



Forest Bird Habitat Assessment

**North Danville Town Forest
Danville, VT**

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Introduction

The purposes of this document are to 1) provide an assessment of forest bird breeding habitat on the North Danville Town forest in Danville, VT and 2) offer management options and considerations with the goal(s) of protecting, enhancing, and/or creating quality breeding habitat conditions for *responsibility forest bird species* as identified by Audubon Vermont's Forest Bird Initiative (FBI). A *responsibility species* is a bird species with a significant amount of its global breeding population found in the Northern Forest region, some of which are showing long-term population declines.

Regional Context

This roughly 90 acre property is located in the Atlantic Northern Forest Bird Conservation Region (BCR 14) as delineated by the North American Bird Conservation Initiative (NABCI).

The Atlantic Northern Forest encompasses a geographic area stretching southwest to northeast from the Taconic hills of eastern New York/western Massachusetts and the Adirondack Mountains (cut off from the remainder of the BCR by the Lake Champlain valley), through most of Vermont, New Hampshire and Maine, Quebec south of the St. Lawrence River including the Gaspé Peninsula, and all of the Maritime provinces of New Brunswick, Prince Edward Island, and Nova Scotia. (BCR14 Blueprint page 7.) (Figure 1). Predominant general forest types include spruce-fir, northern hardwood, and mixed deciduous-coniferous forests.

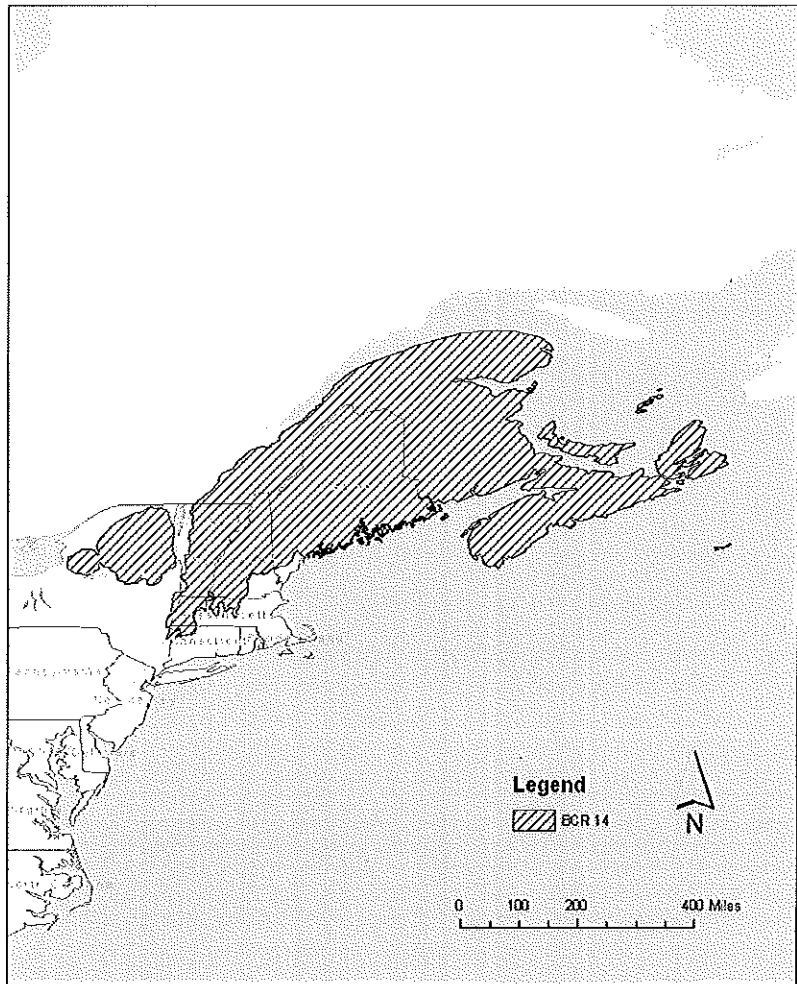


Figure 1 - BCR 14

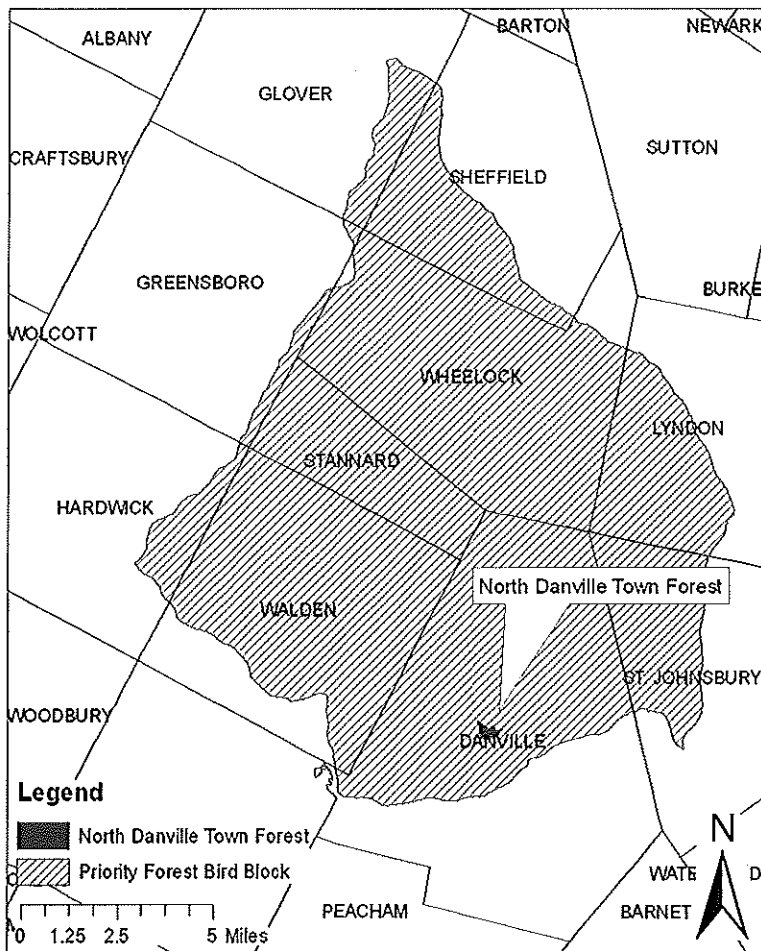


Figure 2. Audubon Vermont's Priority Forest Bird Block

Audubon Vermont has identified the area around Danville, VT as a Priority Bird Block, denoting its high importance to conserving responsibility bird species (Figure 2). The Block is approximately 101,000 acres of contiguous forest land in the Northern Vermont Piedmont Biophysical Region. The Block is roughly bounded by Interstate 91 to the east, Route 2 to the south, and Routes 15 and 16 on the west.

Landscape Context

A consideration of the property's surrounding landscape (2,500 acres) is an important component of assessing current habitat conditions and making management recommendations.

The landscape surrounding the North Danville Town forest is roughly 90% forested, with the remainder of the land mostly in agricultural use (Figure 3). The contiguous nature of the forest on this landscape makes the area suitable for area sensitive birds. These are birds that tend to fledge young more successfully in extensively forested landscapes, compared to fragmented landscapes, commonly due to their vulnerability to nest predators and parasites. The interior forest conditions found on and around the town forest likely offer a refuge from nest predators such as raccoons, skunks and housecats and the brood parasite brown-headed cowbird, all of which are associated with developed landscapes. Protecting interior forest conditions is the recommended primary bird habitat conservation goal for the property.

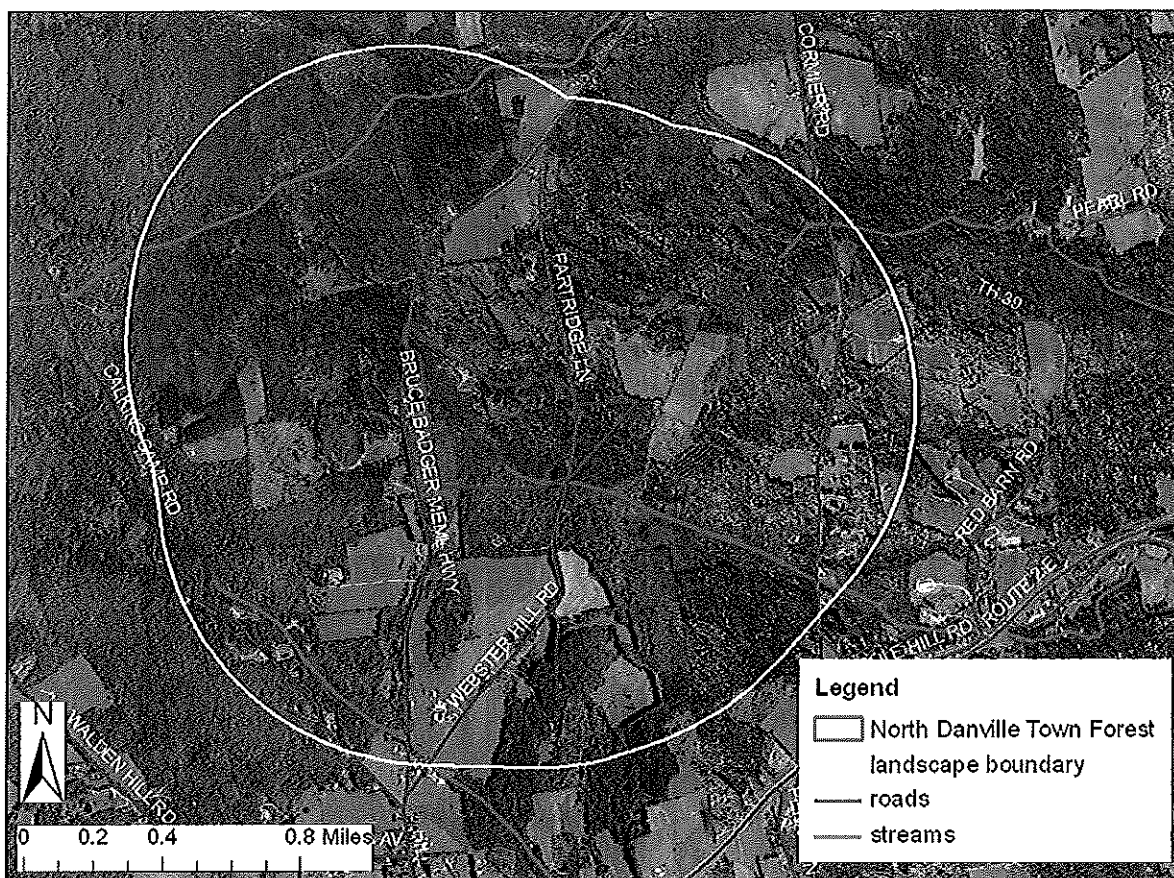


Figure 3. 2,500 acre landscapes surrounding the Town Forest.

Some young forest habitat is available on the landscape, including a small patch in the town forest itself and a 15-20 acre area bordering the property on the west that appears to have been clear-cut within the past 5 years. This habitat type is desirable because several responsibility species depend on it during one or more phases of their breeding cycle. It can be created by natural or human-caused disturbances, such as forestry activities, but only lasts a short time (roughly 15 years) because it decreases in value for target species once the new growth reaches about 20 feet in height. A target of 3-5% of the landscape in a young forest or early-successional habitat type at any one time is appropriate. Because there appears to be less than that on the landscape at this time, management for some early-successional habitat conditions is the recommended secondary bird habitat conservation goal for the town forest. Maintaining the current amount of early-successional habitat, about 3 acres, is recommended.

Additional notable features include streams and forested wetlands. These resources should be protected for their habitat and water quality values.

Landowner Objectives

The landowners are residents of the town of Danville, VT. A community survey indicated that many citizens value the recreational, aesthetic and wood production potential of the town forests. They would like the resource to be used in a way that sustains those values.

Definitions

Terms defined below are in **bold** in the text of this report.

General habitat terms

Area-sensitive Bird Species

Bird species which increase in abundance, occur more frequently, and/or achieve higher nesting success with increasing forest patch size such as the wood thrush and scarlet tanager.

Early-Successional Habitat

Regenerating forest and brushy, overgrown fields are two of the most common types of early-successional habitat. The vegetative conditions of these areas are often similar; a high density of small, woody-stemmed vegetation. This may include tree seedlings and saplings, blackberry and/or raspberry, and meadowsweet. These conditions are temporal; generally lasting for 15-20 years in regenerating forest area, longer on old fields. Responsibility bird species that require this habitat type for all or a portion of their needs are chestnut-sided warbler, mourning warbler, white-throated sparrow, American woodcock, ruffed grouse, magnolia warbler, and Canada warbler.

Edge

At the edge between forest and open land, the transition from low herbaceous vegetation to tree canopy can be considered either a “soft” or “hard” edge. A soft edge refers to a gradual change in vegetation height moving into the forest. This gradual transition is important for buffering interior forest specialists like the wood thrush from the incursions of nest predators (such as raccoons and skunks) and nest parasites (such as the brown-headed cowbird) that are frequently found in open and developed areas. A gradually increasing canopy height will help shield interior nesting birds from view by predators and parasites. Additionally, the brushy conditions that often develop in a soft edge may provide breeding habitat for early-successional bird species including chestnut-sided warbler and white-throated sparrow.



Fragmented Forest

Forest that is broken into smaller, unconnected patches, primarily due to some form of development (e.g. residential, commercial, major roads). A fragmented forested landscape is more likely to support “generalist” wildlife species, such as raccoons and skunks, which can decrease nesting success of interior forest birds.

Interior Forest

Forest condition that occurs with increasing distance from a forested/non-forested edge. As perceived from a bird's perspective, interior forest conditions occur approximately 600-900 ft. from an edge. It is at this distance that negative edge-associated effects such as nest predation and parasitism generally no longer occur. Bird species that are labeled interior forest specialists tend to avoid edges.

Structural Complexity

Structural complexity refers to the complexity of vegetation as it is spatially arranged in the forest, both vertically and horizontally. A forest with a well developed under-story, mid-story, and canopy exhibits complex or diverse structure, which offers habitat for a greater array of bird species compared with a structurally simple forest. Non-living features, such as coarse woody material, and canopy gaps, contribute as well.

Habitat parameters

The following attributes of forest structure were evaluated during the field visit:

Cover Type

Cover type is a generalized description of the dominant vegetation of a habitat unit; such as mixed forest, forested wetland, and open field. Focus is given to how the area may be perceived by breeding birds.

Dominant Canopy Trees

Tree species that are most abundant in the dominant and co-dominant forest canopy classes. Applicable only when habitat unit is forested. Some tree species have notable value to responsibility bird species. Yellow birch has been shown to be preferentially chosen by some species of insect eating songbirds as a foraging substrate. Among these are scarlet tanager, black-throated green warbler, and blackburnian warbler. Cherry species are also important, particularly during the post breeding/pre-migration period, as their fruits become a significant component of many bird species diets.

Tree Size Class

Size class(s) of trees in the dominant and co-dominant canopy classes. Determined by measuring the diameter of a tree at breast height (dbh), which is 4 ½ ft. from the ground. Classes include seedling/sapling (≤ 3.9 inches), poletimber (4-8.9 inches for softwoods, 4-11.9 inches for hardwoods), and sawtimber (≥ 9 inches for softwoods, ≥ 12 inches for hardwoods).

Responsibility bird species are often associated with 1 or more size classes. As a general rule, a pre-dominance of seedlings/saplings will provide habitat for early-successional bird species such as chestnut-sided warbler, while pole and sawtimber is more suitable for wood thrush and blue-headed vireo.

Understory Vegetation

Understory vegetation includes the most abundant woody-stemmed vegetation 1-20' in height, such as tree seedlings and saplings along with understory trees and shrubs such as hobblebush. The fruits of understory species such as serviceberry provide food for a number of responsibility

bird species; while the structure created by hobblebush is an ideal nesting substrate for birds that nest in this forest layer (see Understory Development for further detail).

Understory Development

A qualitative, relative measurement of the amount of woody-stemmed vegetation 1-20' in height; described as low, moderate, or high. For some responsibility bird species this is one of the most important habitat features. Black-throated blue warbler and wood thrush are two species that nest almost exclusively in this forest layer. Other species including American redstart and ovenbird spend a portion of their time foraging in the vegetation within this height range. Understory growth is initiated when light reaches the forest floor, which can happen in the event of natural disturbances, such as fire, wind, or other agents of tree death. Human disturbances such as logging can mimic natural disturbances and have a similar effect. Cutting groups of trees will often provide better understory regeneration than single tree removal.

Snags (standing dead trees)

Snags are important nesting habitat for several species including the yellow-bellied sapsucker and northern flicker. In order to provide adequate nesting opportunity for these and other responsibility species, retaining six snags per acre of forest is recommended. Three of the six snags should be of a large size class, greater than 16" diameter at breast height (dbh). This can be accomplished through retaining dead, dying, and old trees and by girdling trees of poor form and quality. Qualitative measurements used are low (overall low abundance of any snags), moderate (snags present, but of small diameter(s)), or, minimal abundance of snags of target diameters), and high (abundance of target diameter snags).

Ground Cover

All layers of the forest are important, including the forest floor. Coarse woody material (CWM) is made up of large woody material (*ie.* tree trunks), branches, limbs, and slash piles. This mix of material provides nesting opportunities for species such as white-throated sparrow that tend to build their nests in and under brush piles. Additionally, ruffed grouse utilize CWM as perches from which to drum during the mating season. Forest management provides an opportunity to increase the amounts of CWM on the forest floor. An abundant layer of moist leaf litter is home to an array of insects, mites, and spiders. These arthropods make up a significant component of an ovenbird's and wood thrush's diet during the breeding season. Management activities that lead to dessication of the leaf litter can negatively effect the habitat suitability of the area to these bird species. Amounts of CWM and leaf litter are described qualitatively as low, moderate, or high.

Trails/Roads

Recreational trails, access roads, and skid trails are often an important component of a habitat unit. In a landscape that is predominately forested, these man-made features generally do not degrade the habitat quality. Research has shown that roads/trails less than 25 ft. in width, when combined with a greater than 70% canopy cover over the road/trail, have minimal negative impact on the forest bird community.

Additional Significant Features

Wetlands and streams sides (riparian habitat) provide nesting and feeding opportunities for a variety of forest nesting birds and wetland specialists. Larger fast moving stream may support nesting of the Louisiana waterthrush, a responsibility species whose nesting is strongly associated with fast moving streams with forested buffers. Protecting this riparian buffer will ensure it is available for Louisiana waterthrush nesting. Other forest features have a high level of value to other wildlife in addition to birds. For this reason, significant habitat elements such as vernal pools, deer winter habitat and bear feeding areas may be taken into account when making management recommendations.

Habitat Assessment

Based on a June 3, 2010 field visit, the property was divided into 3 habitat units, or areas currently providing different habitat conditions for responsibility species.

This section includes:

- 1) General management considerations applicable to all properties
- 2) Description of the habitat units and assessment of their current habitat value
- 3) Description of desired future conditions for enhancing responsibility species habitat in each habitat unit, and management options specific to the property, aimed at achieving the desired conditions

Recommendations are provided for a 10-15 year period. While not always discussed in the report, the recommended practices will also benefit a variety of other bird and other wildlife species. The recommendations are designed to be discussed with the property's forester or land manager and implemented where practical and appropriate. If the property is enrolled in the Use Value Appraisal program, it is important that the forest management plan be amended or updated before any actions not in the plan are taken.

Contact Katie Manaras at 802-453-6710 or kmanaras@audubon.org for more information or questions about the report.

General Management Considerations

The following management considerations can be implemented throughout any forested property to protect and enhance the quality of breeding habitat for responsibility species.

✓ Retain yellow birch

The branches and foliage of yellow birch are preferentially chosen foraging substrates for insect eating responsibility bird species, including blackburnian warbler, black-throated green warbler, and scarlet tanager. This preference may be due to higher densities of potential prey and the ability of these bird species to forage effectively among the branching and foliage structure of this tree species (Holmes and Robinson 1981). Retain as many individuals, across all size classes, as possible.

✓ Conduct harvesting operations outside the bird breeding season

The forest bird breeding season roughly extends from May-August. Harvesting during frozen ground conditions is preferable as it has no direct negative impact on the breeding bird community. Winter harvesting can also help protect advanced regeneration and understory shrubs from damage. If harvesting outside of this time frame is required, schedule it after the second or third week of July, which will allow most birds to fledge a first brood.

✓ Retain standing snags

Standing dead trees are of significant value to a number of responsibility bird species including northern flicker, chimney swift, and olive-sided flycatcher as well as many other species of wildlife. To the extent possible retain a minimum of six snags and/or cavity trees per acre, with one exceeding 18 in. dbh and two additional exceeding 16 in. dbh. Priority should be given to hardwood snags as they remain intact longer. Also, retain some live trees of poor form and quality during harvests to serve as the next cohort of snags. If target number of snags does not exist, consider girdling poor quality trees in order to achieve abundance objectives.

✓ Retain large diameter aspen and birch spp.

Yellow-bellied sapsuckers and northern flickers frequently excavate nest cavities in trees in the sawtimber size class (≥ 13 in. dbh), aspen and birch spp. Cavities are often made in trees with the heartwood decay fungus *Phellinus tremulae* (*Fomes igniarius* var. *populinus*) (Kilham 1971) and *Fomes fomentarius* and sapwood decay fungi (*Trichaptum biformis* and *Traemetes versicolor*).

✓ Retain coarse and fine woody material

Small limbs and branches, including the tops of harvested trees, on the forest floor provide cover and feeding sites for ground and understory foraging bird species such as veery and white-throated sparrow. Larger diameter logs serve as drumming sites for male ruffed grouse and singing perches for songbirds including ovenbird. Refrain from widespread use of whole tree harvesting and leave slash (branches, limbs, etc.) in the forest.

✓ Minimize extent of forest access roads

Forest access roads can serve as pathways for increased nest predation and parasitism, particularly in forests within an agricultural matrix. Maintain < 15 percent of a property in roads

and access trails and utilize the current trail system as much as possible. Minimize long, straight stretches of access roads into the forest interior. Road/trail widths <20 ft. are preferred (Rich et al. 1994). Wider forest roads may decrease habitat quality for ground foraging bird species such as ovenbird along the road edge due to decreases in leaf litter moisture, increased leaf litter temperature, and subsequent lowered densities of leaf litter arthropods. Densities of birds and reproductive success may be affected (Ortega and Capen 1999).

✓ **Soften edges between field and forest habitats**

At the interface between forest and open land, the transition from low herbaceous vegetation to tree canopy can be considered either “soft” or “hard”. A soft edge refers to a gradual change in vegetation height moving into the forest. This gradual transition is important for buffering interior forest bird species like the wood thrush from the incursions of nest predators (such as raccoons and skunks) and nest parasites (such as the brown-headed cowbird) that are frequently found in open and developed areas. A gradually increasing canopy height will help shield interior nesting birds from view by predators and nest parasites. Additionally, the brushy conditions that often develop in a soft edge may provide breeding habitat for early-successional bird species including chestnut-sided warbler and white-throated sparrow.

✓ **Monitor and control invasive plants**

The fruits of invasive plants such as buckthorn and honeysuckle are eaten by birds, but are of low nutritional value. Because many migrants focus their diets on fruits in the fall as they prepare for long migrations, their choice of these plants comes at an energetic cost at a critical time. Additionally, bird nests in invasive plants are more vulnerable to nest predators. When new light is allowed to reach the forest floor, due to either natural or human-induced changes in forest structure, the growth on invasive plants can be stimulated, and they can outcompete native, desirable plants. If invasive plants are present in an area, their response to any canopy openings should be monitored closely. For information about controlling invasive plants contact Sharon Plum, The Nature Conservancy’s “Wise on Weeds” coordinator, at splumb@tnc.org or 802.229.4425 x120.

✓ **Retain streamside buffers**

The edges of swiftly flowing, gravelly to rocky bottomed streams imbedded in a forest matrix can provide suitable nesting habitat for Louisiana waterthrush. Retain streamside buffers sufficient to protect water quality and potential nesting sites for this responsibility bird species. Features to preserve include small hollows or cavities within the root base of upturned tree, within bank of stream, or under fallen log.

Habitat Units

1. Mixed forest - approximately 67 acres

Description

This habitat unit includes plantations of white pine, red pine and Norway spruce as well as areas that appear to have regenerated naturally following forest clearing. Even-aged and two-aged stands are included in this area, which accounts for roughly 76% of the property's total area.

Assessment of Current Conditions

Forest Canopy (>30 ft height)

Dominant Tree Species: *white pine, red pine, Norway spruce, red spruce, balsam fir, sugar maple, red maple, white ash, hemlock*

The mix of hardwoods and softwoods provides breeding habitat for a more diverse bird community than either pure hardwoods or softwoods would alone offer. Some birds show a preference for hardwoods (e.g. ovenbird, eastern wood-pewee) while others select for softwoods (e.g. blackburnian warbler). Pure softwood inclusions, in particular hemlock, are higher quality habitat for bird species such as black-throated green warbler, blackburnian warbler, and blue-headed vireo.

Dominant Tree Size Class(es): *pole and sawtimber*

The size classes represented by the dominant, co-dominant, and intermediate canopy trees makes this habitat unit most suited to bird species that utilize mid- to late-successional forest conditions (e.g. ovenbird, northern parula, blackburnian warbler).

Canopy Cover Classification: *intermediate (30-80%) and closed (>80%)*

Variability in % canopy cover makes this habitat unit suitable for bird with a preference for closed canopy conditions (e.g. black-throated green warbler and blue-headed vireo) as well as those that utilize well developed understory conditions that often develop in stands with a more open canopy (e.g. black-throated blue warbler, veery).

Patches of sapling-dominated forest, sedges and black-berry were noted in areas where overstory trees have been removed. This habitat structure is critical for birds such as chestnut-sided warbler and Nashville warbler that rely on stand-replacing disturbances to "re-set the clock" on forest development. A chestnut-sided warbler was even observed in one of these areas near the southeastern corner of this habitat unit. However, existing patches of young forest habitat appear to be too small to support successful breeding of these early-successional breeders. Patches of one acre or more are preferred. See Habitat Unit 3 for more information about early-successional habitat conditions and the birds that depend on it.

Snags and Cavity Trees: *low*

Some high quality snags and cavity trees exist in this area. However, Audubon's density and diameter target of 6 snags per acre > 16 inches in diameter does not appear to be met, on average. The majority of snags noted are smaller diameter (<10 in dbh). Larger diameter

hardwoods, in particular aspen and birch spp. are preferable in order to meet the needs of cavity nesting species such as yellow bellied sapsucker.

Forest Understory/Midstory (1-30 ft height)

Understory Development (1-5 ft): *high*

Midstory Development (6-30 ft): *moderate*

The majority of forest responsibility bird species utilize the lower forest layers to meet all or a portion of their breeding habitat needs. Greater understory and midstory development, or structural complexity, increases habitat suitability for bird species that nest and/or forage within 30 ft of the ground. The understory is well-developed in general in this habitat unit

The midstory layer is overall in moderate density in terms of stems and foliage cover. Bird species that nest in this forest layer such as black-throated green warbler were observed.

Dominant Understory/ Midstory Species: *beech, white ash, sugar maple, red spruce, balsam fir, gray, yellow and paper birch*

A variety of tree and shrub species are used as nesting sites in these forest layers. While not necessarily desirable from a timber management perspective, beech is frequently selected as nest locations by black-throated blue warbler, wood thrush, and American redstart.

Forest Floor

Coarse Woody Material (>4 in dia.): *low to moderate*

Fine Woody Material (<4 in dia.): *low to moderate*

Both coarse and fine woody materials are well distributed throughout the habitat unit but overall are in low abundance. Logs >10" in diameter on the ground would provide male ruffed grouse with more drumming site opportunities. Smaller diameter material, particularly when aggregated into piles, provides potential cover, foraging areas, and singing perches.

Leaf Litter: *low*

Moist deciduous leaf litter contributes to higher habitat quality for wood thrush and veery, which forage in it for snails and arthropods, and ovenbird which also forages there as well as constructs its nests from it. The feature appears to be lacking here due to the dominance of coniferous trees.

Responsibility Bird Species Observed

- Blue-headed vireo
- White-throated sparrow
- Black-throated green warbler
- Black-throated blue warbler
- Ovenbird
- Chestnut-sided warbler

Desired Future Habitat Conditions

Overall the recommended habitat management for this unit is to continue to develop structurally complex uneven-aged mid-late successional forest conditions particularly for **interior forest** bird species. Among the desired features are a diverse tree species composition in all forest layers, an overall closed canopy with small canopy gaps (diameter <2 times the canopy height) that result in well developed understory and midstory layers; a range of tree size classes - from older large sawtimber to seedlings and sapling; random arrangement of current and future large diameter

snags and cavity trees; and a forest floor that contains moist, dense deciduous litter and woody material of various sizes and decay classes.

Target Responsibility Species

- Wood thrush
- Ovenbird
- Veery
- Yellow-bellied sapsucker
- Eastern wood-pewee
- Scarlet tanager
- Northern parula
- American redstart
- Black-throated blue warbler
- Black-throated green warbler
- Blackburnian warbler
- Purple finch
- Blue-headed vireo
- Canada warbler

Management Options

✓ Enhance structural complexity of mature interior forest

Responsibility bird benefit: Bird species specialize in using different foliage strata for nesting and foraging. For example, Black-throated blue warblers tend to nest low in the understory, but forage above 5' in height. Blue-headed vireo nest between 6' and 15' on average, and scarlet tanagers tend to forage and nest in the upper canopy. For this reason, maximizing the diversity of foliage height will enhance breeding habitat conditions for a variety of bird species.

Management strategy(s): For regeneration cuts, single-tree and group selection harvests that create canopy openings with a diameter < 2x the height of dominant canopy trees will help release advanced regeneration, promote shrub development, and enhance nesting site opportunities for black-throated blue warbler and wood thrush. Timber stand improvement treatments (e.g. canopy thinning, crop tree release) would likely have a similar effect, depending upon their intensity. Research in tolerant northern hardwood stands has shown that, where silviculturally appropriate, minimum residual basal area of at least 85-90 sq. ft./acre, with at least 30- 35 sq. ft. /acre composed of sawtimber >14 in. dbh, should maintain suitable conditions for interior forest bird species sensitive to disturbance, including ovenbird (Holmes and Pitt 2007). Similarly, in stands with a softwood component densities of blue-headed vireo, blackburnian warbler, and northern parula have been shown to decline when canopy cover is <62% and there are fewer than 28 trees/acre <12" dbh (Guenette and Villard 2005).

2. Forested wetland – approximately 20 acres

Description

This habitat unit is located in the southwestern corner of the property. The forest is mixed mid- to late-successional forest with wet soils, and features a higher percentage of hardwoods, compared to Habitat Unit 1. The area accounts for roughly 23% of the property's total acreage.

Assessment of Current Conditions

Forest Canopy (>30 ft height)

Dominant Tree Species: *sugar maple, red maple, white ash, red spruce, balsam fir, white cedar*
The mix of hardwoods and softwoods provides breeding habitat for a more diverse bird community than either pure hardwoods or softwoods would alone offer. Some birds show a preference for hardwoods (e.g. ovenbird, eastern wood-pewee) while others select for softwoods (e.g. Blackburnian warbler).

Dominant Tree Size Class(es): *pole and sawtimber*

The size classes represented by the dominant, co-dominant, and intermediate canopy trees makes this habitat unit most suited to bird species that utilize mid- to late-successional forest conditions (e.g. ovenbird, northern parula, Blackburnian warbler).

Canopy Cover Classification: *intermediate (30-80%) and closed (>80%)*

Variability in % canopy cover makes this habitat unit suitable for bird with a preference for closed canopy conditions (e.g. black-throated green warbler and blue-headed vireo) as well as those that utilize well developed understory conditions that often develop in stands with a more open canopy (e.g. black-throated blue warbler, veery). All of these species were observed in the area during the field visit.

Snags and Cavity Trees: *low*

Some high quality snags and cavity trees exist in this area. However, Audubon's density and diameter target of 6 snags per acre > 16 inches in diameter does not appear to be met, on average. The majority of snags noted are smaller diameter (<10 in dbh). Larger diameter hardwoods, in particular aspen and birch spp. are preferable in order to meet the needs of cavity nesting species such as yellow bellied sapsucker.

Forest Understory/Midstory (1-30 ft height)

Understory Development (1-5 ft): *high*

Midstory Development (6-30 ft): *high*

The majority of forest responsibility bird species utilize the lower forest layers to meet all or a portion of their breeding habitat needs. Greater understory and midstory development, or structural complexity, increases habitat suitability for bird species that nest and/or forage within 30 ft of the ground. The understory and mid-story are well-developed in general in this habitat unit, and several birds that nest and forage in the understory were observed. Dense understory vegetation is an important habitat feature for Canada warbler.

Dominant Understory/ Midstory Species: *balsam fir, red spruce, sugar maple, beech, stripped maple*

A variety of tree and shrub species are used by understory and mid-story nesters and foragers. A mix of coniferous and deciduous trees in a dense understory is thought to be an important habitat characteristic for Canada warbler, a species of high conservation concern that was observed in this habitat unit.

Forest Floor

Coarse Woody Material (>4 in dia.): *high*

Coarse woody debris is more abundant in this habitat unit compared to the upland mixed forest areas of Habitat Unit 1. Moist soils may contribute to the number of fallen, uprooted trees in the area. The micro-site complexity created on the forest floor by fallen logs and hummocks of sphagnum moss and ferns are important features for Canada warblers, a bird of that was observed during the field visit. Canada warblers are birds of high conservation concern due to a rapid population decline over the past 30 years. They tend to place nests into root masses of tipped up trees, or on the ground tucked into a rotting log or stump, or a mossy hummock, concealed by overhanging vegetation such as ferns and seedlings. The complexity of the forest floor in these wetlands, along with the dense understory vegetation, makes it suitable for Canada warbler. Yellow-bellied flycatchers, another responsibility bird of northern and boreal swamps, have similar nesting habits and may be using the area as well.

Ruffed grouse use fallen logs as perches for drumming.

Fine Woody Material (<4 in dia.): *high*

Smaller diameter material, particularly when aggregated into piles, provides potential cover, foraging areas, and singing perches for birds of the lower forest layers and gaps and canopy gaps, such as white-throated sparrows.

Leaf Litter: *moderate*

Moist deciduous leaf litter contributes to higher habitat quality for wood thrush and veery, which forage in it for snails and arthropods, and ovenbird which also forages there as well as constructs its nests from it.

Other: Sphagnum moss covers the wet forest floor in many areas of this habitat unit. Canada warbler and yellow-bellied flycatcher are both associated with forested wetland with sphagnum moss.

Responsibility Bird Species Observed

- Veery
- Blue-headed vireo
- Black-throated blue warbler
- Black-throated green warbler
- Canada warbler *
- Ovenbird

* Audubon Watch List species and Species of Greatest Conservation Need according to the State Wildlife Action Plans in Vermont, New Hampshire and New York.

Desired Future Habitat Conditions

Current conditions are desirable in the area. The vertical and horizontal structure of the forest will continue to diversify over time, whether the area is managed actively as recommended in Habitat Unit 1 or it is managed passively as a biological reserve.

Target Responsibility Species

- White-throated sparrow
- Canada warbler
- Northern parula
- Black-throated green warbler
- Blackburnian warbler
- Blue-headed vireo
- Yellow-bellied flycatcher
- Eastern wood-pewee
- Black-throated blue warbler
- Veery
- American woodcock

Management Options

- ✓ **Minimal management is recommended in this area due to the wet conditions, the apparent suitability for breeding Canada warblers, and the observation of that species. If harvesting activity is pursued, frozen winter conditions would reduce soil and water quality degradation.**

3. Early-successional habitat – approximately 3 acres

Area Description

A small patch of regenerating forest south of the main access road from the Bruce Badger Memorial Highway makes up this habitat unit.

Assessment of Current Conditions

Forest Canopy (>30 ft height)

Dominant Tree Species: *no overstory trees are present*

Dominant Tree Size Class(es): *sapling*

Canopy Cover Classification: *0% cover of overstory trees*

Snags and Cavity Trees: *none noted*

Forest Understory/Midstory (1-30 ft height)

Understory Development (1-5 ft): *high*

This young forest habitat appears to be providing excellent habitat for disturbance-dependent species such as chestnut-sided warbler, mourning warbler and Nashville warbler. These birds specialize in breeding in young forest,

Midstory Development (6-30 ft): *low*

Dominant Understory/ Midstory Species: *sugar maple, red maple, larch, aspen, yellow birch*

Forest Floor

Coarse Woody Material (>4 in dia.): *moderate*

Fine Woody Material (<4 in dia.): *moderate*

Large, partially decayed logs among dense, young stems of hardwood growth are ideal for ruffed grouse to use as drumming logs in the spring. On these logs, grouse can get a good grip on the softened logs and perform their mating ritual, under cover where they are less likely to be detected by avian predators.

Leaf Litter: *low*

Birds such as ovenbird, veery and wood thrush that forage in moist, deciduous leaf litter are more likely to be found in mature forest areas of the property where deciduous leaf litter provides habitat for insects and the other invertebrates that make up the bulk of those birds' diets.

Responsibility Bird Species Observed

- Chestnut-sided warbler

Desired Future Habitat Conditions

Early-successional habitat is characterized by an open canopy (<30% closure) over a high density of seedlings, saplings, and shrubs. One acre is thought to be a minimum patch size in which chestnut-sided warbler and associated species can breed successfully. The current area of young forest presents an opportunity to maintain those conditions.

Target Responsibility Species

- Chestnut-sided warbler
- Nashville warbler
- Mourning warbler
- American woodcock
- Ruffed grouse

Management Options

✓ Maintain early-successional habitat conditions

Responsibility bird benefit: Population levels of birds associated with this habitat type are declining relative to 1960s levels, as their habitat becomes less abundant. Responsibility species that require this habitat type for all or a portion of their needs are chestnut-sided warbler, mourning warbler, white-throated sparrow, American woodcock, ruffed grouse, magnolia warbler, and Canada warbler. Areas that regenerate softwoods will be more suitable for magnolia warbler while hardwood regeneration will be utilized by chestnut-sided and mourning warblers. Early-successional habitat will likely be used by mature forest nesting bird species such as wood thrush and black-throated green warbler during the post-breeding season. The fruits of soft mast producing trees and shrubs that often grow in openings of these sizes are an important food service as the birds prepare for fall migration.

Management strategy: To maintain the best early-successional habitat, brush-hog the area on a rotation designed to keep all sections of the unit between 0 and 15 years post-mowing at all times. For example, half the acreage could be mowed every 7 years, or a quarter of the area could be mowed every 4 years.

Bird Monitoring

Understanding the response of bird communities to forest management is a critical aspect of conservation efforts. It is important for us to understand how our management activities impact bird populations over time, so that we can adapt practices accordingly. One method to collect this information is through a bird monitoring program. By periodically recording the bird species present at a given time and place on the property in question, we can see if and how the composition of the bird community is changing in response to management activity.

For assistance on getting started with monitoring on this property, please contact Audubon Vermont at 802-434-5827 or shagenbuch@audubon.org.

Appendix 1: Forest Bird Initiative Responsibility Species



Audubon VERMONT

Bicknell's Thrush
Wood Thrush
Canada Warbler
Bay-breasted Warbler
American Woodcock
Olive-sided Flycatcher
Rusty Blackbird
Cape May Warbler
Chestnut-sided Warbler
Veery
Eastern Wood-Pewee
Purple Finch
Yellow-bellied Sapsucker
American Redstart
Boreal Chickadee
Black-throated Blue Warbler
Chimney Swift
Ruffed Grouse
Blackpoll Warbler

Louisiana Waterthrush
Northern Parula
Blackburnian Warbler
Black-throated Green Warbler
Ovenbird
Yellow-bellied Flycatcher
Gray Jay
Palm Warbler
Northern Flicker
Black-backed Woodpecker
Tennessee Warbler
White-throated Sparrow
Mourning Warbler
Spruce Grouse
Magnolia Warbler
Alder Flycatcher
Nashville Warbler
Lincoln's Sparrow
Swamp Sparrow
Blue-headed Vireo
Scarlet Tanager

Bibliography

Chase, J.F, S.D. Faccio, and A.Chacko. 2009. Canada Warbler Habitat Use of Northern Hardwoods in Vermont. *Northeastern Naturalist* 16(4):491–500.

Holmes, R.T., Robinson, S.K., 1981. Tree species preferences of foraging insectivorous birds in a northern hardwood forest. *Oecologia* 48, pp. 31-35.

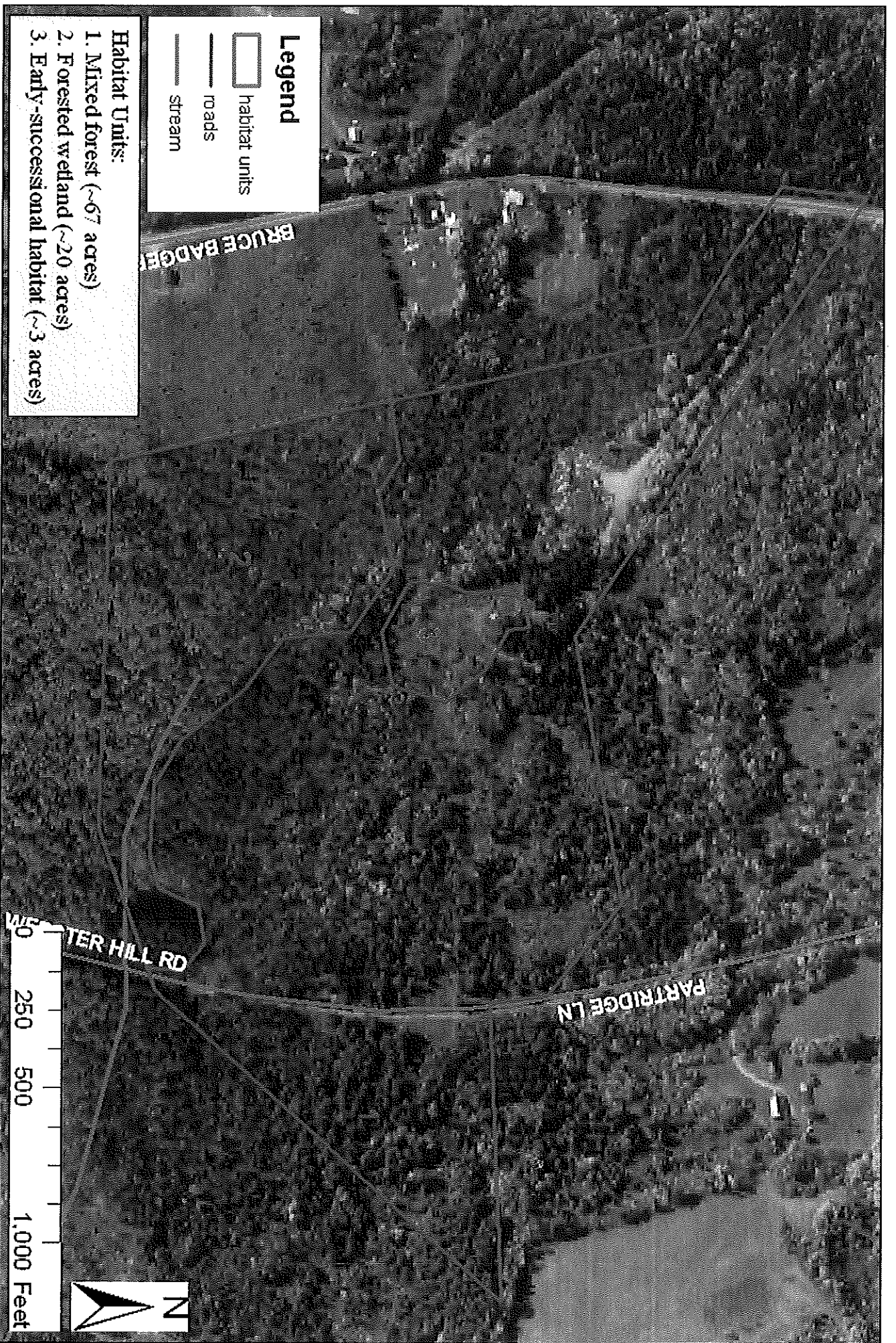
Holmes, S.B. and D.G. Pitt. 2007. Response of bird communities to selection harvesting in a northern tolerant hardwood forest. *Forest Ecology and Management* Vol. 238(1-3), pp. 280-292.

Kilham, L. 1971. Reproductive Behavior of Yellow-Bellied Sapsuckers I. Preference for Nesting in Fomes-Infected Aspens and Nest Hole Interrelations with Flying Squirrels, Raccoons, and Other Animals. *Wilson Bulletin* Vol. 83(2), pp. 159-171.

Lambert, J.D. and S.D. Faccio. 2005. Canada Warbler population status, habitat use, and stewardship guidelines for northeastern forests. *VINS Technical Report* 05-4.

Ortega, Y.K. and D.E. Capen. 1999. Effects of Forest Roads on Habitat Quality for Ovenbirds in a Forested Landscape. *The Auk* Vol. 116(4). pp. 937-946

Rich, A.C., D.S. Dobkin, and L.J. Niles. 1994. Defining Forest Fragmentation by Corridor Width: The Influence of Narrow Forest-Dividing Corridors on Forest-Nesting Birds in Southern New Jersey. *Conservation Biology* Vol. 8(4), pp. 1109-1121.



Map 1.

North Danville Town Forest Danville, Vermont