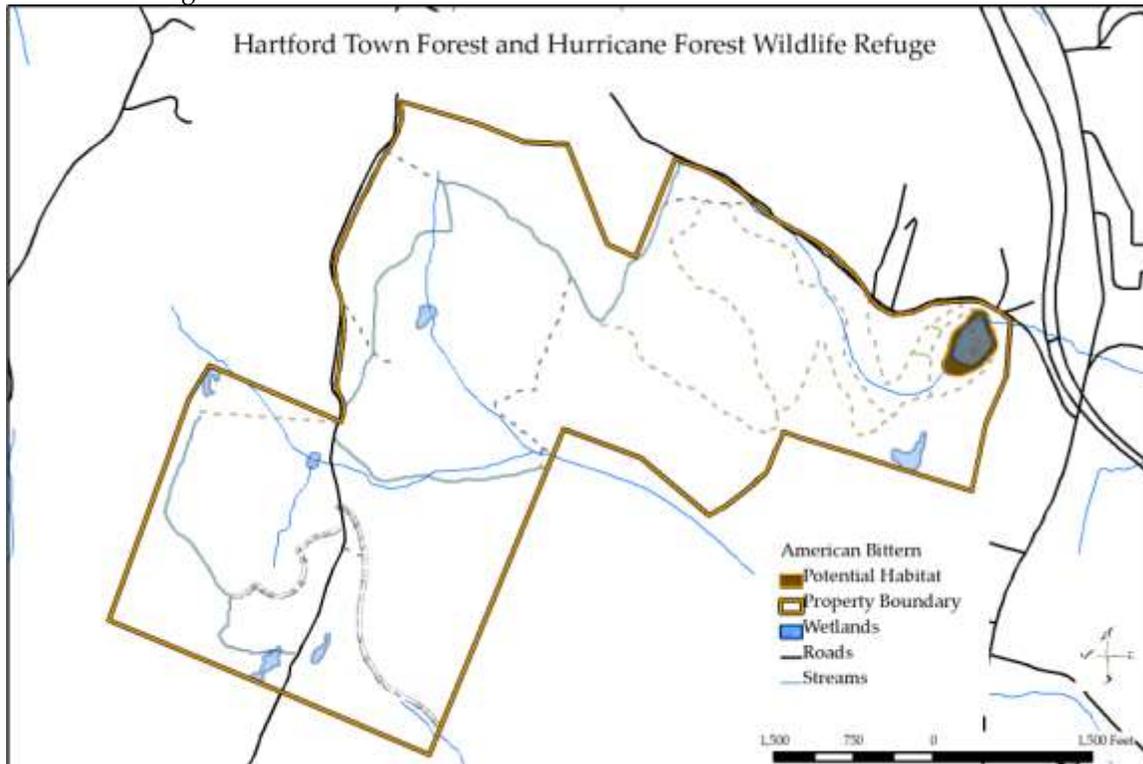
**Timber Management:** none. **Priority: Low**

**Recreation:** None **Priority: Low**

**Educational:** Educate users the differences between American toad and Fowler's toad. **Priority: Low**

**Scientific Name:** *Botaurus lentiginosus*  
**Common Name:** American bittern  
**State Priority Level:** High Priority  
**State Rank:** S3B, S3N  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** Marshes or any large wetlands with vegetation 1.0- 62.5 acres. The American bittern is more abundant in larger wetlands. (Gibbs and Melvin 1990) and requires dense vegetation (cattails, bulrushes) (Duebber and Lokemoen 1977) for nest sites. The American bittern migrates south for winter. Nesting in mid may, the American bittern is susceptible to disturbance from visitors and dogs.



**The population trends in Vermont** State wide increase. In the southern Vermont piedmont, observations decreased 20% between 1987 and 2007 (Breeding Bird Atlas Explorer (online resource). 2008). Shoreline development, establishment of invasive species (phragmites and purple loosestrife) and wetland conversion are all important threats to this species.

**Habitat Suitability:** Very Low

**Probability of Occurrence:** Very Low

**Habitat Availability within the HTF & HFWR:**

Reservoirs may serve as stopovers or secondary forage sites. Suitable breeding habitat is not present on the property. Wetlands are small and lack emergent vegetation for cover.

Wright Reservoir

**Recommendations for Land Uses:**

*Forest Habitat Management:* Keep Wright Reservoir full of water. Avoid chemical use.

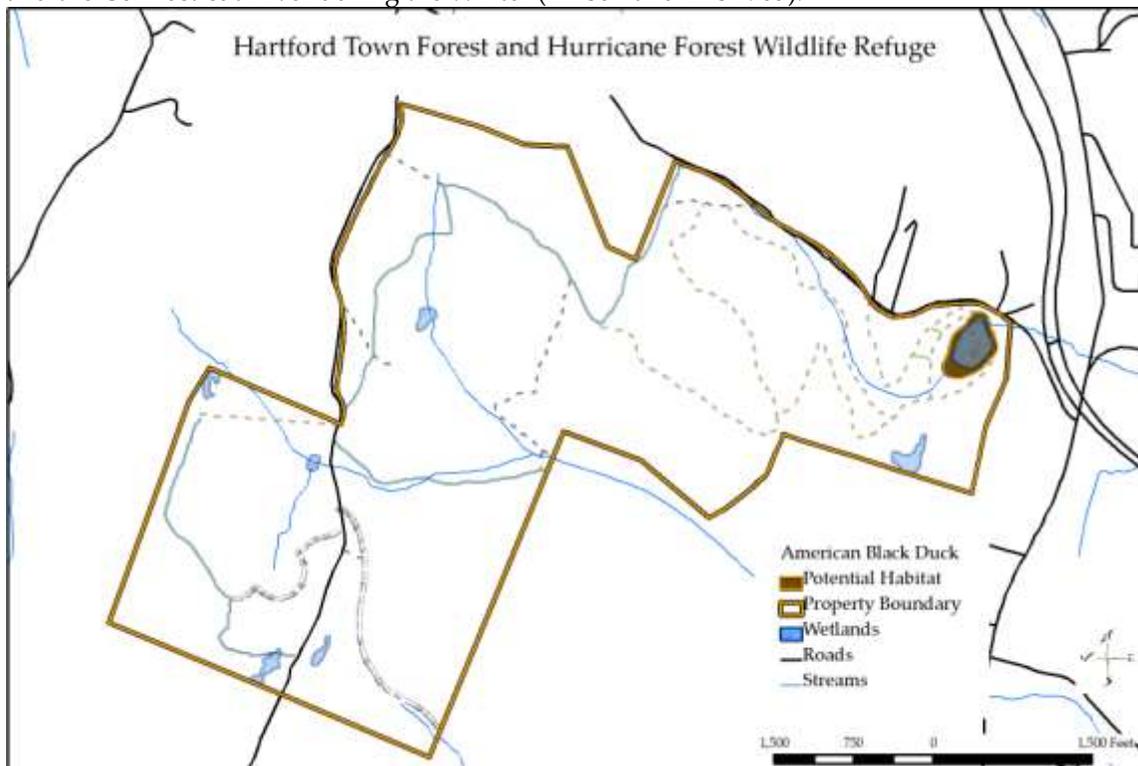
*Timber Management:* none. **Priority: Low**

*Recreation:* Visitation to the ponds will deter any activity from cryptic wildlife. Trails could be closed from May-end of June to allow for breeding birds. **Priority: Low**

*Educational:* None. **Priority: Low**

**Scientific Name:** *Anas rubripes*  
**Common Name:** American black duck  
**State Priority Level:** High  
**State Rank:** S5B, S5N  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** A versatile breeder known to use many types of still water habitat, including lakes ponds, edges of rivers, forested swamps, beaver ponds and emergent wetlands. Black ducks prefer fertile (function of water chemistry and correlates with forage, prey and cover availability) wetlands (Merendion and Ankney, 1994). Nesting occurs in well hidden areas on the ground, in woods or close to or within the wetland (Stotts and Davis 1960). Concealed by vegetation, nests are built of a collection of pine needles, grasses, and vegetative debris (Stotts and Davis 1960). Black ducks stay as far north as available unfrozen water and may use rivers or brooks, portions of Lake Champlain, and the Connecticut River during the Winter (Ellison and Elis 1985).



**Population status in Vermont:** Widespread and locally common. Vermont populations in decline by 32%. (Breeding Bird Atlas Explorer (online resource). 2008). . Known threats include acidification of wetlands, hybridization with mallards, habitat loss, and contamination of mollusks – an important winter food source, by pollution (Kart, et al eds 2005, Degraaf and Yamasaki 2001 ).

**Habitat Suitability:** Low

**Probability of Occurrence:** Low

In the 1976 Vermont Breeding Bird Survey it was present in Hartland but absent in Quechee 2089-6, and Windsor. Absent during 2003-2005 survey (Breeding Bird Atlas Explorer (online resource). 2008).

Habitat Availability within the HTF & HFWR:

The Wright Reservoir would be an ideal forested wetland for this bird. Concealed, with adequate vegetation directly adjacent to cover and forage and invertebrates this wetland would support 1 or 2 pairs of ducks. However due to the recreation and disturbance from humans, black ducks, and any other ducks are likely to flee from human pedestrians within 250' (Pease, Rose, and Butler 2005). Breeding here would not be productive.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Maintain open water habitats. Keep Wright Reservoir full of water. Avoid chemical use. **Priority: Moderate**

**Timber Management: none. Priority: Low**

**Recreation:** Visitation to the ponds will deter any activity from cryptic wildlife. Modification to visitation to ponds could increase use of ponds by wildlife. Use of breeding birds extends May-end of

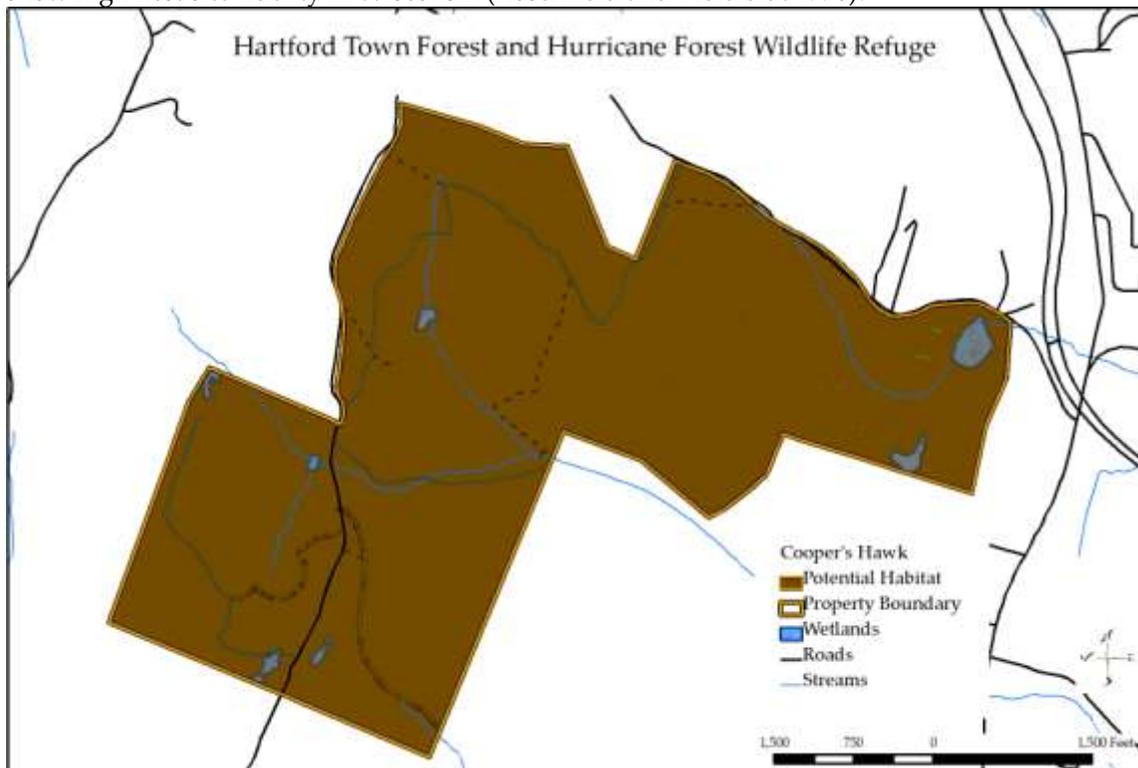
**Priority: High**

**Educational:** Educate public on recreation modification and the importance of isolated wetlands. .

**Priority: Low**

**Scientific Name:** *Accipiter cooperii*  
**Common Name:** Coopers' hawk  
**State Priority Level:** Medium  
**State Rank:** S2S3B  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The Cooper's hawk is migrant and a generalist, tolerant of fragmentation, occupying mature deciduous, coniferous and mixed forest types and semi-open areas. Most frequently found adjacent to open fields, or non-forest habitats. In New York, Cooper's hawk prefers forest stand conditions with high basal area with large diameter trees however nest site conditions includes areas with higher shrub concentration (Bosakowski, et. al 1992). Nests are built next to or in the crotch of a tree trunk in or just under the canopy. In Oregon, average height of nests is 42' above ground (Wright and Reynolds 1978). Cooper's hawks nest in flat terrain, can tolerate human habitation, proximity to roads (Bosakowski, et. al 1992, DeGraaf and Yamasaki 2001). Coopers hawk show high nest site fidelity in Wisconsin (Rosenfield and Bielefeldt 1996).



**Population Status within Vermont:** The bird is considered a rare and local breeder (DeGraaf and Yamasaki 2001). In the late 1800's populations plummeted from persecution, since then DDT is thought to have contributed to further population problems. However, observations of breeding Cooper's hawks have dramatically increased (Breeding Bird Atlas Explorer (online resource). 2008).

**Habitat Suitability:** High

**Probability of Occurrence:** Moderate

**Habitat Availability within the HTF & HFWR:** Large diameter trees especially oak and pine are ubiquitous. Small openings are found at reservoirs, and recent timber harvests. Adjacent open fields are present at the north and south. With the exception of the hilly terrain, this forest is of high quality for the Cooper's hawk. It is likely that the HTF and the HFWR will be used in conjunction with adjacent agricultural fields.

However, the high frequency of use on trails may prevent successful nesting. Nests that are more than 1700' from frequent human activity are more likely to succeed (Richardson and Miller, 1997). No portion of the HTF and the HFWR is 1700' or more from mapped trails.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Avoid chemical use. Promote large diameter trees; pine and oak and high basal areas within forest sites. Decrease human recreation in areas or times of year. **Priority: high**

**Timber Management:** Maintain basal area with large diameter trees. Within forests, canopy gaps that promote or improve understory or midstory will improve site specific nest characteristics. (0-,25 acre canopy gaps). **Priority: Low**

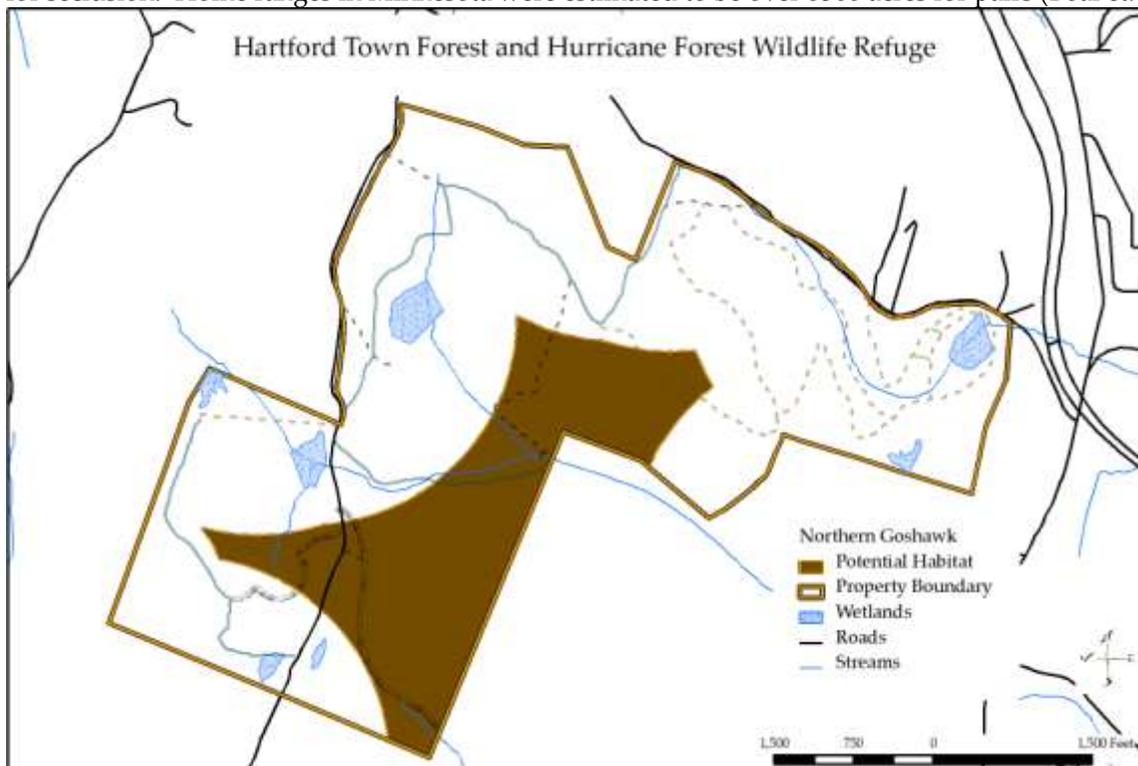
**Recreation:** The frequency of use on this property will disturb wildlife, including the Cooper's hawk. A buffer distance of 1700' from nests is required to prevent nest failure as a direct result of human avoidance. Trail closures during April –Mid June that allow for some portion of this property to be at least 1700' from trails will be beneficial to the Cooper's hawk and many other species. Areas for closure should: have high basal area (>85ft<sup>2</sup>) large diameter ((QM) dbh>11") have high proportion of species be oak and pine and have small canopy gap openings.

**Priority: High**

**Educational:** Educate public on recreation modification and the values of reduced human disturbance on wildlife. **Priority: Moderate**

**Scientific Name:** *Accipiter gentilis*  
**Common Name:** Northern goshawk  
**State Priority Level:** Medium  
**State Rank:** S2B  
**State Status:**  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The goshawk is known as a forest interior hawk avoiding human habitation (Bosakowski and Smith 1997, Squires and Kennedy, 2006 ). The goshawk preys primarily on small mammals (Squires and Kennedy, 2006, Degraaf and Yamasaki 2001) like squirrels, chipmunks, voles and mice, and goshawk populations are greatly affected by small mammal abundance (Squires and Kennedy, 2006, Salafsky et. al. 2007). The goshawk nests and forages in upland mature hardwood or mixedwood forests with large diameter trees, large amounts of coarse woody debris, dense canopy cover, and open midstory layers for flight paths (Boal et. al. 2005). In New York Speiser and Bosakowski (1987) found nests in large diameter (14" average) hardwoods in mixed hardwoods. Nests are placed an average of 0.3 miles ( Bosakowski and Smith 1997) and 0.80 miles (Speiser and Bosakowski 1987) from human habitation. Additionally, nest sites are on average 1000' from swamps or other wetlands. The goshawk is very susceptible to human disturbance and requires large contiguous forests for seclusion. Home ranges in Minnesota were estimated to be over 8500 acres for pairs (Boal et. al. 2003).



**Population Status within Vermont:** Considered a rare and uncommon breeder. Populations have grown since 1930's with agriculture lands reverting to forest. However, this birds aversion to human disturbance continues to restrict the occurrences. A slight decline in state wide population was recorded (Breeding Bird Atlas Explorer (online resource). 2008).

**Habitat Suitability:** High  
**Probability of Occurrence:** low

**Habitat Availability within the HTF & HFWR:** The large diameter contiguous forest is exceptional for the northern goshawk. Nesting trees are available as is abundant foraging areas. Small mammal populations are likely abundant from prolific red oak acorns and pine seed crops. However, if a 0.3 mile buffer was placed around houses adjacent to the HTF and HFWR, only 100 acres of the property would be suitable for nesting. If mapped trails were considered as human habitation, no area on the property would be suitable.

**Recommendations for Land Uses:**

**Forest Habitat Management:** The current available habitat is exceptional for the northern goshawk. No modifications to the habitat is recommended. Retain mature forest characteristics (large diameter trees, closed canopy, open midstory) in potential habitat. **Priority: high**

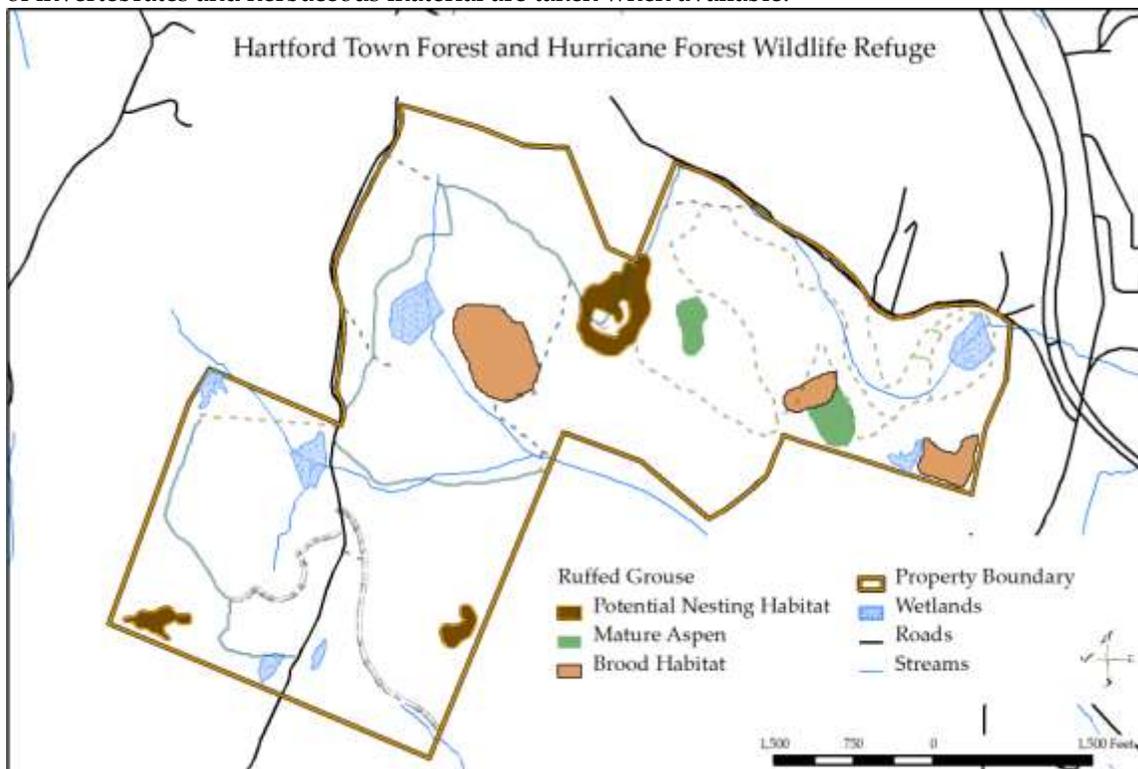
**Timber Management:** Maintain high basal area (>75ft<sup>2</sup>) with frequent evenly spaced large diameter hardwood trees (>14"). Conduct harvests during winter. Promote mast producers. **Priority: High**

**Recreation:** Where potential habitat is present, close all trails from March 1<sup>st</sup>-July 1<sup>st</sup>.  
**Priority: High**

**Educational:** Educate public on recreation modification and the values of reduced human disturbance on wildlife. . **Priority: Moderate**

**Scientific Name:** *Bonasa umbellus*  
**Common Name:** Ruffed grouse  
**State Priority Level:** Medium  
**State Rank:** S4S5  
**State Status:**  
**Federal Listing:** Unlisted  
 Considered a game bird

**General Habitat Preferences in Vermont:** The ruffed grouse is a permanent resident of Vermont. Found using a variety of forests and use depends on gender, age and time of year. Males use raised substrates (downed logs, rocks, rock walls, stumps, etc..) for drumming. Females will build nests at the base of live trees, dead trees, stumps, or next to downed trees for protection from predators (Tirpak et.al 2006, Larsen et. al. 2003, Bump et. al. 1947). Young birds (<5weeks) will roost on the ground during the night. Subsequently (>5weeks) broods will roost in concealing trees in deciduous forest (Tirpak and Guiliano 2005). Nest site habitats are varied. Nests are often located in or in close proximity to young pole sized hardwoods or hardwood conditions with dense shrub, pole cover (Larsen et. al. 2003). In Appalachian forests, nests were located in forests with high basal areas, high coarse woody debris, and low ground cover (Tirpak et. al. 2006).. Aspen, alder, and American hazelnut are preferred food sources throughout the year, and depended on during nesting (Maxson, 1978, Guglielmo and Karasov 1995) though a variety of invertebrates and herbaceous material are taken when available.



Primary brood habitat will offer cover from predators and food resources. Early successional habitat, often young aspen stands, are consistently used, however will be used in conjunction with other forest types (Maxson, 1978 Larsen et.al 2003, Giroux et. al., 2007, Zimmerman, et.al 2009). During winter grouse use older age classes of forests with a larger composition of coniferous species for cover from weather (Blanchette et. al. 2007)

**Population Status within Vermont:** Common. 1% decrease in breeding observations from 1976-2005 breeding surveys (Breeding Bird Atlas Explorer (online resource). 2008).

**Habitat Suitability:** High

**Probability of Occurrence:** High

**Habitat Availability within the HTF & HFWR:** Nesting, feeding, and winter habitat is available here. The forest is dominated by mature oak and pine with moderate frequencies of coarse woody debris for drumming and nesting. Pole sized hardwoods are available in low frequencies for midstory cover. Understory is dense where beech or hemlock are abundant. Large diameter aspen are present where ruffed grouse will feed primarily during nesting periods. Early successional habitat is present in very small quantities.

Suitable feeding habitat is ubiquitous, as is aspen in patches.

Suitable nesting and early brood habitat (early successional habitat) is present at Beacon Hill, around wetlands, atop Neal's Hill and with recent timber harvests primarily on the south west corner.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Diversity of landscape features is important. Mature forest characteristics adjacent to early successional habitat is required by grouse. Creation of 1 acre patches will create habitat conducive to the ruffed grouse, while maintaining the majority of forest in mature category. Within these patches, drop whole trees and leave for drumming and nest sites and retain snags. Locate patches where large diameter aspen is present to promote aspen regeneration. **Priority: high**

**Timber Management:** Identify 1 acre patches for ruffed grouse management areas by their ability to produce a prolific amount of regeneration quickly. A small percentage of this area should include aspen. Reduce basal area below 40ft<sup>2</sup> Do not use whole-tree harvest techniques. Patch cuts are ideal, but can be used in conjunction with shelterwoods or group selection. Identify at least 10 trees >12" dbh per acre of hardwood to drop and leave at the completion of the harvest. Can treat Patch cuts as habitat management and implement every 30 years, rather than on a timber production cycle **Priority: high**

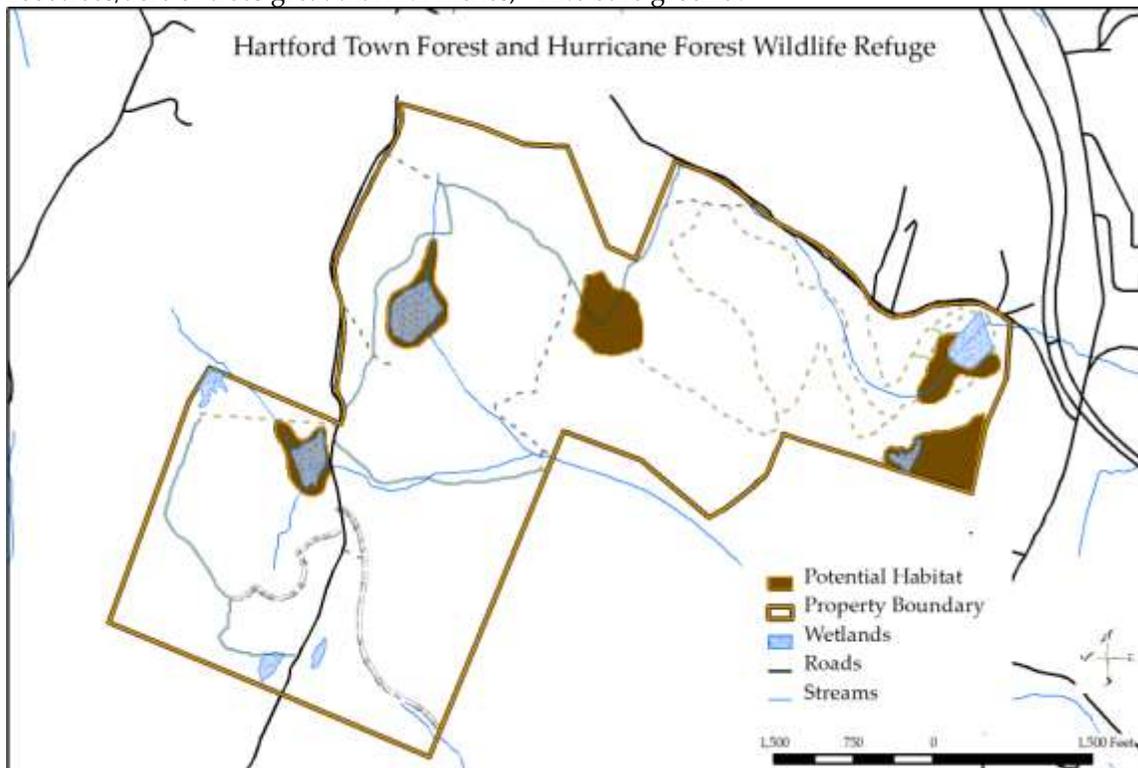
**Recreation:** Trails should be as far away from openings as possible. If desired, trails can be made to be directly adjacent to, or better serve as a "look-out", but not a destination based trail. Because of their nature, these habitats are less susceptible to human disturbance than others however, species that use these habitats are still likely to flee when disturbed.

**Priority: High**

**Educational:** Educate public on the value of these habitats and recreation modification and the values of reduced human disturbance on wildlife. **Priority: High**

**Scientific Name:** *Scolopax minor*  
**Common Name:** American woodcock  
**State Priority Level:** Medium  
**State Rank:** S5B  
**State Status:**  
**Federal Listing:** Unlisted  
 Considered a game bird

**General Habitat Preferences in Vermont:** The woodcock is migrant and uses a variety of habitats during the summer season. Male woodcocks will sing and conduct aerial displays in open fields, shrubby habitats, young forests, or wetland complexes (Pitelka 1943). Nests are found in a variety of young forests and shrubby habitats (McAuley et. al. 1996, Gregg and Hale, 1977). The woodcock may nest in close proximity to or within aspen, alder and/or beaked hazelnut. Broods will stay under cover habitats. In the later months woodcocks will use more mature forests for foraging opportunities (McAuley et al. 1996). Straw (et. al 1986) defined ideal habitats for woodcock in Pennsylvania as forest with a basal area of 60ft<sup>2</sup>, 2000trees/acre of trees great than 1.2 inches, >12% bare ground.



**Population Status within Vermont:** Slight increase (7%) during breeding bird surveys state wide (Breeding Bird Atlas Explorer (online resource). 2008). Populations thought to be in decline because of habitat loss. Dwyer et. al. (1983) found 20 years ago that where

**Habitat Suitability:** low

**Probability of Occurrence:** low

Populations are likely to occur here in later summer months. It is unlikely that woodcock will nest here.

**Habitat Availability within the HTF & HFWR:** Foraging habitat is abundant throughout the property. Early successional habitat is conducive for woodcock nest and brood habitat is patchy and found around

wetlands, at forest edges, and in recently harvested areas. Likely reservoirs are conducive for male singing territories and nest sites are found at edges of forest where soils and forest composition are suitable.

Specific areas;

- Wright Reservoir and associated seeps and streams
- Upper Reservoir and associated seeps
- Lower Reservoir and associated seeps
- Beacon hill and north facing slopes.

#### **Recommendations for Land Uses:**

**Forest Habitat Management:** Creation of 1 acre patches will create habitat conducive to the woodcock. Locate patches where large diameter aspen is present to promote aspen regeneration and where site productivity is high. **Priority: high**

**Timber Management:** Identify 1 acre patches for woodcock management areas by their ability to produce a prolific amount of regeneration quickly, proximity to seeps or other wetlands and aspen. Reduce basal area below 40ft<sup>2</sup> ( of trees greater than 4" dbh). Do not use whole-tree harvest techniques. Patch cuts are ideal, but can be used in conjunction with shelterwoods or group selection. Can treat Patch cuts as habitat management and implement every 30 years, rather than on a timber production cycle **Priority: high**

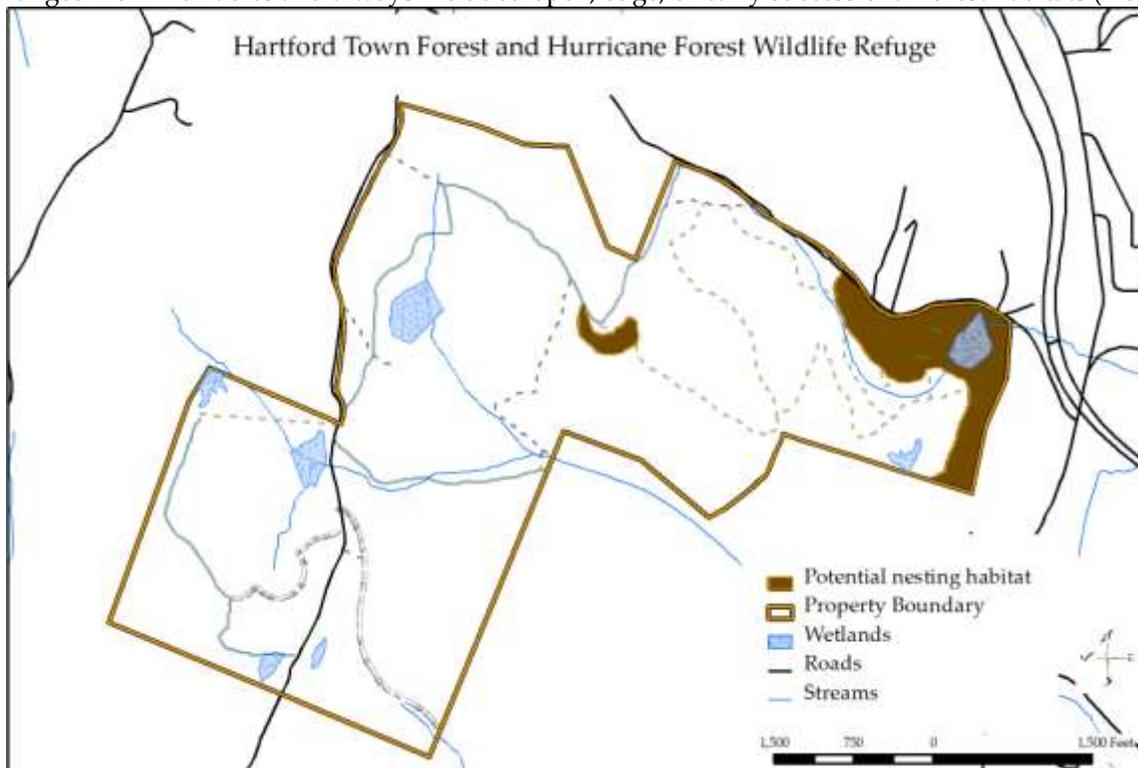
**Recreation:** American woodcock are susceptible to human disturbance and will either remain cryptic, or give flight. Woodcock are poor fliers and flying requires much more energy and reduced feeding or rearing energy. Trails that travel through woodcock habitat may cause woodcock to find less disturbed sites. Trail use could be closed during April –June or navigate to avoid American woodcock habitat or managed areas.

**Priority: High**

**Educational:** Educate public on the value of these habitats and recreation modification and the values of reduced human disturbance on wildlife. . **Priority: High**

**Scientific Name:** *Caprimulgus vociferus*  
**Common Name:** Whip-poor-will  
**State Priority Level:** High  
**State Rank:** S2B, S2N  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The whip-poor-will is a nocturnal migrant. The whip-poor-will use forests for nesting and open forests, fields, agricultural areas, and wetlands for foraging. Mature forests are not used (Hunt 2009). In New Hampshire Hunt (2009) found whip-poor-wills using thinned pine and shrub wetlands and established territories associated with open or edge habitats. Whip-poor-wills will use using dry oak woodlands, managed pine plantations all associated with open areas or shrub wetlands (Raynor, 1941, Wilson and Watts 2008, Hunt 2009, Thompson 2011). The whip-poor-will nests on the ground under a shrub or in the open. Nesting habitat is often best when close to early successional forests or open land. (DeGraaf and Yamasaki 2001). Estimated territories in New Hampshire ranged from 7-32 acres and always included open, edge, or early successional forest habitats (Hunt 2009).



**Population Stats Within Vermont:** Rare and Uncommon breeder. Populations in decline (Breeding Bird Atlas Explorer (online resource). 2008). Population decline attributed to loss of preferred habitat.

**Habitat Suitability:** Low

**Probability of Occurrence:** Low

Known to occur in Hanover 1659-3 survey block 6 (2003-2007) and Quechee 2089-6 3 (1976) (Breeding Bird Atlas Explorer (online resource). 2008). Forest habitat within these blocks are similar to availability with the HTF and HFWR however, the HTF and HFWR has a low frequency of preferred forest

conditions. Within these blocks, likely to occur in the lowlands, adjacent to the Connecticut River on either side of Interstate 91 associated with the agriculture fields and small forest patches.

**Habitat Availability within the HTF & HFWR:**

Low frequency of open, edge or early successional forest habitat. Mature oak-pine forests are found throughout the property and are not conducive for the whip-poor-will. Recent harvest activities are not likely to produce suitable conditions.

Specific locations:

1. Edge forest on western boundaries of HFWR.
2. Beacon Hill

**Recommendations for Land Uses:**

**Forest Habitat Management:** Promote early successional forest habitat. Work should target areas adjacent to edges of property, wetland and close to existing open areas. . **Priority: Moderate**

**Timber Management:** Identify areas >1 acre for regeneration treatments. Locate areas directly adjacent to existing openings, forest edges, and wetlands and by their ability to produce a prolific amount of regeneration quickly areas should extend at least 500' from these features. Reduce basal area below 40ft<sup>2</sup>. Within treatments, insure that ground is exposed and free of debris through management of tops or whole-tree harvests. Patch cuts are ideal, but can be used in conjunction with shelterwoods or group selection. Can treat Patch cuts as habitat management and implement every 30 years, rather than on a timber production cycle. **Priority: Moderate**

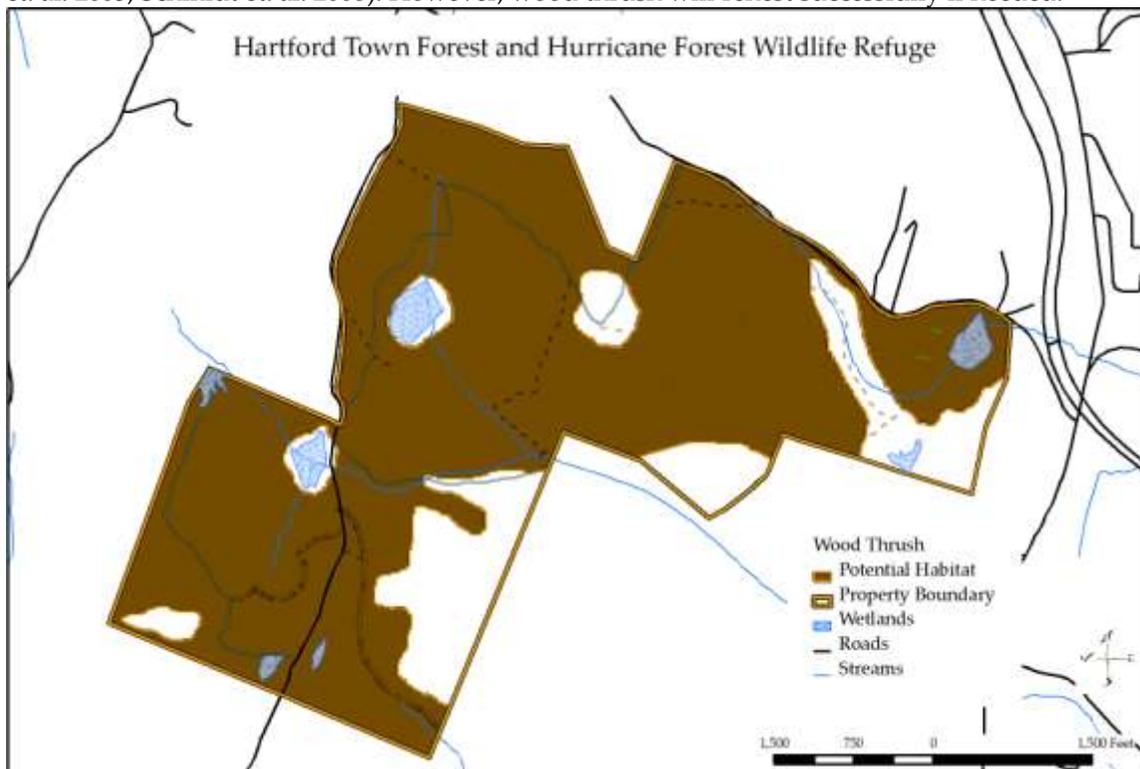
**Recreation:** Nesting is likely not to occur where human disturbance is frequent though Raynor (1941) was able to observe nesting whip-poor-wills with little disturbance. Because of their nocturnal behavior, daytime use may not impact the birds. Forest management should target activities to occur where trails are infrequent.

**Priority: Low**

**Educational:** Educate public on the value of these habitats and recreation modification and the values of reduced human disturbance on wildlife. . **Priority: High**

**Scientific Name:** *Hylocichla mustelina*  
**Common Name:** Wood thrush  
**State Priority Level:** Medium  
**State Rank:** S5  
**State Status:** SC  
**Federal Status:** Unlisted

**General Habitat Preferences in Vermont:** A neotropical migrant, the wood thrush is ubiquitous in Vermont. The wood thrush is associated with mature deciduous or mixed forests. Wood thrushes seek closed canopies with moderately closed under stories and midstory (Thompson and Capen 1988, Sargent et. al 2003, Driscol et. al. 2005). The wood thrush nests are located in shrubs, saplings or trees under dense cover between 5-35' often on a forked branch ( Brackbill, 1958, Brackbill 1943, Kaiser and Lindell 2003, Sargent et. al 2003). In New York, Driscol et al. (2005) found successful wood thrush nests most associated with large contiguous forests and percent forest cover and distance from field edge which are likely related to abundance of predators and nest parasites. The wood thrush will use gradual edges successfully and will result in higher fledgling growth rates (Kaiser and Lindell, 2007). The predation of eggs or fledglings and nest parasites is consistently cited as the cause of nest failures. (Trine, 1998, Driscol et. al. 2005, Schmidt et. al. 2008). However, wood thrush will renest successfully if needed.



**Population Stats Within Vermont:** Common. Slight statewide population decline (Breeding Bird Atlas Explorer (online resource). 2008) concentrated in the north east.

**Habitat Suitability:** High

**Probability of Occurrence:** High

Known to occur in Hanover 1659-3 survey block 6 (2003-2007) and Quechee 2089-6 3 (1976) (Breeding Bird Atlas Explorer (online resource). 2008). Habitat here is abundant and excellent. Canopy cover and under-mid story cover will improve nesting success. In pine oak stands rodent populations are high and are directly related to raptor abundance. Nest predation is likely to be inherently high here.

**Habitat Availability within the HTF & HFWR:**

Ubiquitous. May be more successful where oak and pine are less abundant; in maple, beech or hemlock hardwood forests. Beech saplings improve conditions.

**Recommendations for Land Uses:**

*Forest Habitat Management:* None. . **Priority: low**

*Timber Management:* On a large scale; retain mosaic of forest age classes; including older age classes. Within hardwood treatments; single tree selection, thinning or small groups (<0.25 acres) will retain canopy cover suitable for the wood thrush. **Priority: low**

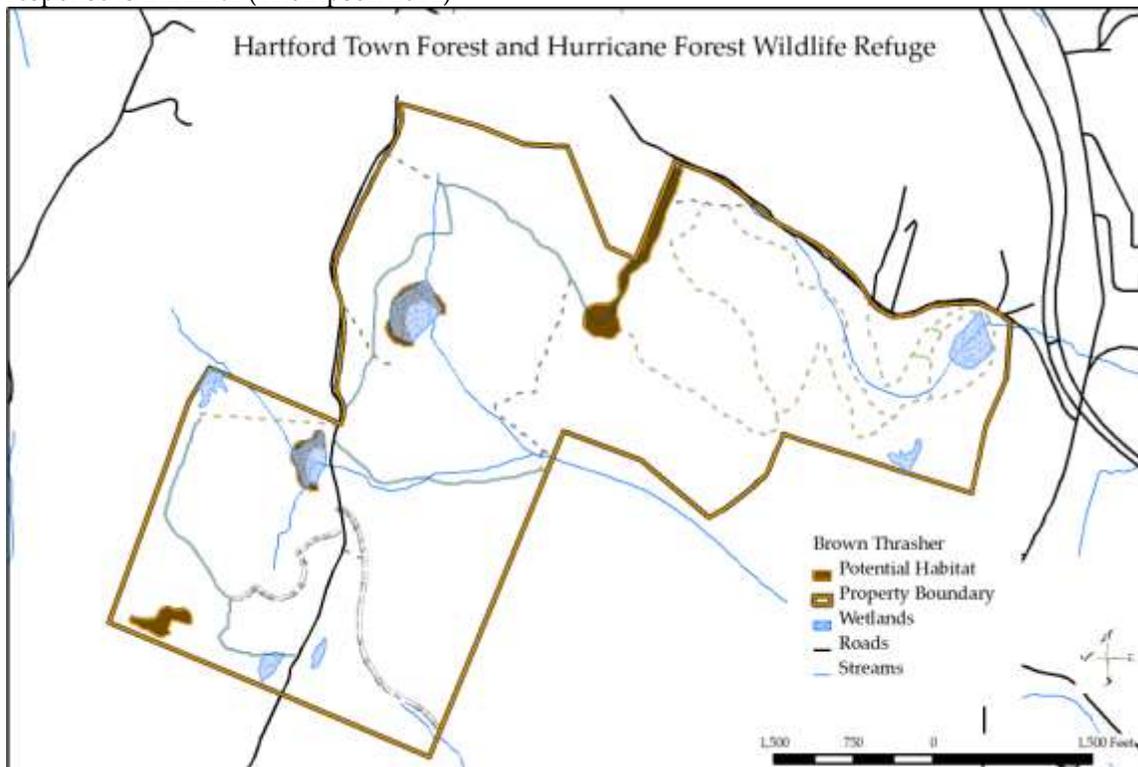
*Recreation:* None; reportedly not highly susceptible to human disturbance.

**Priority: Low**

*Educational:* None. . **Priority: Low**

**Scientific Name:** *Toxostoma rufum*  
**Common Name:** Brown thrasher  
**State Priority Level:** Medium  
**State Rank:** S4B  
**State Status:** SC  
**Federal Status:** Unlisted

**General Habitat Preferences in Vermont:** A migrant, this bird is highly associated with shrubby habitat found in overgrown fields, forest edges or hedgerows. The nest is placed 2-7' from the ground (Stauffer and best 1986) in a densely covered shrub. Secretive mimic is susceptible to human disturbance. Though response is minimal (Thompson 2011)



**Population Stats Within Vermont:** Locally common. Statewide decline of 45% (Breeding Bird Atlas Explorer (online resource). 2008). Maturing forest landscapes and development cause habitat declines.

**Habitat Suitability:** Low

**Probability of Occurrence:** Moderate

Known to occur in Hanover 1659-3 survey block 6 (1976) and Quechee 2089-6 3 (2003-2007) (Breeding Bird Atlas Explorer (online resource). 2008).

**Habitat Availability within the HTF & HFWR:**

Limited to absent. It is unknown what area of shrubby habitat the brown thrasher requires. The majority that is available is characterized small (<1 ac) patches of early successional hardwoods and riparian shrubs (willows, spirea). A small patch of shrubby habitat is available along Reservoir Road, and the Beacon trail from the poor, packed soil conditions. This area is small and is unlikely to support a breeding pair.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Increase shrubby habitats on the property. Preferably expand on existing gaps like Beacon Hill or around reservoirs. Care should be taken to prevent colonization of invasives.

**Priority: High**

**Timber Management:** Create patch cuts greater >1 acre. Patches can be located anywhere. If isolated from existing openings, roads, or fields patches should be 2-5 acres. Coppice growth techniques are excellent.

**Priority: High**

**Recreation:** Trails should avoid going directly through of traveling entirely around a patch. Thrashers will seek cover when disturbed, though flight distance is short.

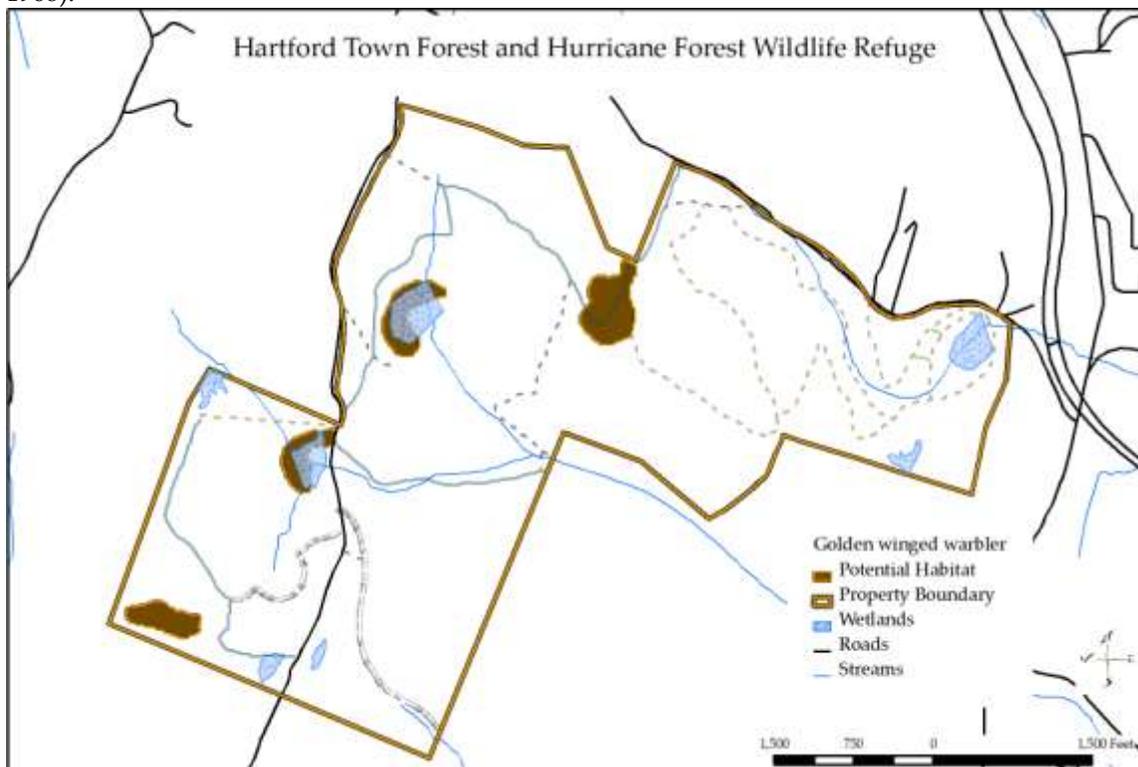
**Priority: High**

**Educational:** Educate public on importance of recreational modifications. **Priority: Low**

**Scientific Name:** *Vermivora chrysoptera*  
**Common Name:** Golden-winged warbler  
**State Priority Level:** High  
**State Rank:** S2S3B  
**State Status:** SC  
**Federal Status:** Unlisted

**General Habitat Preferences in Vermont:** Golden-winged warbler is a bird of early successional growth, dry uplands, old abandoned fields, or hedge rows (Kart et. al. 2005, Confer and Knapp 1981). Preferred habitat is early successional growth in abandoned agriculture fields, although clear cuts, fire, or maintained grasslands offer suitable habitat. Territories are within large tracts of forest, located adjacent to forest edge and include extensive shrub, sapling, and herb cover and little tree cover (Confer et. al. 2003). Shrub cover is positively correlated with the success of the golden-winged warbler. (Confer et. al. 2003). Nests are located on or near the ground with extensive cover in relatively open areas.

**Population Status within Vermont** The golden winged warbler saw a slight decline during breeding atlas surveys (Breeding Bird Atlas Explorer (online resource). 2008). The golden-winged warbler became abundant in the 1800's as a result of the progression of reforestation of abandoned agriculture land. Now populations in the east are receding as a result of land use change and reforestation (Ficken and Ficken 1968).



Threats include genetic introgression and competition of the sympatric blue winged warbler, habitat fragmentation, and natural reforestation.

**Habitat Suitability:** Low  
**Probability of Occurrence:** Low

This species is generally reported within the Champlain Valley and has a low probability of occurring within HTF & HFWR. Source populations do not exist within the Connecticut River Valley. Landscape level attributes are required to improve before local efforts will be fruitful.

**Habitat Availability within HTF & HFWR:**

Early successional dry and shrubby habitat is present on Beacon Hill, around forest edges and at the upper and lower reservoirs. Small groups are present within the forest landscape but are too small to offer breeding habitat.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Increase shrubby habitats on the property. Preferably expand on existing gaps like Beacon Hill or around reservoirs. Care should be taken to prevent colonization of invasives.

**Priority: Low**

**Timber Management:** Create patch cuts greater >1 acre. Patches can be located anywhere. If isolated from existing openings, roads, or fields patches should be 2-5 acres. Coppice growth techniques are excellent.

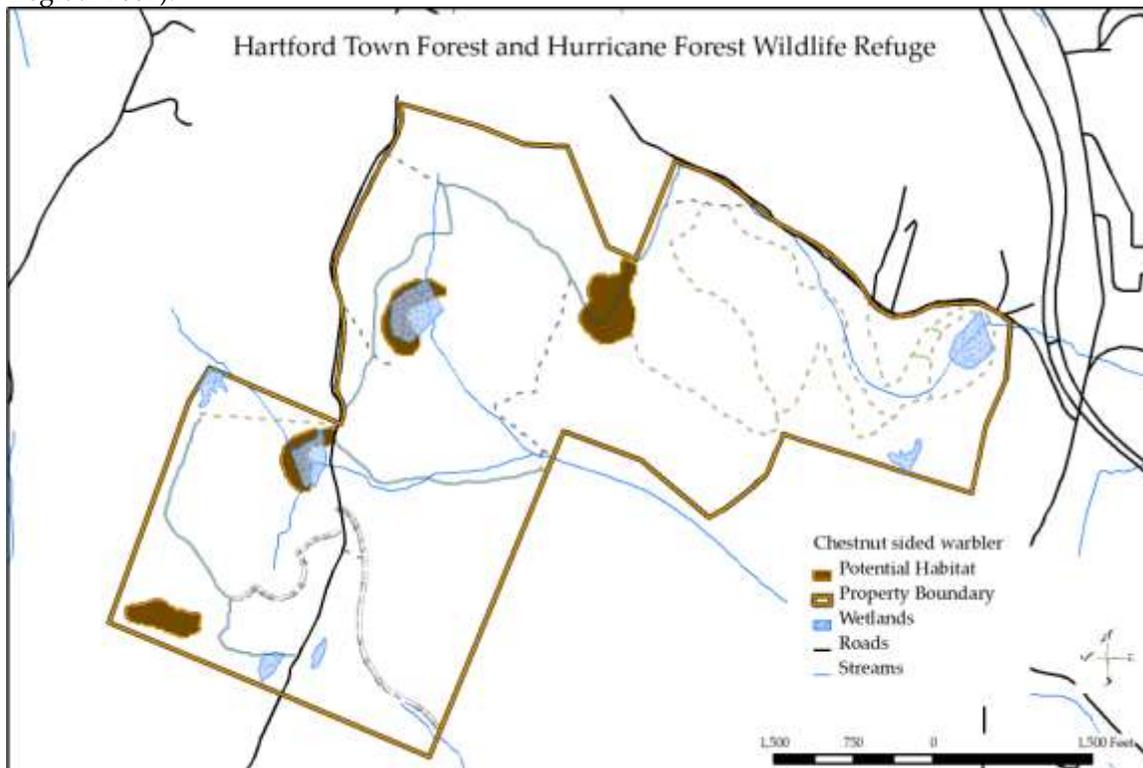
**Priority: Low**

**Recreation:** Trails should avoid going directly through of traveling entirely around a patch. **Priority: Low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Dendroica pensylvanica*  
**Common Name:** Chestnut-sided warbler  
**State Priority Level:** Medium  
**State Rank:** S5B  
**State Status:** SC  
**Federal Status:** Unlisted

**General Habitat Preferences in Vermont:** Chestnut sided warbler is a neotropical migrant that uses shrubby habitats (Collins et. al 1982) or early successional forests. Within forests, chestnut sided warblers use either recently forested agricultural fields or logged forests that promote early successional habitat conditions (Schulte and Niemi 1998, Thompson and Capen 1988 ). Nest site selection is best correlated with higher stem density for cover (Schill and Yahner 2009) Nests are place low to the ground 1'-4' in a shrub, or tree under dense cover. (Lawerence 1948, Degraaf and Yamasaki 2001). Chestnut-sided warblers prefer 0.5-1.5 acre patches of early successional hardwoods (King and Degraaf 2004), becoming common 4 years after patch creation and begin to decline after forests reach 10 years old (Thompson and Degraaf 2001).



**Population Status within Vermont** Throughout and common. Concern for the birds habitat as forests mature.

**Habitat Suitability:** Low

**Probability of Occurrence:** High

Known to occur in Hanover 1659-3 survey block 6 (1976) and Quechee 2089-6 3 (2003-2007) (Breeding Bird Atlas Explorer (online resource). 2008).

**Habitat Availability within HTF & HFWR:**

Available habitat is extremely limited. However, where it occurs is suitable. Recent group cuts, drained reservoirs and hardwood poles at Beacon hill will provide habitat for a few pairs. This bird requires only small patches of suitable habitat, presumably because landscape populations are abundant.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Increase early successional habitats on the property. Can expand on existing openings, or within forest interior. Care should be taken to prevent colonization of invasives.

**Priority: Moderate**

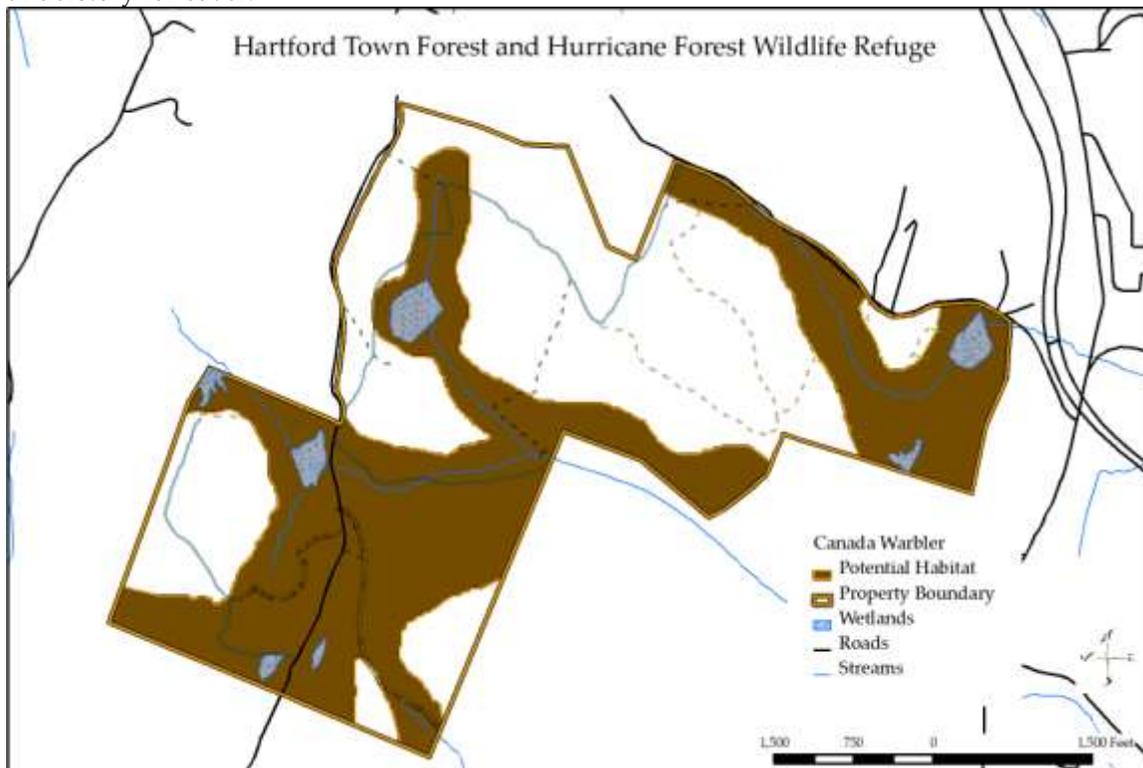
**Timber Management:** Create multiple patch cuts of 0.5-1.0 acre. Patches can be located anywhere. If isolated from existing openings, roads, or fields patches should be. Coppice growth techniques are excellent. **Priority: Moderate**

**Recreation:** Trails should avoid going directly through of traveling entirely around a patch. **Priority: Low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Wilsonia canadensis*  
**Common Name:** Canada Warbler  
**State Priority Level:** High  
**State Rank:** S4B  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** The Canada warbler occupies a variety of forest conditions. The Canada generally prefers forests with moderate canopy cover, dense subcanopy with shrub or fern cover (Chace et. al. 2009, Hallworth, 2008). Degraaf et. al. (1998) found a strong association with sapling stands. The Canada warbler has shown to use forested wetlands (Golet et.al. 2001) of various sizes, and as small as 2.5 acres (Golet et. al. 2001). Coniferous inclusions are valuable to Canada warbler (Sodhi and Paszkowski 1995). Wetland use is likely associated with insect production and wetland shrub and frequent disturbances. Landscape features, including large contiguous forest is likely to contribute to local population abundance. The Canada warbler nests on the ground and uses dense midstory and understory for cover.



**Population Status within Vermont:** State wide decline in observations during breeding atlas (30%) (Breeding Bird Atlas Explorer (online resource). 2008). Region wide population declines from spruce budworm, threats on wintering grounds, and changes in wetland habitats contribute to state wide declines.

**Habitat Suitability:** low

**Probability of Occurrence:** High

The Canada warbler is likely to occur on the property though infrequent. Forest conditions are ubiquitous though infrequent.

Habitat Availability within the HTF & HFWR:

Dense subcanopies are found throughout the property. Valuable subcanopies are formed primarily by dense beech, willow, striped maple, and hemlock. Concentrations of prime habitat is found around wetlands and all reservoirs.

Vernal pools

- NW vernal pool
- Saddle vernal pool
- Eastern pool
- Upper Reservoir
- Lower Reservoir
- Wright Reservoir

**Recommendations for Land Uses:**

**Forest Habitat Management:** Improve habitat conditions by creating small groups (multiple 0.25 acre patches) of early successional habitat. **Priority: Moderate**

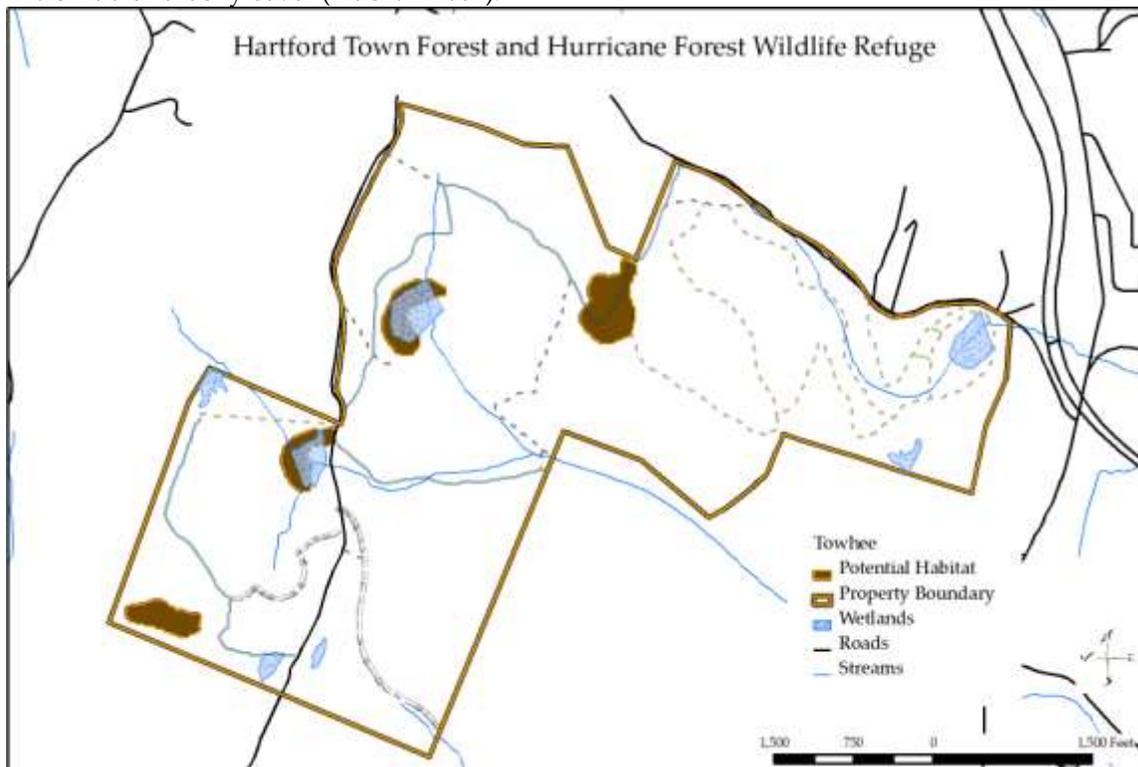
**Timber Management:** Uneven aged management treating an 20% of a stand with small groups 0.25 acres. Irregular shelterwood treatments also excellent for management. **Priority: Moderate**

**Recreation:** None. **Priority: Low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Pipilo erythrophthalmus*  
**Common Name:** Eastern Towhee or Rufous Sided Towhee  
**State Priority Level:** High  
**State Rank:** S4B  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** This is a common bird of declining population (Hagan 1993) that occupies old fields, regenerating hardwoods with high shrub density (Ellison 1985). Often found in powerlines corridors, forest edges or hedgerows. This bird nests either on the ground or very close to it in a shrub or brushy cover (DeGraff 2001).



**Populations status in Vermont:** are dramatically declining as a result of reduced availability of breeding habitat due to forest succession and conversion of uses.

**Habitat Suitability:** Low

**Probability of Occurrence:** Low

Confirmed in 1976 atlas in Quechee 2089-6 SE Quad. (Breeding Bird Atlas Explorer (online resource). 2008)

**Habitat Availability within the HTF & HFWR:**

Very few habitats are available on the HTF and HFWR. Dry shrubby conditions are not likely to naturally occur. However, towhee's will use recent logged habitats, presumably so long as there is source habitat in close proximity.

**Specific areas:**

Beacon hill  
All forest edge at reservoirs.

**Recommendations for Land Uses:**

*Forest Habitat Management:* Improve habitat conditions by creating early successional habitat. Habitat should be created adjacent to existing openings at beacon hill, reservoirs, roads, or property boundaries.

**Priority: High**

*Timber Management:* Even aged management: Patch cuts >1 acre. Shelterwood with a residual basal area of <40ft<sup>2</sup> and at least 5 acre treatment areas. **Priority: High**

*Recreation:* Trails should not encircle early successional habitat patches. Trails should avoid, but can traverse sides, under closed canopy. Limited atv/snowmobile. **Priority: Low**

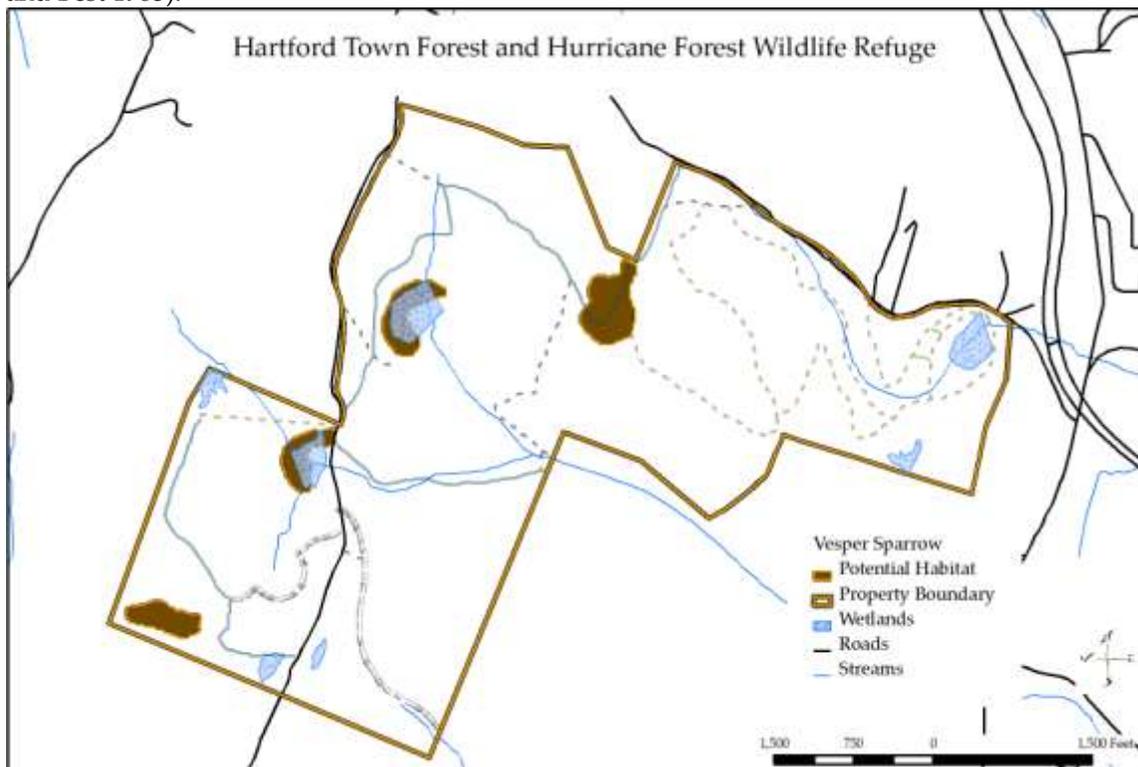
*Educational:* Educate public on benefits of creating habitats suitable for towhee and modified recreation.

**Priority: Low**

**Scientific Name:** *Pooecetes gramineus*  
**Common Name:** Vesper Sparrow  
**State Priority Level:** High  
**State Rank:** S3B  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:**

The vesper sparrow is a grassland bird found in crop land, hayfields, hedgerows, and dry open uplands (Kart et. al. 2005, Degraaf and Yamasaki 2001). The vesper sparrow territories are located between croplands and meadows, in hedgerows, or in areas that include extensive low cover (Reed 1986, Rodenhouse and Best 1983). Territories are located in fields that are closer to forest edges or incorporate tree cover more than other grassland nesting birds (Grant et. al. 2004). Nests are placed close to the ground in areas with dense low vegetation and success is correlated with density and vertical structure of cover (Wray and Whitmore 1979). Vesper sparrows have low reproductive success when nests are placed in actively managed agriculture fields due to continual disturbances and inadequate cover (Rodenhouse and Best 1983).



**Population Status within Vermont** is considered to be declining. Dramatic declines region wide and within Vermont (Kart et. al. 2005). Like most grassland nesting birds, as reforestation occurs in Vermont's abandoned farmland, grassland bird habitat declines and populations decline.

Threats include grassland conversion, agriculture activities during breeding season.

**Habitat Suitability:** Low

**Probability of Occurrence:** Low

During the 1976-1981 Vermont Breeding Bird Atlas monitoring periods the vesper sparrow was detected in Hanover 1659-3 (Laughlin et. al. 1985).

**Habitat Availability within the HTF & HFWR:**

Habitat availability is low. Dry upland shrubby with low vegetation is available at recently drained reservoirs and at beacon hill. Vesper sparrow habitat is maintained by 1. Natural soil and vegetation characteristics that prevent forest growth or 2 where forest growth is productive, biennial mowing, brush hogging. The reservoir habitats have suitable structure characteristics, but in some places wetness may limit nest site suitability. Dry ground conditions is required.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Improve habitat conditions by creating early successional habitat. Design 5 acre area for 2-5 year brush hogging to improve low vegetation. Habitat should be created adjacent to existing openings at beacon hill, reservoirs, roads, or property boundaries. **Priority: high**

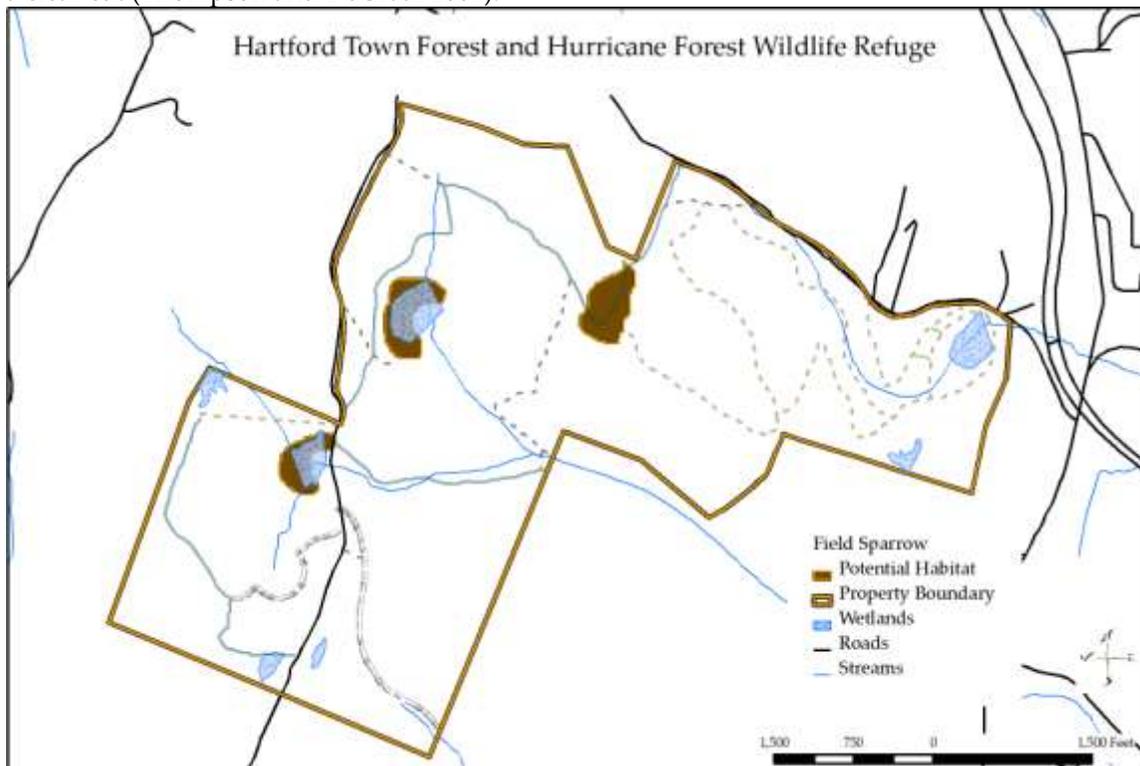
**Timber Management:** None, no timber management. Habitats are not conducive for timber production  
**Priority: low**

**Recreation:** Trails should not encircle or travel within early successional habitat patches. Trails should avoid, but can traverse sides and preferably under closed canopy. Limited atv/snowmobile. **Priority: moderate**

**Educational:** Educate public on benefits of creating habitats suitable for sparrow and modified recreation.  
**Priority: Low**

**Scientific Name:** *Spizella grammineus*  
**Common Name:** Field Sparrow  
**State Priority Level:** Medium  
**State Rank:** S4B  
**State Status:** SC  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:** Field sparrows are migrants that use a variety of young habitats. Grasslands, hayfields, edge habitat, hedgerow, old field habitat or regenerating forests are used (Best, 1977, Evans, 1978, Annard and Thompson, 1997, Fink et. al. 2006). The nest is placed on the ground in dense grasses or leaf litter or elevated from the ground in a dense often thorny shrub (Best 1977). Success is often determined by the extent of concealing vegetation (Burhans and Thompson 1998). Within forests, the field sparrow will use regenerating forests in the first year after clear cuts (Annard and Thompson 1997; Thompson and DeGraaf 2001). Suitable cover species can be diverse, so long as cover is available and low to the ground. Field sparrows will begin to decline in regenerating forests 5 years after a clear cut (Thompson and DeGraaf 2001).



**Population Status within Vermont:** Locally common and widespread. State wide decline in observations during breeding atlas (39%) (Breeding Bird Atlas Explorer (online resource). 2008). Region wide population declines from spruce budworm, threats on wintering grounds, and changes in wetland habitats contribute to state wide declines.

**Habitat Suitability:** Low

**Probability of Occurrence:** Moderate

The field sparrow was observed during the 1976 breeding bird atlas in Hanover 1659-3 (Breeding Bird Atlas Explorer (online resource). 2008).

**Habitat Availability within the HTF & HFWR:** Habitat availability is low. Grassland habitat or old field habitat only exists at the upper and lower reservoirs and at beacon hill. Habitat at the reservoirs is currently poor, though may increase as vegetation develops. Beacon hill grassland habitat is ideal, though is small. It may support a breeding pair as local source populations are present/

#### **Specific Habitats**

Beacon Hill

Upper Reservoir

Lower Reservoir

#### **Recommendations for Land Uses:**

**Forest Habitat Management:** Improve habitat conditions by creating early successional habitat. Design 1-5 acre for a 6 year brush hogging/clearing to improve low vegetation. Habitat can be created adjacent to existing openings at beacon hill, reservoirs, roads, or property boundaries. **Priority: high**

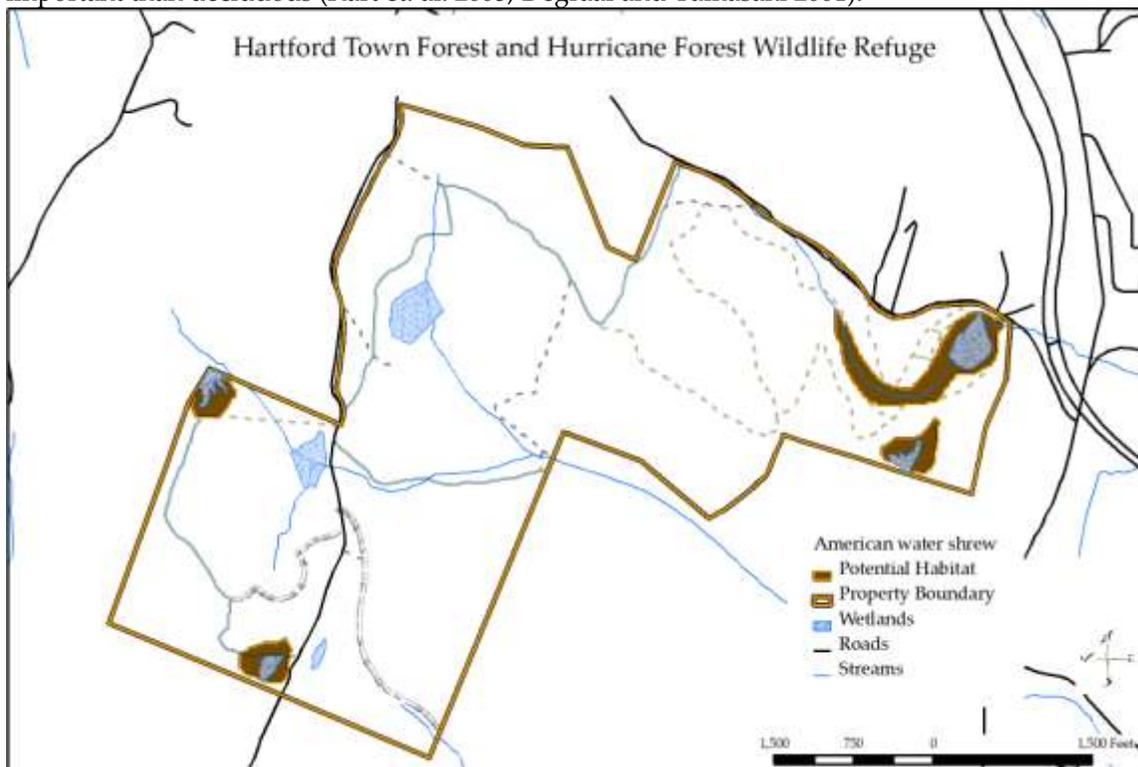
**Timber Management:** None. Habitats are not conducive for timber production **Priority: low**

**Recreation:** Trails should not encircle or travel within early successional habitat patches. Trails should avoid, but can traverse sides and preferably under closed canopy. Limited atv/snowmobile. **Priority: moderate**

**Educational:** Educate public on benefits of creating habitats suitable for sparrow and modified recreation. **Priority: Low**

**Scientific Name:** *Sorex palustris*  
**Common Name:** American water shrew  
**State Priority Level:** High  
**State Rank:** S3  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont** The water shrew is a woodland species and is closely associated with wetlands and streams (Conaway 1952, Spencer and Pettus 1966). Wetlands or streams with sufficient structure (rocks, down woody debris), emergent vegetation (grass, sedge, cattails) or canopy cover (alder swamps, forested swamps and upland streams) are necessary to support invertebrate diet and preferred habitat. (Conaway 1952, Beneski and Stinson 1987, Spencer and Pettus 1966, Degraaf and Yamasaki 2001). Beaver dams are important as well. Conaway (1952) found water shrews using undercut banks more than other sample water edge habitats. In western U.S. and Canada high elevation wetlands are common preferred habitats. Within forested habitats, coniferous forest types may be more important than deciduous (Kart et. al. 2005, Degraaf and Yamasaki 2001).



**Population Status within Vermont** is considered to be unknown. Detection rates are low and very little is known regarding distribution.

Threats include habitat loss through wetland degradation and forest management activities adjacent to wetland and streams.

**Habitat Suitability:** Low

**Probability of Occurrence:** Low

**Habitat Availability within the HTF & HFWR:**

Cold water preferences will restrict use to forested wetlands and deeper waters. Stream habitat here is shallow and silty and warm. Most forested wetlands have only shallow water in the driest portions of the summer. The Wright Reservoir has some vegetation and structure, but limited amounts.

**Specific locations:**

Lower portions of brooks  
Saddle pool  
Eastern pool  
Wright reservoir

**Recommendations for Land Uses:**

*Forest Habitat Management:* Retain shading canopies adjacent to wetlands. Avoid chemical use.

Improve structural characteristics: down woody debris adjacent to wetlands. **Priority: Low**

*Timber Management:* Avoid harvests within 100m of potential habitats that reduce canopies below 75%.

Retain coniferous cover where available. **Priority: low**

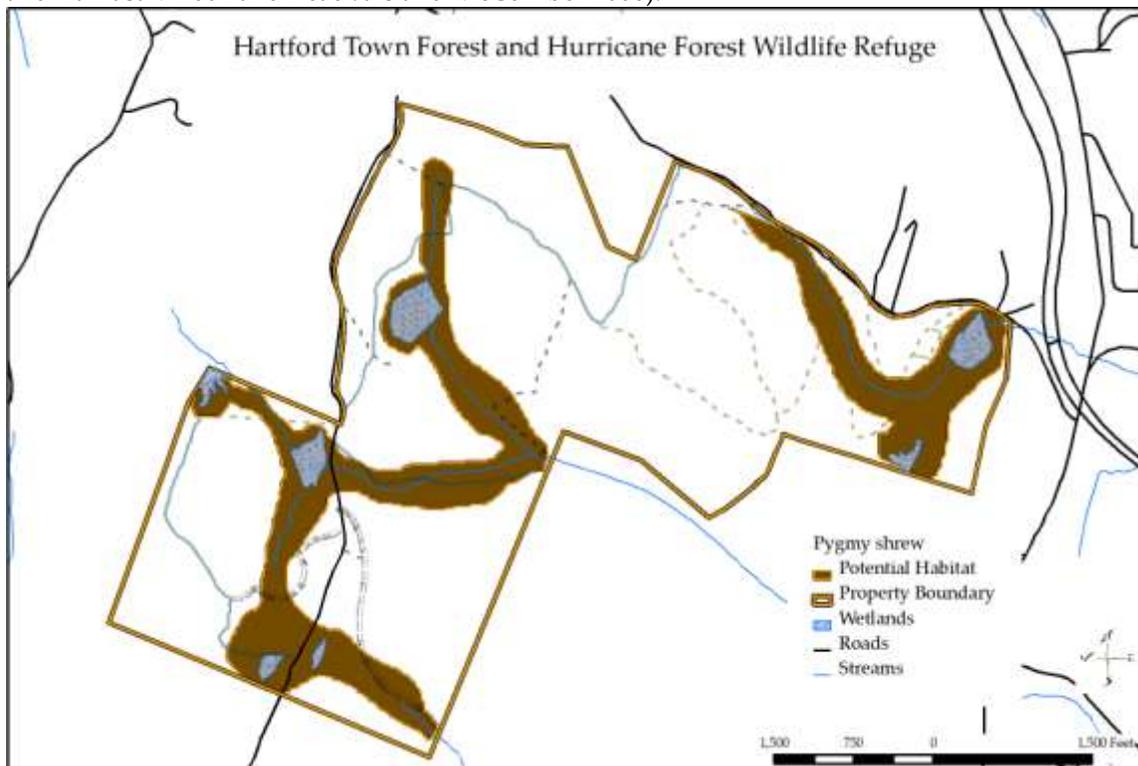
*Recreation:* Prevent trails or off-trail wetland forays. Compaction of soils will reduce habitat quality. .

**Priority: low**

*Educational:* Educate public on benefits of recreation restrictions. **Priority: Low**

**Scientific Name:** *Sorex hoyi*  
**Common Name:** Pygmy shrew  
**State Priority Level:** High  
**State Rank:** S2  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont** The pygmy shrew is a woodland species and is closely associated with moist environments with leaf litter or down woody debris (Spencer and Pettus 1967, Long 1974, Brown 1967, Wrigley et. al. 1979, Beauvais and McCumber 2006). Local habitat relationships suggest while moist conditions are preferred pygmy shrews are not selective of specific forest types. Collections have occurred in boreal forests, hardwoods, hemlock, bogs, open fields, cultivated fields (Miller 1964, Kirkland et. al. 1987, Degraaf and Yamasaki 2001). Specific habitat requirements include moist conditions and forest floor debris that supports invertebrate prey base and nesting sites (Degraaf and Yamasaki 2001 and Beauvais and McCumber 2006).



**Population Status within Vermont** is considered to be unknown. Little is known about historic populations and there are few reports. Populations are known to exist in northern Vermont and the southern Green Mountains. (Kart et. al. 2005). As a result, insufficient information is available to make accurate statements regarding its status but most likely status is rare to endangered.

Threats include habitat loss, habitat alteration.

**Habitat Suitability:** Moderate

**Probability of Occurrence:** Moderate

**Habitat Availability within the HTF & HFWR:**

Moist forest habitats are available in limited frequencies. Habitat availability is limited by soil and geology, and possibly improved by reservoirs. Streams, forest wetlands, seeps, and reservoirs alike are all potential habitat.

Specific locations:

- NW vernal pool
- Saddle vernal pool
- Eastern pool
- Upper Reservoir
- Lower Reservoir
- Wright Reservoir
- All streams
- All seeps

**Recommendations for Land Uses:**

**Forest Habitat Management:** Retain shading canopies adjacent to vernal pools, streams, wetlands. Avoid soil compaction or soil disturbance from machinery within 300' of wetlands. Retain canopy greater than 75% at or near wetlands. Improve structural characteristics: down woody debris adjacent to wetlands.

**Priority: Moderate**

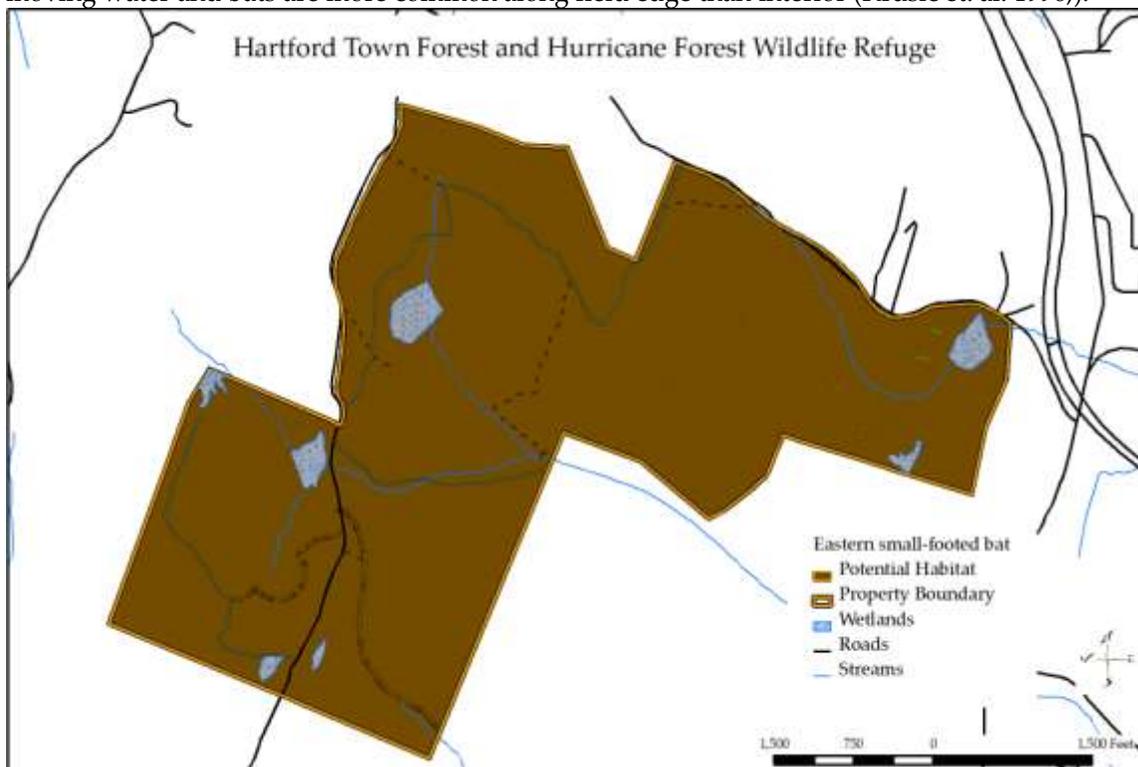
**Timber Management:** Winter-snow covered frozen harvests when activity is within 300' of potential habitat. Within potential habitat retain 75% canopy (can include midstory or understory). Where harvests occur drop and leave hardwood trees or boles greater than 12" . Push trees over if possible. **Priority: low**

**Recreation:** None. **Priority: low**

**Educational:** None **Priority: Low**

<b>Scientific Name:</b>	<i>Myotis leibii</i>
<b>Common Name:</b>	Eastern small-footed bat
<b>State Priority Level:</b>	High
<b>State Rank:</b>	S1
<b>State Status:</b>	T
<b>Federal Listing:</b>	Unlisted

**General Habitat Preferences in Vermont** During the winter (Late October – April) the eastern small footed bat hibernates in caves, mines or in deep rock crevices and wintering populations are small (Trombulak et. al. 2001). Small footed bats prefer rocks crevices or talus slopes for roosting (Virginia: Johnson and Gates 2007). Conflicting reports suggest eastern small footed bats primarily use dead or dying trees with exfoliating bark for maternity colonies (Kart et. al. 2005). No known maternity sites have been found in Vermont. Vermont’s geology supports little of these rocky features, so it is more likely that roosts are found in large trees as well as rocks. Known to be frequent in the Connecticut River Valley. Generally, with forests, bats tend to prefer older forest age classes with open mid-stories and closed upper canopies. Mature hardwoods or pine forests are selected more regularly than other age classes for roosting and both mature and very young stands for foraging (Krusic et. al. 1996, Jung et. al. 1999). Bats require areas with high insect abundance for forage and relatively open areas for flight like field edge, woodland marshes or wetlands, beaver ponds or forested roads or trails. Still water is preferred over moving water and bats are more common along field edge than interior (Krusic et. al. 1996,).



**Population Status within Vermont** is considered to be at risk. The state trend is unknown but the eastern small footed bat is found in very low numbers throughout the year in relation to other Vermont forest bats. Population risk is extremely high during the winter due to disturbance during hibernation and populations can exhibit large fluctuations in a short period of time. Populations are known in the Champlain Vermont and the Connecticut River basin.

Threats include habitat loss, habitat alteration, disturbance to hibernacula's or disturbance to bats during hibernation. White Nosed Syndrome, pesticide use.

**Habitat Suitability:** High

**Probability of Occurrence:** High

**Habitat Availability within the HTF & HFWR:**

Large diameter roost trees are ubiquitous. Oak, pine and hemlock would provide the majority of roosting opportunities. Interior forest foraging opportunities is available in places. Beech understory reduces flyways. Open areas within reservoirs, roads, trails will be suitable. Recently harvest areas will be excellent for insect production and bat foraging.

Specific locations:

- Throughout.

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Habitat is excellent. Avoid foliar chemical use. **Priority: Low**

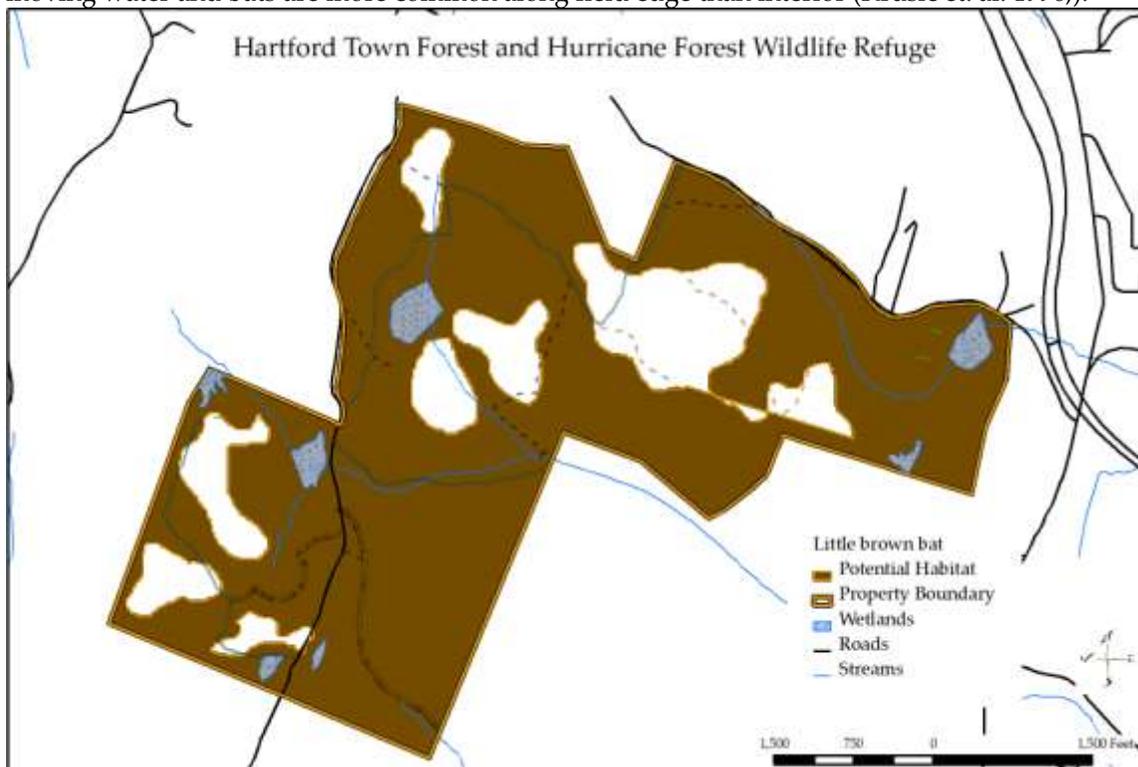
**Timber Management:** Promote large diameter hardwoods and pines. Harvests should include reserves of large diameter trees. Retain snags and live large diameter (>15") trees with cracks or exfoliating bark. Uneven aged management is an excellent tool to create bat habitat. Groups of 0.25-1 acre with single tree selection. Irregular shelterwood treatments with reserves will also serve all bats. Avoid foliar chemical sprays **Priority: low**

**Recreation:** None. **Priority: low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Myotis lucifugus*  
**Common Name:** Little brown bat  
**State Priority Level:** High  
**State Rank:** S1  
**State Status:** E  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont** During the winter (Late October – April) the little brown bat hibernates in caves and mines. Winter emergence occurs in the spring and bats will migrate to summer ranges where females will establish maternity colonies in buildings or trees with exfoliating bark. Night time foraging occurs with 1 mile of the roost in forested areas in close proximity to water. Males will roost in forested conditions more often than females (Broders et. al. 2006). It is not clear how common roost trees are used for maternity colonies as compared to buildings. In New Brunswick, male little brown bats roosted in coniferous trees within coniferous or mixedwood stands with high frequencies of snags (Broder and Forbes 2004). Little brown bats forage open forested conditions and over open still water. Generally, with forests, bats tend to prefer older forest age classes with open mid-stories and closed upper canopies. Mature hardwoods or pine forests are selected more regularly than other age classes for roosting and both mature and very young stands for foraging (Krusic et. al. 1996, Jung et. al. 1999). Bats require areas with high insect abundance for forage and relatively open areas for flight like field edge, woodland marshes or wetlands, beaver ponds or forested roads or trails. Still water is preferred over moving water and bats are more common along field edge than interior (Krusic et. al. 1996,).



**Population Status within Vermont** White nose syndrome has reduced populations by 90% within Vermont. Little brown bat was once the most common species observed, and now, locally may be totally absent.

**Habitat Suitability:** High

**Probability of Occurrence:** Low

**Habitat Availability within the HTF & HFWR:**

Large diameter roost trees are ubiquitous. Oak, pine and hemlock would provide the majority of roosting opportunities. Interior forest foraging opportunities are available in places. Beech understory reduces flyways. Open areas within reservoirs, roads, trails will be suitable. Recently harvest areas will be excellent for insect production and bat foraging.

Specific locations:

- Throughout.

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Habitat is excellent. Avoid foliar chemical use. **Priority: Low**

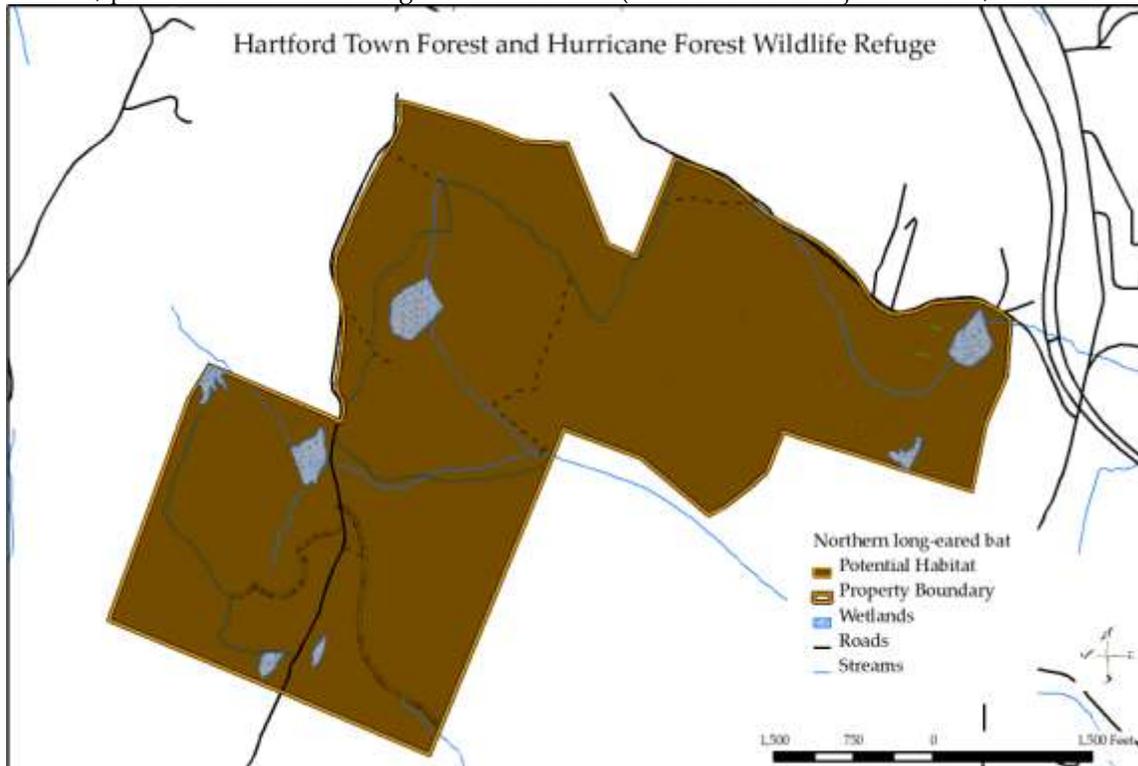
**Timber Management:** Promote large diameter hardwoods and pines. Harvests should include reserves of large diameter trees. Retain snags and live large diameter (>15") trees with cracks or exfoliating bark. Uneven aged management is an excellent tool to create bat habitat. Groups of 0.25-1 acre with single tree selection. Irregular shelterwood treatments with reserves will also serve all bats. Avoid foliar chemical sprays **Priority: low**

**Recreation:** None. **Priority: low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Myotis septentrionalis*  
**Common Name:** Northern long-eared bat  
**State Priority Level:** Medium  
**State Rank:** S1  
**State Status:** E  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont** During the winter (Late October – April) the northern long-eared bat hibernates in caves or mines (Thompson 2011 personal obs). Upon emergence long-eared's migrate to summer forested conditions where females establish maternity colonies in roost trees. Roost trees are large diameter hardwoods in mature closed canopy deciduous stands. (Broder and Forbes 2004). The northern long-eared bat generally forages within forests where open midstory, small wetlands, streams, permits forest interior flight without clutter (Lacki and Schwierjohann 2001, Broders et.al. 2006).



**Population Status within Vermont** Dramatic declines from white-nose syndrome. Populations were always small, but with the onset of WNS, observations are very rare.

**Habitat Suitability:** High

**Probability of Occurrence:** Low

**Habitat Availability within the HTF & HFWR:**

Large diameter roost trees are ubiquitous. Oak, pine and hemlock would provide the majority of roosting opportunities. Interior forest foraging opportunities is available in places. Beech understory reduces flyways. Open areas within reservoirs, roads, trails will be suitable. Recently harvest areas will be excellent for insect production and bat foraging.

Specific locations:  
 Throughout.

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Habitat is excellent. Avoid foliar chemical use. **Priority: Low**

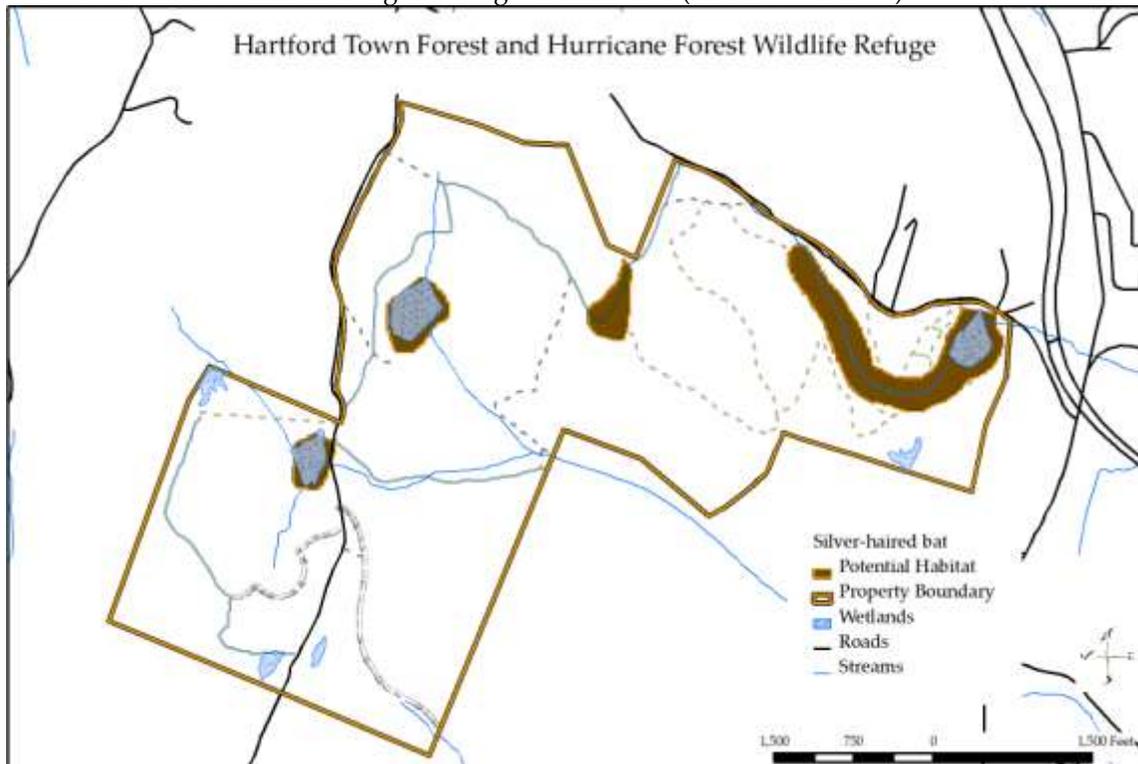
**Timber Management:** Promote large diameter hardwoods and pines. Harvests should include reserves of large diameter trees. Retain snags and live large diameter (>15") trees with cracks or exfoliating bark. Uneven aged management is an excellent tool to create bat habitat. Groups of 0.25-1 acre with single tree selection. Irregular shelterwood treatments with reserves will also serve all bats. Avoid foliar chemical sprays **Priority: low**

**Recreation:** None. **Priority: low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Lasionycteris noctivagans*  
**Common Name:** Silver-haired bat  
**State Priority Level:** High  
**State Rank:** S2B  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont** The silver haired bat is a migrant and is present in Vermont during the summer from May-September. Specific habitat use is generally unknown (Kart et. al. 2005). Silver haired bats form maternity colonies under exfoliating bark of trees or in cracks or crevices of trees. Forest types used are boreal forests or hardwoods associated with wetlands (Kart et. al. 2005, Campbell et. al. 2005). Roost trees are typically larger than surrounding trees and are exposed to solar radiation. Late successional forests with open mid stories are used (Barclay et. al. 1988 and Campbell et. al. 1996). Mature hardwoods or pine forests are selected more regularly than other age classes for roosting and both mature and very young stands for foraging (Krusic et. al. 1996, Jung et. al. 1999). Bats require areas with high insect abundance for forage and relatively open areas for flight like field edge, woodland marshes or wetlands, beaver ponds or forested roads or trails. Still water is preferred over moving water and bats are more common along field edge than interior (Krusic et. al. 1996).



**Population Status within Vermont** is considered to be in a slow decline. The state trend is unknown but populations are thought to be less than historic levels. Synthesis by Kunz (1982) regarding historic trends suggests that the silver haired bat was very common throughout Northern America.

Threats include habitat loss, habitat alteration, forest fragmentation or disturbance within migratory pathways, pesticide use.

**Habitat Suitability:** Moderate

**Probability of Occurrence: High**

During 2011 bat acoustic survey (Thompson 2011) the silver haired bat was observed and constituted 1% of the total observations. Habitat

**Habitat Availability within the HTF & HFWR:**

Foraging habitat is available at open reservoirs, and in adjacent fields. Proximity to large wetland habitat is absent. Roost available is ubiquitous, though limited observation during acoustic survey suggests limited use of the area.

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Habitat is excellent. Avoid foliar chemical use. **Priority: Low**

**Timber Management:** Promote large diameter hardwoods and pines. Harvests should include reserves of large diameter trees. Retain snags and live large diameter (>15") trees with cracks or exfoliating bark. Uneven aged management is an excellent tool to create bat habitat. Groups of 0.25-1 acre with single tree selection. Irregular shelterwood treatments with reserves will also serve all bats. Avoid foliar chemical sprays **Priority: low**

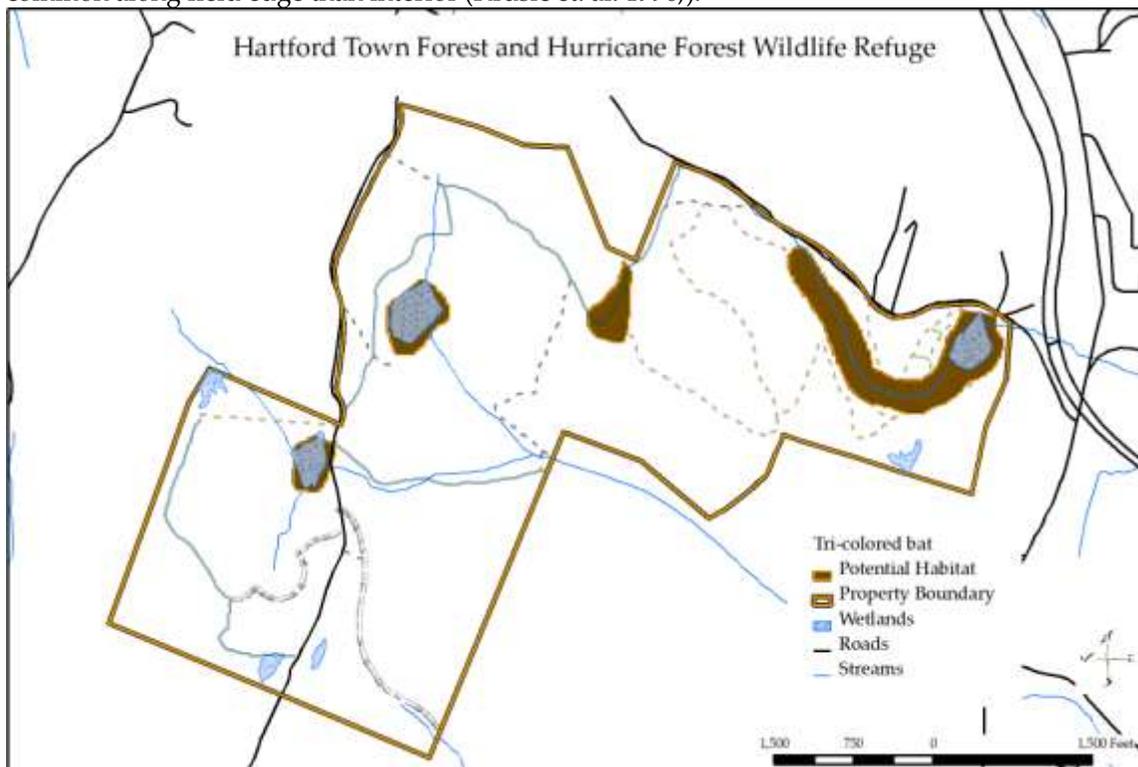
**Recreation:** None. **Priority: low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Perimyotis subflavus*  
**Common Name:** Tri-colored bat  
**State Priority Level:** High  
**State Rank:** S2S3  
**State Status:** Petitioned for endangered (9/2011)  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:**

The tri colored bat roosts in primarily oak and maple leaf clusters (Veilleux et.al. 2003) and can use buildings (Whitaker 1998). This species is present year round, hibernating locally but found rarely. This species prefers large rivers or wetlands to forage over (Degraaf and Yamisaki 2001) and is found roosting with 350-500ft of water (Veilleux et.al. 2003). Pipistrelles show strong site fidelity and may be responding to stand characteristics and foraging grounds (Veilleux and Veilleux 2004). Overall specific summer habitat requirements are still unknown (Kart et. al. 2005). Generally bats require areas with high insect abundance for forage and relatively open areas for flight like field edge, woodland marshes or wetlands, beaver ponds or forested roads or trails. Still water is preferred over moving water and bats are more common along field edge than interior (Krusic et. al. 1996).



**Population Status within Vermont** is considered to be unknown. This bat is very rarely detected, and captured even less. The pipistrelle may be at the northern limit of its range. Within the state, little is known regarding historic populations (Kart et. al. 2005).

Threats include habitat loss, habitat alteration, forest fragmentation or disturbance within migratory pathways, pesticide use.

**Habitat Suitability:** Low

**Probability of Occurrence:** Moderate

**Habitat Availability within the HTF & HFWR:**

Available roost site characteristics are available; however lack proximity to large wetlands. Acoustic surveys during 2011 recorded no tri-colored bats. Likely this bat is found within Hartford and may use the Connecticut or White River for foraging and proximal roosting.

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Habitat is excellent. Avoid foliar chemical use. **Priority: Low**

**Timber Management:** Promote large diameter hardwoods and pines. Harvests should include reserves of large diameter trees. Retain snags and live large diameter (>15") trees with cracks or exfoliating bark. Uneven aged management is an excellent tool to create bat habitat. Groups of 0.25-1 acre with single tree selection. Irregular shelterwood treatments with reserves will also serve all bats. Avoid foliar chemical sprays **Priority: Low**

**Recreation:** None. **Priority: Low**

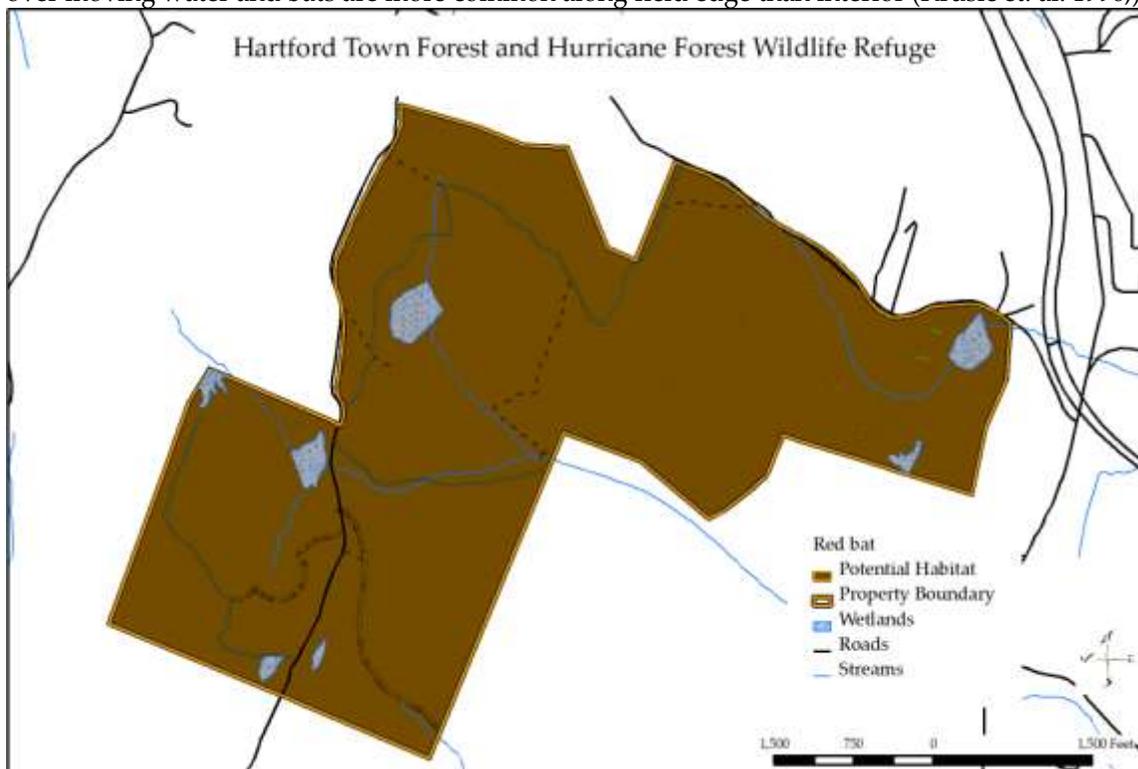
**Educational:** None **Priority: Low**

<b>Scientific Name:</b>	<i>Lasiurus borealis</i>
<b>Common Name:</b>	Eastern red bat
<b>State Priority Level:</b>	High
<b>State Rank:</b>	S4
<b>State Status:</b>	Unlisted
<b>Federal Listing:</b>	Unlisted

#### General Habitat Preferences in Vermont:

The red bat is a migrant woodland species and is present in Vermont during the summer from May-September. Red bats roost in the canopy of shade trees (Mager and Nelson 2001). Red bats hang on the petioles or twigs of branches surrounded by clumps of dead leaves or other branches and leaves or elm, oak, maple or green ash (Mager and Nelson 2001, Kart et. al. 2005, and Hutchinson and Lacki 2000). However, the species of tree is most likely less important, than stand structure and roost characteristics. Red bats prefer older age class forests with an open understory. Hutchinson and Lacki (2000) found 75% of roosts were located on slopes of hardwood ridges. Red bats prefer interior roosts rather than trees near edges of fields or open water.

Bats require areas with high insect abundance for forage and relatively open areas for flight like field edge, woodland marshes or wetlands, beaver ponds or forested roads or trails. Still water is preferred over moving water and bats are more common along field edge than interior (Krusic et. al. 1996,).



**Population Status within Vermont** is considered to be unknown. Within the state, little is known regarding historic populations. However, nationally the population appears to be in a dramatic decline (Kart et. al. 2005).

Threats include habitat loss, habitat alteration, forest fragmentation or disturbance within migratory pathways, pesticide use.

**Habitat Suitability:** High

**Probability of Occurrence:** High

**Habitat Availability within the HTF & HFWR:**

Abundant roost habitat is available. Mature hardwoods with high canopies will offer exceptional roosts. Open midstory is marginally available, but adequate. Foraging opportunities within forests are high as small openings forest openings, stream corridors, and reservoirs are all available.

Specific locations: throughout

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Habitat is excellent. Avoid foliar chemical use. **Priority: Low**

**Timber Management:** Promote large diameter hardwoods and pines. Harvests should include reserves of large diameter trees. Retain snags and live large diameter (>15") trees with cracks or exfoliating bark. Uneven aged management is an excellent tool to create bat habitat. Groups of 0.25-1 acre with single tree selection. Irregular shelterwood treatments with reserves will also serve all bats. Avoid foliar chemical sprays **Priority: Low**

**Recreation:** None. **Priority: Low**

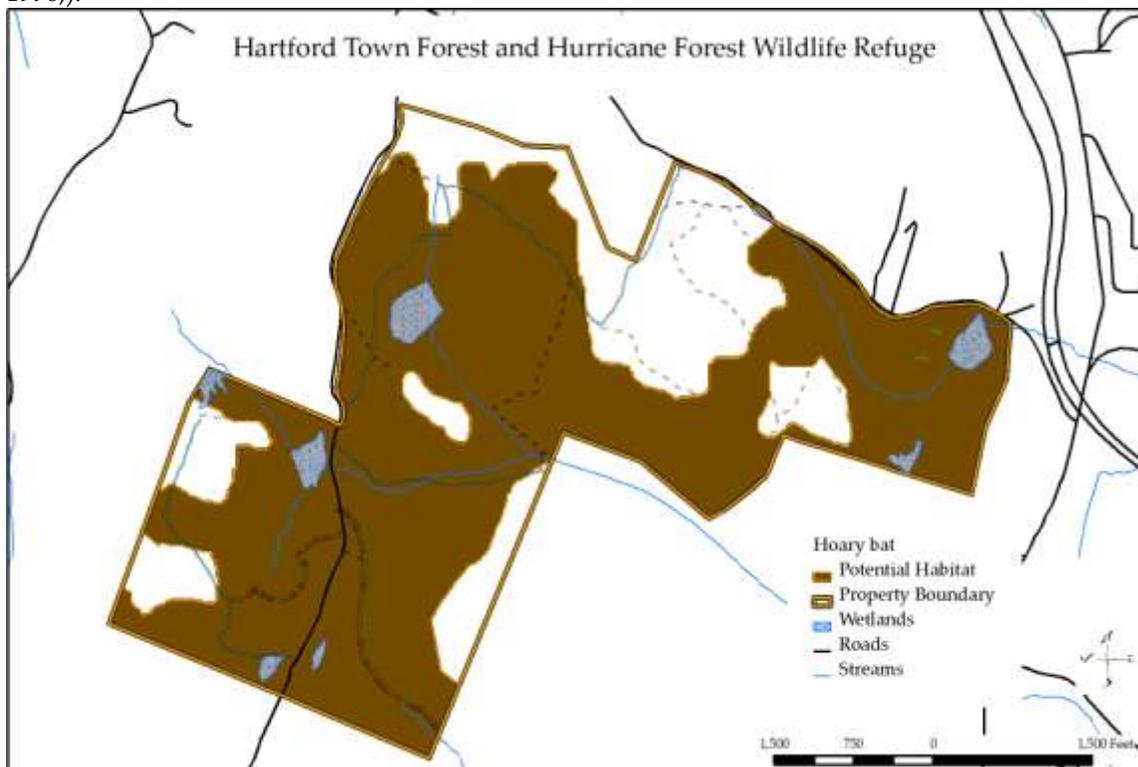
**Educational:** None **Priority: Low**

**Scientific Name:** *Lasiurus cinereus*  
**Common Name:** Hoary Bat  
**State Priority Level:** High  
**State Rank:** S3  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:**

The hoary bat is a migrant woodland species and is present in Vermont during the summer from May-September. Hoary bats roost in the dense canopy of trees (Degraaf and Yamisaki 2001). In New Hampshire, Veilleux et al. (2009) found hoary bats roosting exclusively in eastern hemlock trees while in Arkansas Perry and Thill (2007) found hoary bats roosting in the canopies of oaks and pines. Hoary bats are often detected in acoustic surveys around wetlands (personal obs.) but rarely captured in mist nets. Willis and Brigham (2005) found hoary bats in Saskatchewan using only white spruce trees as roosts which may suggest an affinity for coniferous trees. Overall very little is known regarding the specific habitat requirements of the hoary bat.

Generally bats require areas with high insect abundance for forage and relatively open areas for flight like field edge, woodland marshes or wetlands, beaver ponds or forested roads or trails. Still water is preferred over moving water and bats are more common along field edge than interior (Krusic et. al. 1996).



**Population Status within Vermont** is considered to be unknown. This bat is very rarely detected, and captured even less. Within the state, little is known regarding historic populations (Kart et. al. 2005).

Threats include habitat loss, habitat alteration, forest fragmentation or disturbance within migratory pathways, pesticide use.

**Habitat Suitability:** Low

**Probability of Occurrence:** Moderate

**Habitat Availability within the HTF & HFWR:**

Roost habitat is available. Large diameter oak, pine, hemlock are available for roosting. Proximity to large wetlands is absent and may limit use of roosts. Hoary bats recorded during 2011 acoustic bat survey constituted 4% of total observations. (Thompson 2011)

**Recommendations for Land Uses:**

**Forest Habitat Management:** No improvements are necessary. Habitat is excellent. Avoid foliar chemical use. **Priority: Low**

**Timber Management:** Promote large diameter hardwoods, pines and hemlock. Harvests should include reserves of large diameter trees. Retain snags and live large diameter (>15") trees with cracks or exfoliating bark. Uneven aged management is an excellent tool to create bat habitat. Groups of 0.25-1 acre with single tree selection. Irregular shelterwood treatments with reserves will also serve all bats. Avoid foliar chemical sprays **Priority: Low**

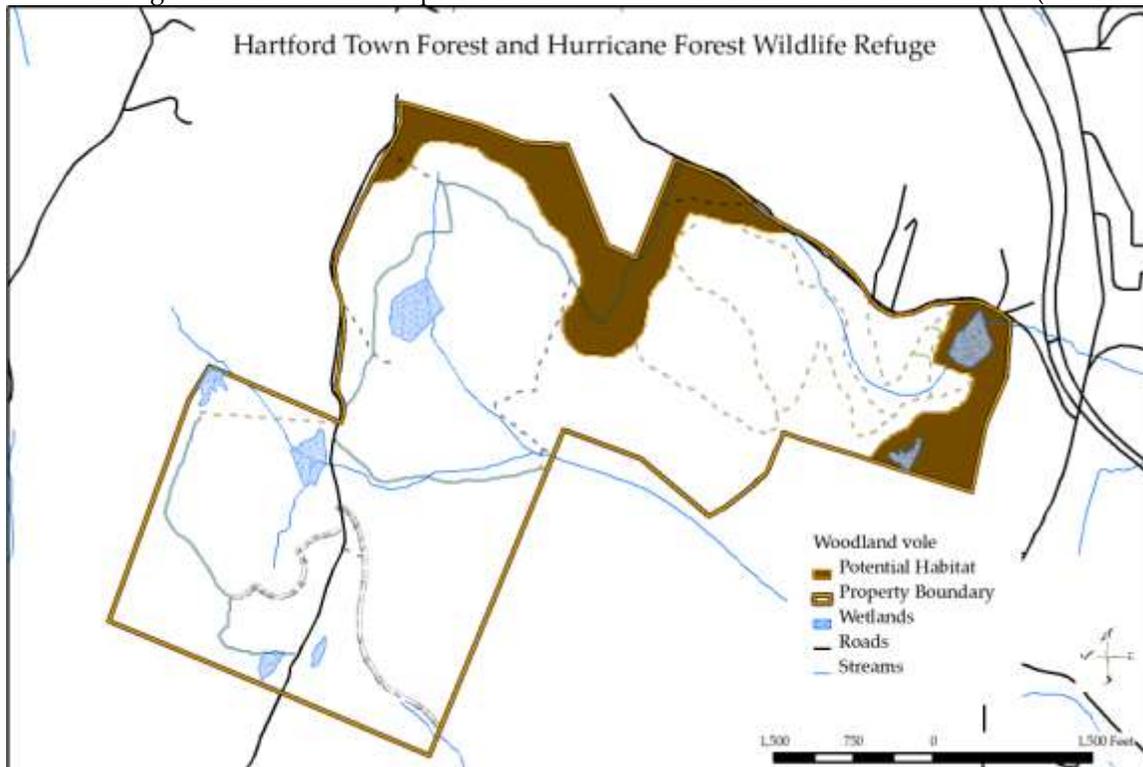
**Recreation:** None. **Priority: Low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Microtus pinetorum*  
**Common Name:** Woodland vole  
**State Priority Level:** High  
**State Rank:** S3  
**State Status:** SC  
**Federal Listing:** Unlisted

#### General Habitat Preferences in Vermont:

The woodland vole is found in a variety of habitats and is reported to require a variety of characteristics (Degraaf and Yamasaki 2001, Miller 1964, Smolen 1981). Little consensus or synthesis of available information exists regarding the woodland voles habitat preferences. In Vermont, woodland voles have been found in upland transition forests to lowland grasslands. The woodland vole is described as a pest in agriculture fields (Kart et. al. 2005) and orchards (Smolen 1981). Vermont is in the northern limit of its range and occurs in low densities in New Hampshire (Degraaf and Yamasaki 2005) and as a result may prefer warmer sites with available food resources (orchards, ag lands, rich northern hardwoods). Miller and Getz (1969) conducted the most in-depth survey of woodland voles and report a high proportion of woodland voles in oak and talus habitats. Woodland voles prefer subterranean tunnels (Miller 1964) and nests below ground and as a result prefer habitats with well drained soils and leaf litter (Smolen 1981).



**Population Status within Vermont** is considered to be stable. However, little is known regarding this species outside of agriculture settings. The woodland vole is rarely detected in Vermont with less than 50 captures recorded in Vermont.

Threats include pesticides.

**Habitat Suitability:** low

**Probability of Occurrence:** Moderate

**Habitat Availability within the HTF & HFWR:**

Little available habitat is thought to be present. Mature forests are not thought to be preferred. A few areas on the fringe of the property and adjacent to other habitat types may offer habitat.

Specific locations:

North of Beacon hill

Eastern boundary

North west corner

**Recommendations for Land Uses:**

*Forest Habitat Management:* Where they exist improve soft mast herbaceous soft mast and shrub resources. Avoid foliar chemical use. **Priority: Low**

*Timber Management:* None. Habitats are not conducive to timber management. **Priority: Low**

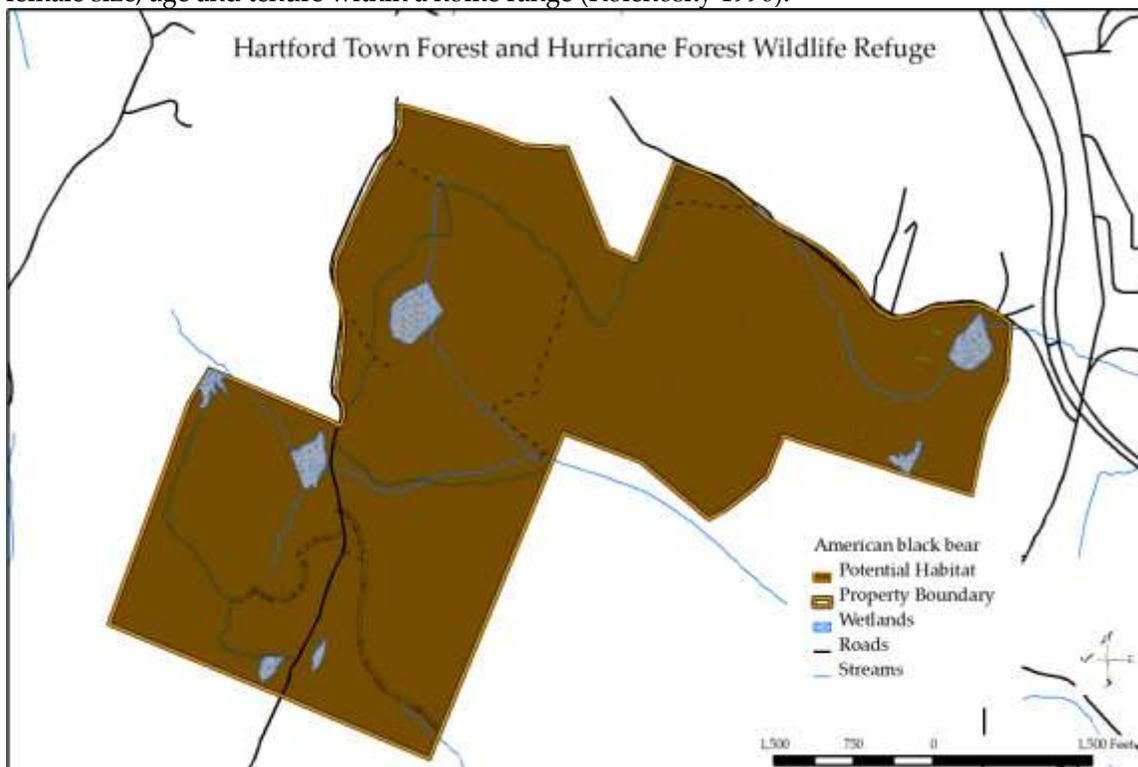
*Recreation:* None. **Priority: Low**

*Educational:* None **Priority: Low**

<b>Scientific Name:</b>	<i>Ursus americanus</i>
<b>Common Name:</b>	American Black Bear
<b>State Priority Level:</b>	Medium
<b>State Rank:</b>	S5
<b>State Status:</b>	Unlisted
<b>Federal Listing:</b>	Unlisted

#### General Habitat Preferences in Vermont:

The black bear is a forest habitat generalist whose home ranges are large and can be 2000 acres to 3000 acres (Samson and Huot 1998). Habitat use varies within home ranges and between seasons but is largely dependent on food availability (Clark et.al 1994, Samson and Huot, 1998, Lariviere, 2001). Foods are eaten when available and abundant; spring vegetation and deer fawns, summer fruits, and autumn fruits and nuts. Throughout the year invertebrates, grubs, and carrion are taken (Degraaf and Yamasaki 2001, Lariviere 2001). Fall foods like beech nuts, oak acorns and other nuts are extremely important in increasing body weights prior to hibernation and habitats providing those sources are preferred. Habitats that provide food include wetlands including seeps, early successional regenerating forests with high amounts of soft mast, mature forests with high frequencies of aspen, beech, oak, cherry, or hickory. Bears will den away from disturbance in secluded areas (Reynolds-Hogland et.al. 2007). Den sites include under fallen trees, standing hollow trees, slash piles and spaces within rocks or talus and protected (Degraaf and Yamasaki 2001). Bears enter hibernation when food availability is low during October-December and emerge when foods become available in March-April. Bear litter success is related to female size, age and tenure within a home range (Kolenosky 1990).



**Population Status within Vermont** Common and increasing. Forested habitat has increased dramatically with the loss of agriculture lands.

**Habitat Suitability:** High

**Probability of Occurrence:** High

**Habitat Availability within the HTF & HFWR:**

Habitat is excellent and food availability primarily hard mast resources; red oak acorns, occasional white oak and beech. Spring food is found at wetlands and reservoirs. Soft mast resources are generally absent; shrubs are sparse with the occasional dogwood and service berries. *Rubus spp* are generally absent. Early successional forage opportunities are restricted to blow downs (south west) and beacon hill, and within now drained reservoirs. Structurally, denning sites are ubiquitous; down trees, and upturned root systems. However, recreation and human disturbance are likely to reduce the value of the available habitat.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Provide year-round food availability by promoting a diverse selection of mast production. Improve growth on healthy beech, white oak, and black cherry where they exist. Retain mature red oak and look for red oak regeneration opportunities. Provide early successional foraging opportunities by increasing amounts of early successional habitats. Retain and improve den sites by increasing coarse woody debris and retain and promote potential den sites in standing large diameter live trees. **Priority: Moderate**

**Timber Management:** Varied; during thinning, or single tree selection, work to increase diameter classes. Consider mast producing trees as crop trees; white oak, healthy American beech, black cherry, hawthorn, apple, and service berry. Even or uneven is suitable so long as they include flushes of early successional habitat (groups > 0.5 acres). Create patch cuts or groups of various sizes. From 0.25 acres and consider areas > 1.0 acres. Target areas away from recreation as primary bear habitat within the property. **Priority: Moderate**

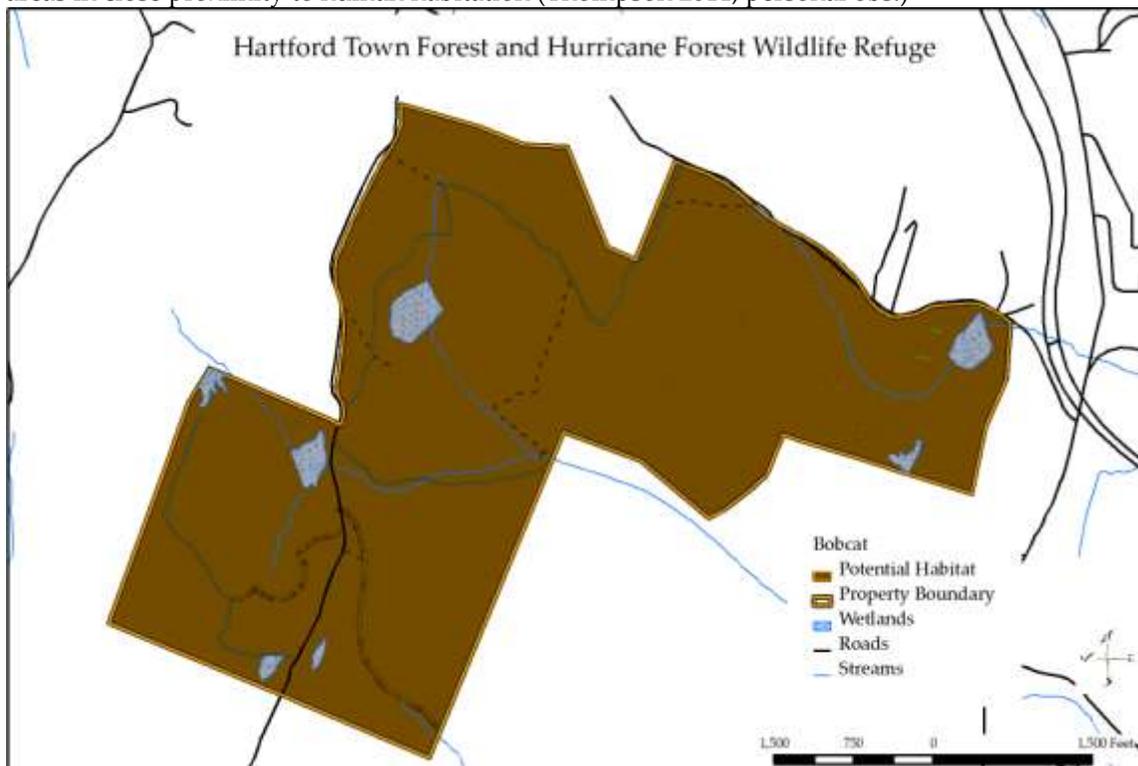
**Recreation:** Bear activity will be low where human recreation is common. Bears will avoid contact with humans through sight, sound and smell. Bikers are more likely to come upon bears than hikers are however response is likely to be similar; avoidance. Reduce recreational opportunities within target bear habitat. **Priority: High**

**Educational:** Provide learning opportunities that incorporate bear habitat and recreational impacts on that habitat. Educate public on changes of recreational opportunities and any management for bear. **Priority: Low**

**Scientific Name:** *Lynx rufus*.  
**Common Name:** Bobcat  
**State Priority Level:** medium  
**State Rank:** S4  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:**

The bobcat uses a variety of forest habitat and use is determined by sufficient prey, dense cover to offer for protection from weather and hunting opportunities, availability of den sites and lack of human disturbance. Bobcats in Michigan showed habitat preference for lowland forest and nonforested wetlands and streams (Preuss and Gehring 2006) and primary habitat often coincide with rocky areas with cliffy refugia (Morse 2011). Habitat use often includes young forests and wetlands where prey is abundant. Food items include snowshoe hare, grouse, small mammals, birds, invertebrates and some mast and vegetation (Hansen 2006, and DeGraaf and Yamisaki 2005). Home ranges are large 200 acres-9000 acres (Hansen 2006) and vary depending on habitat conditions. Males have much large home ranges than females. Bobcats are highly sensitive to humans and will avoid contact, though home ranges can include areas in close proximity to human habitation (Thompson 2011; personal obs.)



**Population Status within Vermont.** Locally common.

**Habitat Suitability:** Moderate

**Probability of Occurrence:** High

**Habitat Availability within the HTF & HFWR:**

Habitats here are moderate, though ubiquitous. The Bobcat's large home ranges, general habitat and prey preferences make much of this property suitable for use, though not preferred. Dense cover is limited and available in far eastern portions, around small wetlands and recently

disturbed sites. It is likely that bobcat will use this property, though core ranges are likely to be centered around other adjacent, off-property habitats with no recreation, higher prey, better cover, and more available den sites.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Improving prey resources through increasing early successional habitat availability. Target prey; ruffed grouse, snowshoe hare, small mammals. **Priority: moderate**

**Timber Management:** patches or groups >1.0 acre or shelterwood that removes over 30% of the basal area over an area >5 acres. **Priority: moderate**

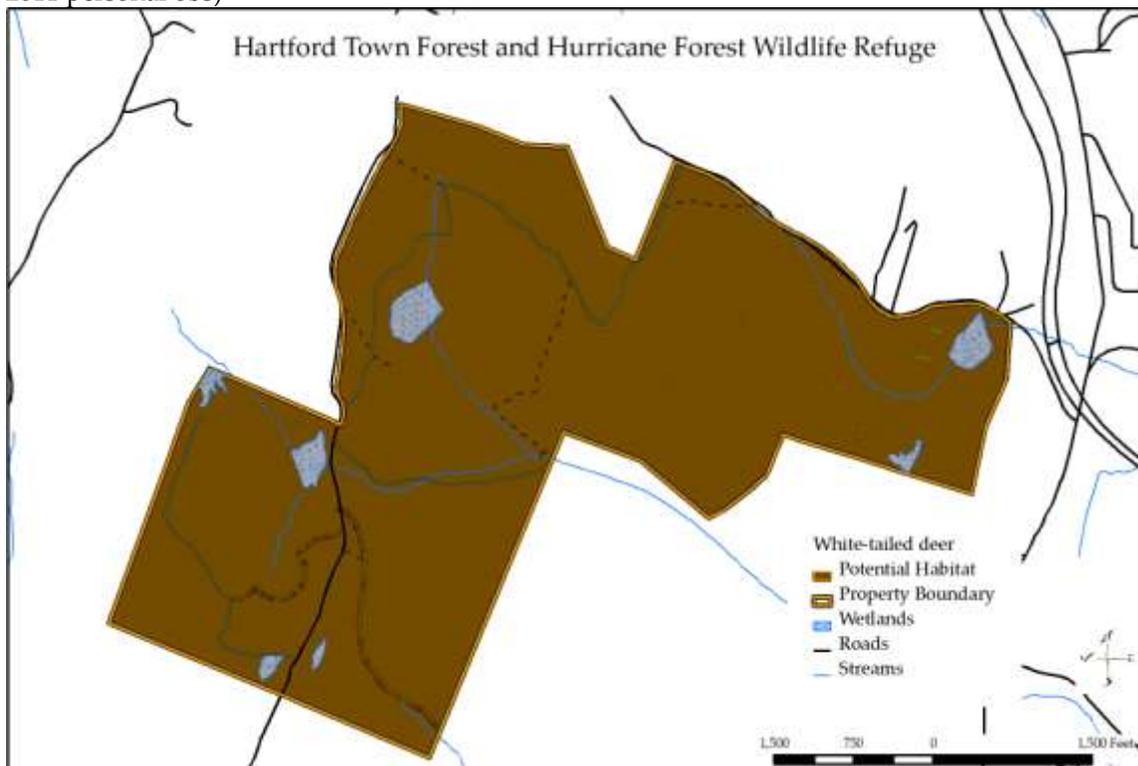
**Recreation:** Reduce recreational frequencies around target bobcat habitats. Bobcats will utilize habitats in close proximity to humans but will avoid areas with constant disturbance. **Priority: high**

**Educational:** Educate public on recreational and habitat modifications designed to improve bobcat use of the area. **Priority: Low**

**Scientific Name:** *Odocoileus virginians*  
**Common Name:** White-tailed deer  
**State Priority Level:**  
**State Rank:** S5  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:**

Habitat use is general and determined by high food availability and cover resources. During winters deer utilize areas with dense softwood cover (under/mid and overstory) to protect from inclement weather, humans and other predators. Herbaceous materials and fruits are browsed year round. Winter foods are primarily softwood needles, barks, buds and ground forage. Spring and summer foods include sedges, grasses and new growth; buds, leaves and bark. Hard mast is preferred when available; beech, oak acorns, and to a lesser extent hickories. Productivity is correlated with food resources and hunting pressures. Dense cover is important during winters and spring. Softwood or mixedwood habitats are used for cover where they exist with or in close proximity with food resources. Wetlands often have high food availability year round. During spring, dense habitat is important for fawn survival. (Thompson 2011 personal obs)



**Population Status within Vermont** Common and dependent on available food, cover and hunting pressure.

**Habitat Suitability:** Moderate

**Probability of Occurrence:** High

**Habitat Availability within the HTF & HFWR:**

Habitat is moderate and available throughout. Winter, spring, and summer food availability is low. Browse is available but mature forest conditions prevent abundant browse in any given

location and deer are required to increase ranges. Fall food availability is high. Acorn and beech will provide excellent food for deer. Cover resources are moderate for spring-summer. Winter cover habitats are locally abundant in eastern portions, along ridges but are only moderate in pure hemlock stands. These areas have closed canopy but lack the ideal cover resources required to keep deer warm and secure during inclement weather conditions.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Retain hard mast resources. Improve quality beech where they exist. Promote cover resources by improving hemlock growth where it exists. Improve browse conditions by increasing frequencies of hardwood poles, shrubs, forbs and grasses. **Priority: Moderate**

**Timber Management:** Deer will benefit from any regeneration harvests. Groups, patches or shelterwoods that improve browse and cover. Where harvesting hemlock; use shelterwoods or groups but leave areas untreated. . **Priority: Moderate**

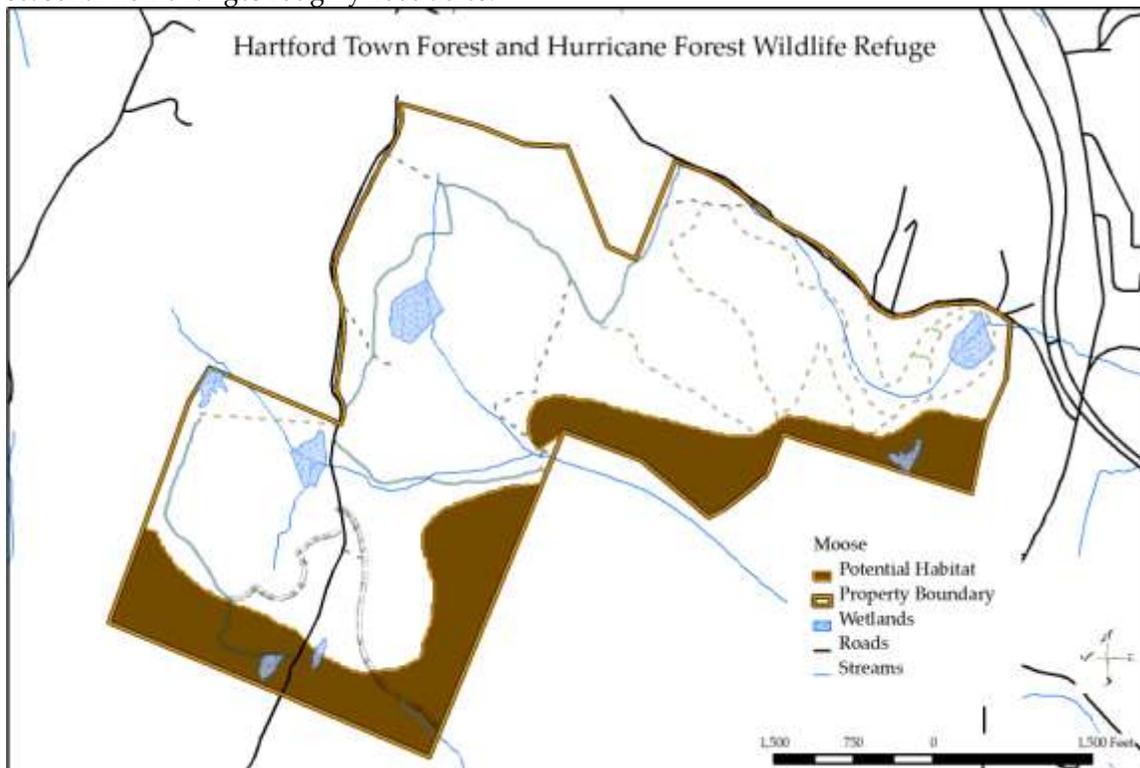
**Recreation:** Deer are most sensitive during winter and spring. Identify and avoid areas with dense softwood cover. Seasonal closure of specific areas will be beneficial. **Priority: Low**

**Educational:** None **Priority: Low**

**Scientific Name:** *Alces alces*  
**Common Name:** Moose  
**State Priority Level:**  
**State Rank:** S5  
**State Status:** Unlisted  
**Federal Listing:** Unlisted

**General Habitat Preferences in Vermont:**

Moose use areas with dense softwood cover and abundant food resources. Cover habitats are used primarily during winters and includes balsam fir, white cedar or in southern ranges; hemlock. Conducive softwood habitats are found at high elevations and/or in Northern Vermont. Moose move away (down or out) of these habitats and target areas with high amounts of herbaceous browse and hardwood tissues (buds, leaves, bark) Buds, leaves, barks and fruits are taken year round, and depending on their availability. Wetlands, and early successional habitat offer excellent food and cover resources for spring-summer. Annual home ranges are vast and can be up to 15000 acres (Degraaf and Yamasaki 2001) and seasonal home ranges roughly 2000 acres.



**Population Status within Vermont** locally Common.

No known threats are noted

**Habitat Suitability:** Low

**Probability of Occurrence:** Low

Evidence of moose browse is present on striped maple at Neal’s hill and is roughly 5 years old.

**Habitat Availability within the HTF & HFWR:**

Hardwood habitats offer moderate browse opportunities. Available browse includes sparse hardwood poles, maple barks, and other woody tissues. Available browse will support transient moose or those on the fringes of home ranges but will likely not support resident moose.

**Recommendations for Land Uses:**

**Forest Habitat Management:** Improve browse availability and cover resources. Focus regeneration on aspen and hardwood poles and where appropriate, hemlock. **Priority: Moderate**

**Timber Management:** Even aged management that treats large areas will improve forage and cover resources for moose. Shelterwoods that remove >30% basal area or patch cuts. **Priority: Moderate**

**Recreation:** Reduce recreational frequencies in areas designed for moose. **Priority: High**

**Educational:** Educate public on habitat and recreational modifications to improve moose habitat. **Priority: Low**

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