



Town of Danville Selectboard

P.O. Box 183
36 Route 2 West
Danville, VT 05828

March 19, 2015

David Houston
3736 Thaddeus Stevens Rd.
Danville, VT 05828

Dear David,

This letter is to confirm, to you and the other members of the Conservation Commission, that the selectboard has reviewed and signed off on the Town Forest Plans for Pumpkin Hill and Rodgers Lot.

This decision is documented in the February 19, 2015 meeting minutes on page three.

Sincerely,

Michael K. Walsh, Chair

Craig Wance, Vice-Chair

Douglas Pastula

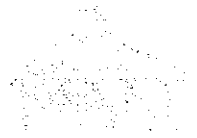
Kenneth Linsley

Angelo Incerpi

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MEMORANDUM FOR THE DIRECTOR

DATE: 3/31/15
BY: _____



Final
~~FIRST DRAFT~~

~~Awaiting: 1. Selectboard Review & Comment
2. Public Review & Comment~~

PUMPKIN HILL TOWN FOREST MANAGEMENT PLAN

"There is serene and settled majesty to woodland scenery that enters into the soul and delights and elevates it, and fills it with noble inclinations."
Washington Irving (1783-1859)

Reviewed by
THE DANVILLE SELECTBOARD
DATE: _____

ADOPTED BY
THE DANVILLE SELECTBOARD
DATE: *February 19, 2015*

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I. INTRODUCTION

A. Why Plan? (adapted with thanks from the Forest Plans of St. Johnsbury and Warren)

The foundation of a successful town forest that enriches life in a community is a well-constructed management plan that reflects the community's goals for that forest. Without a good plan supported by the community, ecological health could be compromised, conflicts between different uses and ideologies could go unaddressed, legal and financial issues could arise, and short-term gain could be chosen over long-term investment. Considerable research, outreach and thought has gone into creating a comprehensive management plan, meant to promote the wise use and stewardship of Danville's public forest resource, by documenting what is known about the forests, the community's values and goals for their management, and the objectives, guidelines, and actions that can be taken to meet those goals. A well-written Town Forest Plan will also provide for continuity of management—so important because forests tend to outlive those entrusted with their stewardship.

B. Overview

The Danville Conservation Commission (DCC), formed in 2006, identified an early objective of developing detailed management plans for Danville's Town Forests, something which had never been formally done. The Town of Danville owns two "town forests" in common trust for all its citizens (Fig. 1). This plan was completed as a group effort, spearheaded by the Conservation Commission and employing the expertise of a number of resource professionals – County Forester Matt Langlais, consulting ecologist Brett Engstrom, State community wildlife biologist Jens Hilke, Vermont Audubon biologist Katie Manaras, and numerous local volunteers and experts. A survey of residents conducted in 2009 and public comments gathered over the course of a variety of public events helped guide the plan as well (see Appendix A: Summary of Public Involvement, and Survey Document and Results)

C. Purposes of Management Plan

The management of the Danville Town Forests will be a model of environmentally sound public land stewardship to maintain and enhance the diverse forest resource to provide multiple benefits taking into consideration natural resources, timber, wildlife, scenic values and wetlands. Specifically, stewardship of the forests will strive to:

1. Conserve forestry values, wildlife habitat, biological diversity, natural communities, riparian buffers, aquatic habitats, wetlands, soil productivity and native flora and fauna
2. Preserve ecological processes that sustain these natural resource values as they exist in 2011 and as they may evolve in the future
3. Provide primarily non-motorized (except for snowmobiles on VAST trails and ATVs on town roads and trails) and non-commercial recreational opportunities for towns people and visitors
4. Protect historic, cultural and scenic values of the property
5. Inventory, document, preserve, and interpret natural, historical, and cultural resources for the benefit of the community

D. General Description of Pumpkin Hill Town Forest

The Forest is accessed by TH 62 (1/4 mile of class 4 road.), which runs north from Trestle Rd (Class 3 dirt road). Trestle Rd. runs from Rt.2B on the east, west to Penny Lane Rd (Class 3 dirt road, Fig. 1). The forest is approximately 100 acres in size (indeed, it was once known as 100-acre woods) and most of the boundaries are now well marked. The property is mostly forested and contains a diversity of forest and habitat types (Figs. 2 and 3). A large field opening is mowed regularly and maintained as a recreational field by the local Boy Scout Troop. There are numerous small wetlands and wetland natural communities, one of which, a Rich Fen, is considered to be a very rare and unique natural community. The Rich Fen is too small to be of State significance, but it is very significant at the local level. Historically, The Forest was the site of the Town Farm. Remnants of the farmhouse foundation still exist.

II. NATURAL RESOURCES

A. WATER

As noted above, the Pumpkin Hill Forest possesses a number of diverse wetland natural communities. Natural Community mapping by consulting ecologist, Brett Engstrom identified eight communities, including the Rich Fen mentioned earlier (Table 1; Natural Communities map, Fig 3; and appendix B). No vernal pools have been identified to date but if they are discovered in the future, they should be mapped and protected as described below.

GOALS OF MANAGEMENT: All management activities will strive to protect and maintain the integrity of wetlands.

STRATEGIES:

- A minimum undisturbed and vegetated buffer of 50 ft. from edges of wetlands shall be maintained.
- Larger buffers may be designated in certain sensitive areas (such as the Rich Fen and vernal pools).
- Any activity which encroaches on a wetland area must be designed to minimize the impact and maintain its natural condition.
- Any forestry contract shall follow the Forest Management Plan and shall follow "Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont", a Vermont Department of Forests, Parks, and Recreation publication date August 15, 1987, or successor (AMP).

B. NATURAL COMMUNITIES

A natural community is an interacting assemblage of plants and animals, their physical environment, and the natural processes that affect them. As these assemblages of plants and animals repeat across the landscape wherever similar environmental conditions exist, it is possible to describe them. Identifying natural communities is a powerful tool for developing effective land management plans, determining conservation priorities, and increasing our understanding of the

DANVILLE'S TOWN FORESTS

Figure 1.



Rogers Lot Town Forest

rivers/streams & ponds

Scale: 1:29,781

0 1,200 2,400 4,800 7,200 9,600

213000 212500 213000

533000 533000

532500 532500

532000 532000

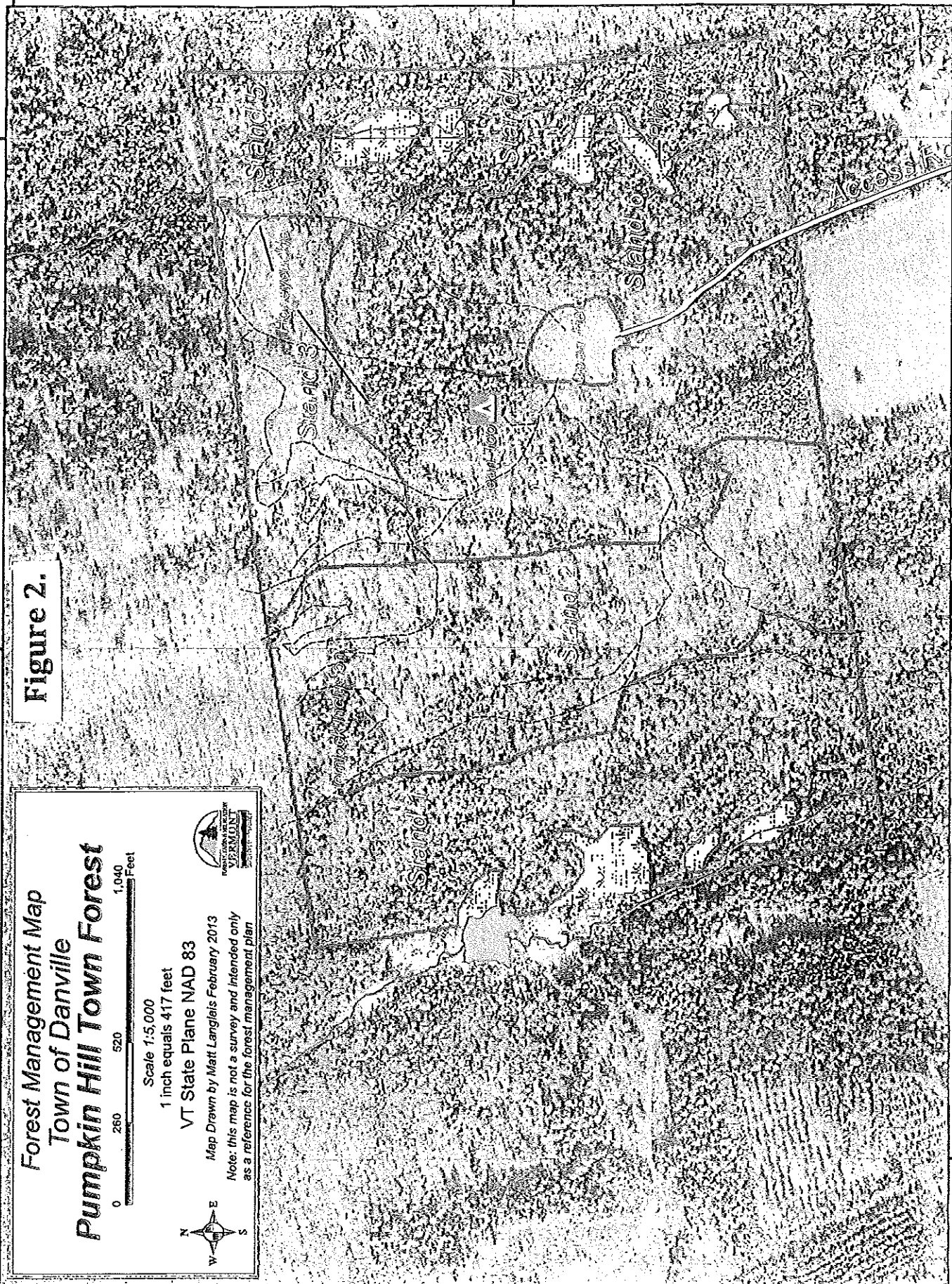
213000 212500 213000

Figure 2.

Forest Management Map
Town of Danville
Pumpkin Hill Town Forest

Scale 1:5,000
 1 inch equals 417 feet
 VT State Plane NAD 83

Map Drawn by Matt Langlais February 2013
 Note: this map is not a survey and intended only as a reference for the forest management plan



533000

532500

532000

natural world. The Vermont Fish and Wildlife Department (VFWD) currently recognizes 80 upland and wetland natural community types in Vermont.

In 2009, supported by a "Trees for Local Communities" grant from the State of Vermont, consulting ecologist and botanist Brett Engstrom, conducted a natural community inventory and mapping project of the Danville town forests. The purpose of the inventory was to provide the town with maps depicting the property's ecological diversity, and information on any state or locally significant natural communities which might warrant special management considerations. The inventory entailed a landscape analysis where GIS data layers and other ecological background information were examined. The analysis revealed a surprisingly high diversity of natural communities, especially wetland natural communities in the Pumpkin Hill Town Forest. The Town Forest was mapped into 16 natural communities – six upland and ten wetland (Fig. 3; Table 1; and appendix B). In general, the upland Northern Hardwood Forest, Red-Spruce-Northern Hardwood Forest, and Northern Hardwood-Hemlock forest are the most extensive natural communities. The largest wetland communities are mixed sloping seepage forests and Northern White Cedar Swamps.

Because of the heavy land use history of the forest (and the small size of the Rich Fen) there are no state level significant natural communities. However, a number of the wetland communities were judged by Engstrom to be "locally" significant. These areas serve as natural reservoirs for biodiversity, including game species, herbs, mosses, invertebrates, etc. and typically have soils that are sensitive to heavy equipment and heavy recreational traffic.

Several (seven) rare or uncommon plant species were found by Engstrom on the Pumpkin Hill Town Forest. These included Swamp Thistle, *Cirsium muticum*, Hay Sedge, *Carex argyrantha*, Back's Sedge, *C. backii*, yellow or showy ladyslipper, *Cypripedium sp.*, Goldie's Fern, *Dryopteris goldiana*, Matted Spikerush, *Eleocharis intermedia*, and Mountain Fly-honeysuckle, *Lonicera villosa* (Table 2; Fig 3; appendix B)

GOALS OF MANAGEMENT: All forest management activities will strive to maintain and protect healthy natural communities as well as work toward converting the existing plantations to naturally functioning communities.

STRATEGIES:

- Utilize the natural community map as a reference in making forest management and recreational planning decisions.
- Occasionally check on the status of the listed rare and uncommon plant species.
- Use best management practices to protect sensitive wetland natural communities during timber and recreation management.
- Implement control of invasive exotic plant infestations.

Table 1. Summary table of natural communities mapped in 2008 at the Roger's Lot and Pumpkin Hill town forests, Danville, Vermont.

Natural Community Name (type or variant)*	Rogers Lot		Pumpkin Hill		Locally Significant
	State Rank	Acres **	# Areas	Acres**	
UPLANDS					
Red Spruce-Northern Hardwood Forest	S4	64.2	2	21.3	2
Northern Hardwood Forest	S5	27.7	2	48.1	1
typical Northern Hardwood Forest	S5	6.5	1		
Semi-rich Northern Hardwood Forest	S5	1.2	1	0.4	1
Northern Hardwood-Hemlock Forest	S5			16.3	1
Rich Northern Hardwood Forest	S4			0.3	1
Hemlock-Northern Hardwood Forest	S4			6.7	3
WETLANDS					
Northern White Cedar Swamp	S3			4.6	2
Northern White Cedar Sloping Seepage Forest	S3	14.7	5	3.4	3
Hemlock-Hardwood Swamp	S2			0.2	1
Seep	S4	0.2	2	0.1	1
Semi-alluvial Seep		0.1	1	0.6	1
Rich Fen	S2			0.1	1
Beaver Meadow	S4	0.7	1	2.2	7
Beaver Pond	S4			0.2	1
Mixed Northern Seepage Swamp/forest				2.4	2
Small Stream Alluvial Woodland		0.4	2		
Seepage Marsh		0.5	2		
Northern Hardwood Seepage Forest		8.1	2		
Mixed Sloping Seepage Forest		7.1	4	9	3
ARTIFICIAL					
Altered Land		3.1	2		
		134	27	116	31
	TOTAL				

*Natural community names include both types and variants as found in the Vermont natural community classification *Wetland, Woodland, Wildland* by Elizabeth Thompson and Eric Sorenson (first letters capitalized) and other names used by the author (lower case). State Ranks (S-Rank) are determined by Vermont Department of Fish and Wildlife's Nongame and Natural Heritage Program and signify the rarity and/or threat. The range of ranks go from Extremely rare (S1) to demonstrably secure (S5) in Vermont.

** Acres are approximate and may differ from those reported elsewhere in this report, (a probable result of different means of calculations and the confounding effect of slope).

Table 2. Rare and uncommon species found at Pumpkin Hill (PH) and Rogers' Lot (RL) town forests in Danville, Vermont, during 2008 natural community mapping. State ranks (S-Rank) are determined by Vermont Department of Fish and Wildlife's Nongame and Natural Heritage Program. The range of ranks go from extremely rare (S1) to demonstrably secure (S5) in Vermont. Element Occurrence (EO) ranks are estimates of species viability at a given location. They range from excellent (A) to poor (D), with E assigned to occurrences extant, but not assessed for viability.

Common Name	Species	Vermont State Rank	Element Occurrence Rank	Significance	Town Forest	Notes
Hay Sedge	<i>Carex argyrantha</i>	S2	C?	State	PH	Close to 100 Plants constituting single population in two locations along path. Species requires sun and disturbance for persistence. Not typical habitat for species.
Back's Sedge	<i>Carex backii</i>	S3	D?	Local	PH	Small population at only 1 location. Otherwise only 1 historical record in Caledonia county.
Swamp Thistle	<i>Cirsium muticum</i>	S3	B	Local	PH, RL	Observed mostly as lone vegetative plants scattered in wetlands on both forests. One unusually large population in fen-like open seepage wetland in PH. EO rank at PH.
Yellow or showy lady's slipper	<i>Cypripedium sp.</i>	S3	E	Site	PH	Observed at 2 wetlands along the west side drainage at PH. Needs confirmation as to species. Both species uncommon.
Goldie's Fern	<i>Dryopteris goldiana</i>	S4	D	Site	PH	Restricted to one rich pocket at PH. Occasionally in rich woods elsewhere in Danville.
Matted Spikebrush	<i>Eleocharis intermedia</i>	S2, S3	B?	State	PH	Colonies observed in beaver wetlands in both drainages at PH. Both colonies vigorous.
Mountain Fly-honeysuckle	<i>Lonicera villosa</i>	S3	D?	Site	PH	Single colony restricted very small area in seepage forest at PH.

C. WILDLIFE

Pumpkin Hill Forest has not been critically assessed with respect to its habitat quality for locally important wildlife game or non-game species. Consequently, management objectives are focused on maintaining a diverse mix of forest plant species and stand structures—factors known to favor most wildlife species.

The existing wetlands, small open areas and diverse forest stands are habitat for many wildlife species. The State of Vermont has mapped deer wintering areas around the State. Although there are several mapped areas adjacent to the Town Forest, none exist within the Pumpkin Hill Town Forest.

The value of the Forest as habitat for song birds was assessed by Katie Manaras of Audubon Vermont. Its value is high, due in large part, because of its inclusion within a 2,500 acre area of desirable habitat (90% forested, the remainder mostly in agricultural use).. According to Manaras, , this area is a Priority Bird Block (defined as being of high importance for conserving responsibility bird species). The contiguous nature of the forested 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.

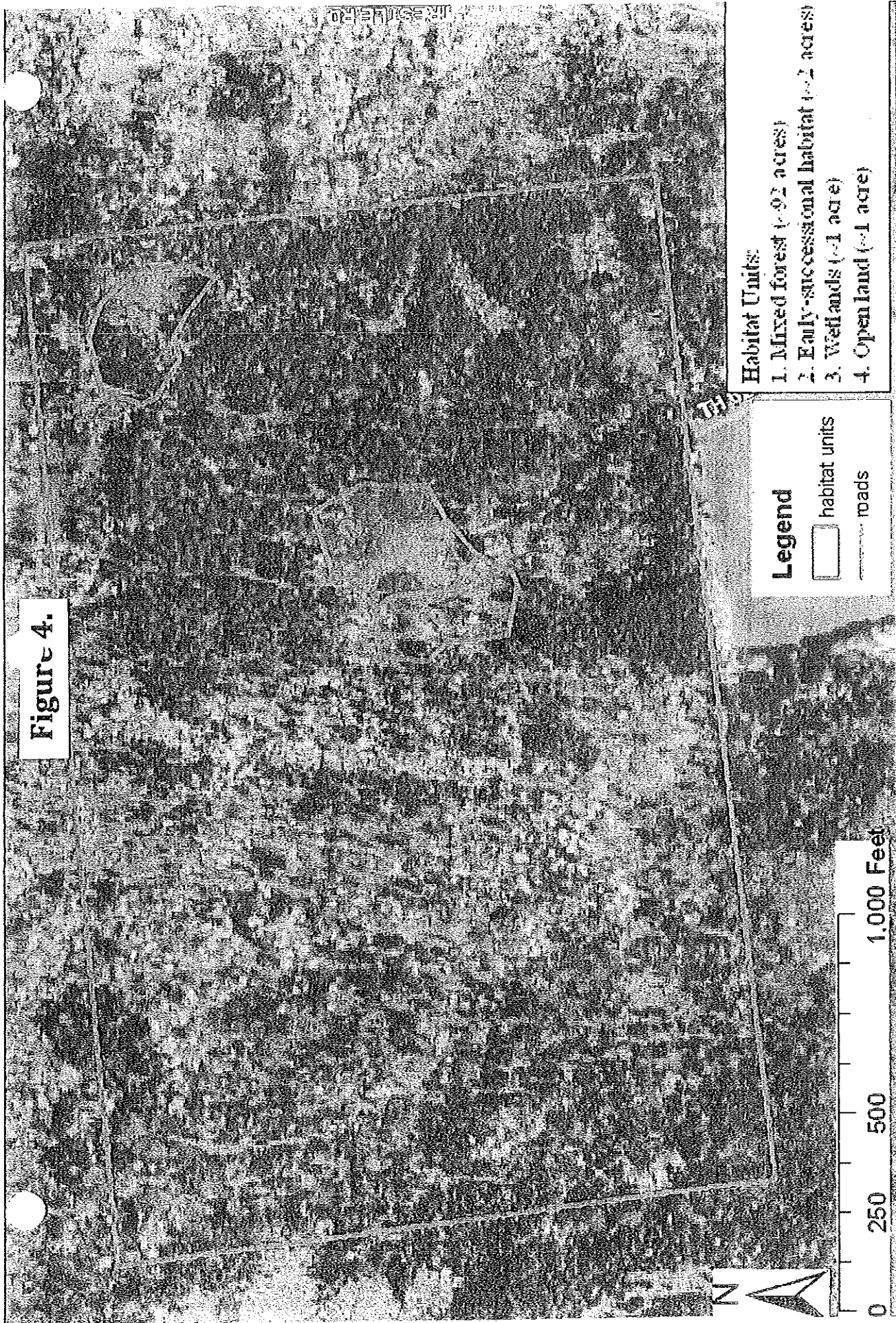
Based on a June 3, 2010 field visit, and detailed in a subsequent report, Manaras divided the property into four habitat units, or areas currently providing different habitat conditions for responsibility bird species (Fig. 4). She provided both general and detailed management recommendations (see Appendix C),

GOALS OF MANAGEMENT: Wildlife habitat management will strive to provide conditions for a diversity of species. Throughout the forest, wildlife habitat management will be integrated with other uses where consistent with the Purposes of the Plan (page 1).

STRATEGIES: The following management considerations will be implemented, where feasible, throughout the forested property to protect and enhance the quality of bird breeding habitat.

- Conduct harvesting operations outside the bird breeding season (May-August) when practicable.
- Retain a minimum of six live cavity trees and/or snag trees per acre
- Retain large diameter aspen and birch spp., especially yellow birch, where possible.

Figure 4.



Map 1.

Pumpkin Hill Town Forest
Danville, Vermont



Prepared 10/26/10 KM
Not a survey. All boundaries approximate

- Retain coarse and fine woody material by avoiding damaging existing coarse woody debris (CWD), especially large (18") hollow or rotten logs and rotten stumps and by leaving some large pieces of cull material from harvested trees
- Maintain and regenerate inclusions of softwood cover in hardwood stands and inclusions of hardwood cover in softwood stands
- Maintain permanent openings dominated by grasses, forbes, and shrubs
- Minimize extent of forest access roads
- Soften edges between field and forest habitats
- Monitor and control invasive plants
- Retain streamside buffers
- Manage mast-producing trees and shrubs for a continuous source of wildlife food
- Retain and release wild apple trees
- Maintain and enhance aspen where it occurs by creating openings that are 1.5 times the height of surrounding trees during dormancy
- Manage for suitable nest trees for woodland-nesting raptors by retaining hardwood trees with large multi-pronged "basket" forks. Avoid impacts to seeps using buffers during timber harvesting
- Continue to consult with wildlife biologists on other ways to enhance wildlife habitat.

PLANNED MANAGEMENT PRACTICES:

Implement above referenced wildlife habitat strategies in stands 1-4, and 6 when conditions warrant treatments to meet planned objectives.

D. FOREST

Most of the Pumpkin Hill Town Forest is forested, so this represents the most dominant resource value present on the property.

1. Timber Resource:

Currently, this Town Forest has an array of natural forest stands and white pine plantations, including forests of mixed northern hardwood and softwood, and white cedar swamp wetlands. The hardwood forests are secondary forests that have arisen after earlier harvests. Earlier plantations of red pine, Scots pine, and Norway spruce, were established as early as the 1920's, but primarily in the 1950's, by Future Farmers of America (FFA) groups on old fields or pasture. All but the white pine plantations were thinned and eventually clearcut. More detail of plantation establishment and management history is given in the Stand Descriptions and Appendices.

A forest inventory conducted by Matt Langlais, Caledonia/Essex County Forester identified six forest stands based on tree maturity, stocking levels, and species

composition. Most of the Pumpkin Hill Forest stands are young, and are not scheduled for harvest for a decade or more.

GOALS OF MANAGEMENT:

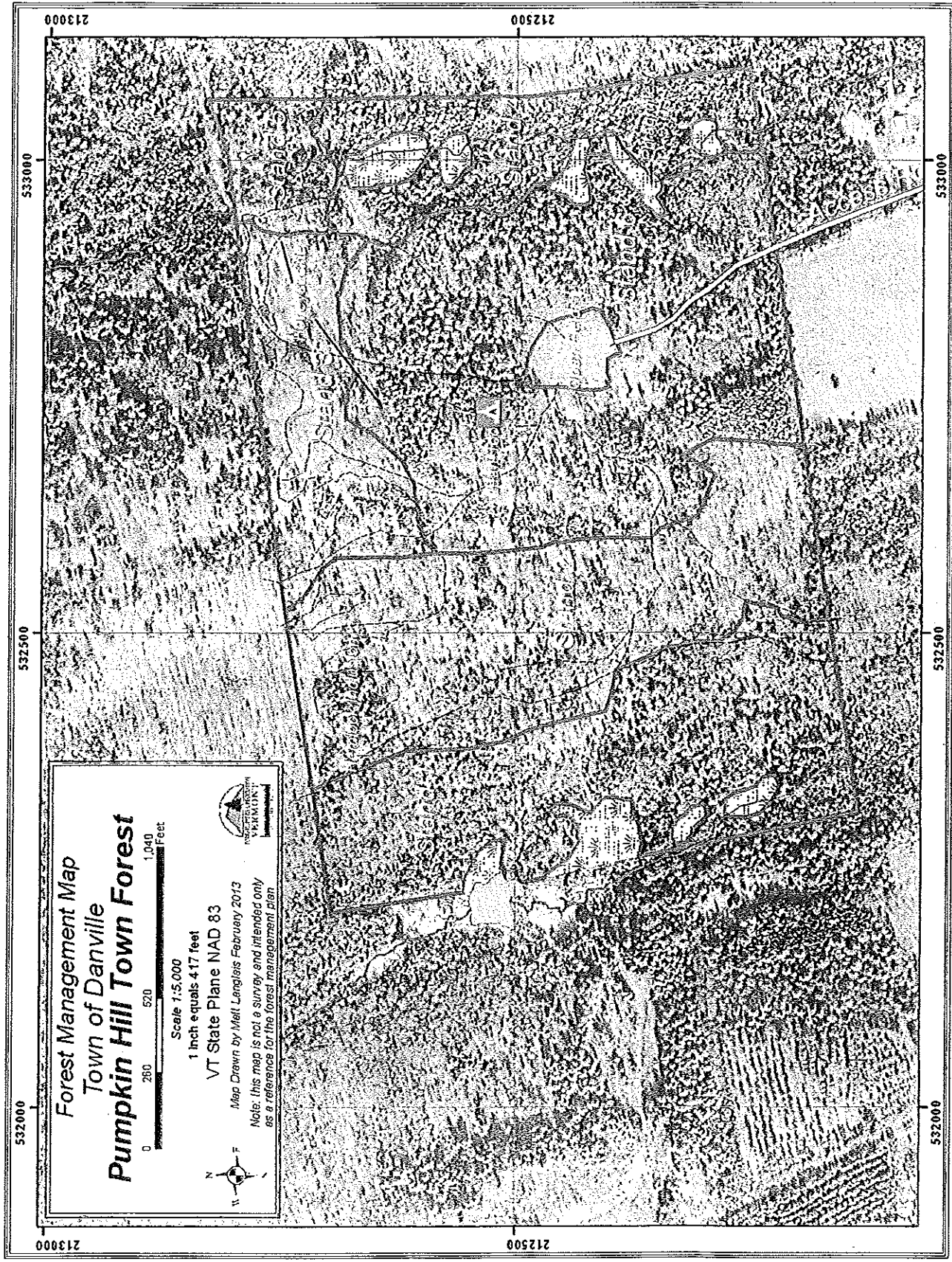
Forest management decisions will be determined primarily by ecological and land capabilities, natural site and soil tendencies, natural disturbance patterns, and ecological processes. Plantations will be managed to extend their life and preserve their character to the extent feasible while working toward the long-term goal of converting the stands to native tree species

STRATEGIES:

- Maintain a sustainable flow of quality timber through control of stand and forest structure.
- Develop stands with a range of tree sizes using partial cutting practices such as group selection, group shelterwood, and individual tree selection.
- Utilize harvest practices that regenerate desired species rapidly and economically while consistent with site capability.
- Control the growth and quality of forest stands through maintenance of optimum stand densities.
- Utilize harvesting systems that are appropriate to the site and stand objectives.
- Utilize the services of the County Forester or professional consulting foresters to mark and oversee harvesting operations.
- Choose experienced loggers.
- Avoid, when feasible, wet or poor logging conditions to reduce residual stand damage, soil compaction and erosion.
- Employ the Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont.
- Minimize the visual impacts of timber harvesting by matching equipment to the specific harvest, using directional felling techniques to avoid damaging unmarked trees, operating at appropriate times of the year, lopping tops to within 2 feet of the ground.
- Plan, construct and maintain skid trails and landings so that they will be available for future use.
- Clear, level and smooth landings of woody debris and plant with appropriate seed mixes.
- Educate users of the Town Forest about timber harvesting activities by holding tours of harvesting operations and utilizing interpretive signs to explain harvest activities.

PLANNED MANAGEMENT PRACTICES:

Following are descriptions of the six forest stands with recommendations for their management:



Forest Management Map
Town of Danville
Pumpkin Hill Town Forest

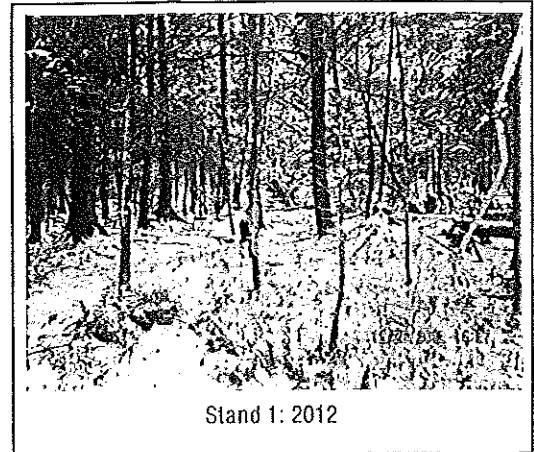
Scale 1:5,000
 1 inch equals 417 feet
 VT State Plane NAD 83

Map Drawn by Matt Langlois February 2013
 Note: this map is not a survey and intended only
 as a reference for the forest management plan

VERMONT
 DEPARTMENT OF
 FORESTRY

STAND 1

Acres: 23
 Current Forest Type: Mixed Forest
 Natural Community: Red Spruce-Northern Hardwood Forest
 Site Class: II-III
 Soils: Cabot: Variable washed till with mix of well-drained and poorly drained.
 Stand Description: Stand one is an even-aged mixed-wood stand composed primarily of Eastern hemlock, yellow birch and white cedar. Stand was harvested in 1958 removing 143 cords of hardwood (see appendix A). Harvested again within the past 15 years though records not found.
 Stand Health: This stand contains a good mix of species that are all well-suited to the site/soil conditions. No serious forest health problems are threatening the stand at this time.
 Access/Operability: Access for the majority of this stand is excellent due to proximity to landing sites and existing skid trails. The thin, shallow to hardpan soils here present difficult operating conditions. Rutting, soil compaction, root shearing and erosion are all highly potential problems. Harvesting operations should only occur during frozen conditions. Interspersed wetlands should be properly buffered.



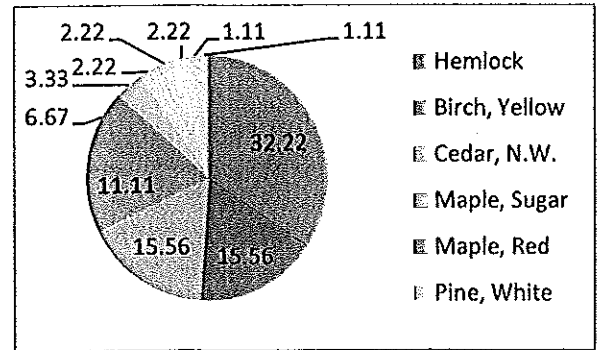
Stand 1: 2012

Silvicultural Information:

Cruise Intensity: (9) variable radius (10 factor) plots
 Age Class Distribution: Two-aged (60/15 years)
 Regeneration: Well-established pockets of regeneration consisting of balsam fir, eastern hemlock and white pine.
 Total Basal Area per Acre: 93.3
 Acceptable Basal Area per Acre: 63.3
 Trees per Acre: 157.9
 Quadratic Mean Stand Diameter: 10.42

Volume Information:

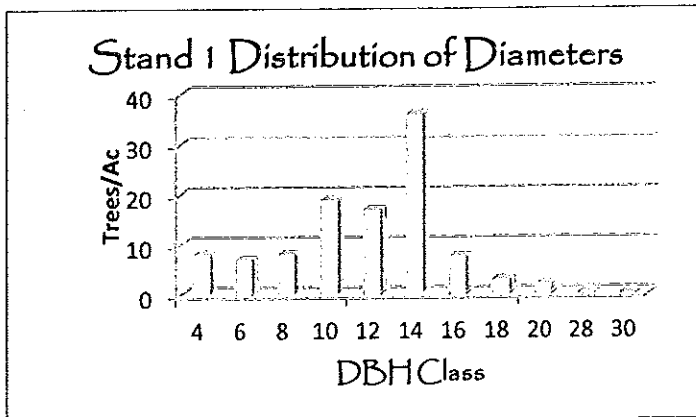
Sawtimber Volume: 4662BF/Acre
 Cordwood Volume: 8.61 Cords/Acre



Stand 1: Species Composition by Basal Area in Sq. Ft./Ac

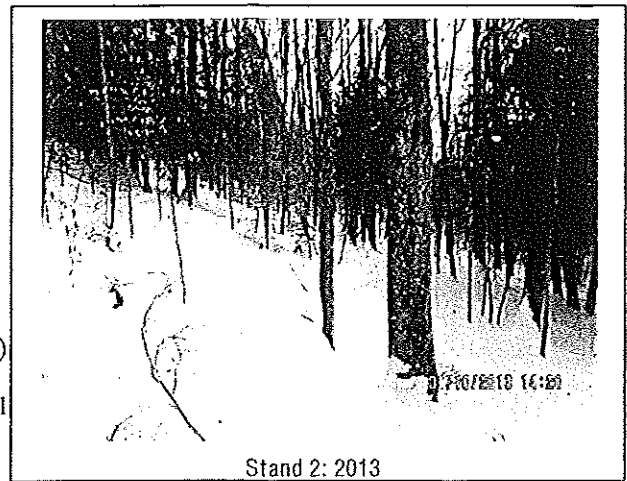
Recommended Silvicultural Plan:

Long Range Goals: Create a fine-grained, all-aged forest with a median canopy age of 150 years. Given the current condition of this stand emphasis will be placed on increasing the representation of red spruce and hemlock while limiting the red maple component. To achieve this goal 1% per of the stand will be regenerated for each year between harvest entries.
 Planned Management Practices: None scheduled at this time due to the recent harvest. Re-evaluate in 10 years time.



STAND 2

Acres: 26
 Current Forest Type: Northern Hardwood
 Natural Community: Northern Hardwood-Hemlock
 Site Class: II
 Soils: Dummerston: Deep, well-drained till. *w-central*
 Stand Description: Stand two is located in the eastern part of the forest. The stand was old pasture that had seeded into white pine. The stand was first harvested in 1958 when young hardwoods were removed to free up white pine (see appendix A) More recent harvesting has occurred within the past 15 years. Stand is currently carrying some quality sugar maple poles/small sawlogs.
 Stand Health: No stand health issues were observed.
 Access/Operability: Access to the stand is readily available with existing skid trails. Deep well-drained soils will not limit operability to frozen ground conditions.



Stand 2: 2013

Silvicultural Information:

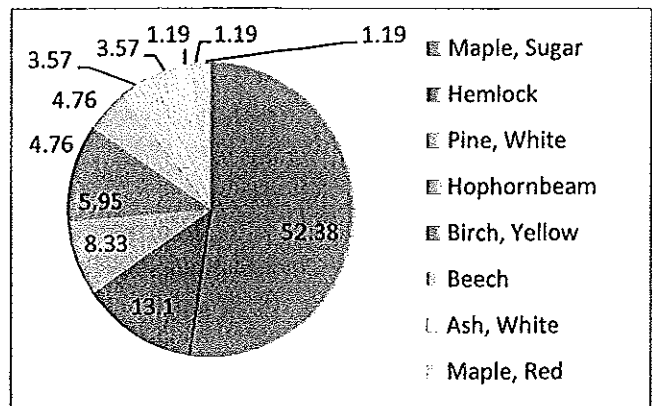
Cruise Intensity: (10) variable radius (10 factor) plots
 Age Class Distribution: Even-aged (@ 55 years)
 Regeneration: Pockets of established yellow birch, hemlock, white pine and sugar maple.
 Total Basal Area per Acre: 84
 Acceptable Basal Area per Acre: 58
 Trees per Acre: 181 trees per acre
 Quadratic Mean Stand Diameter: 9.22"

Volume Information:

Sawtimber Volume: 4809 mbf/ac
 Cordwood Volume: 10.52 Cords/Acre

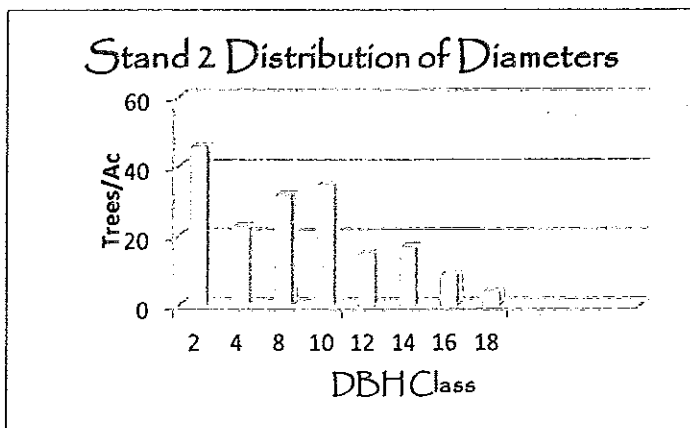
Recommended Silvicultural Plan:

Long Range Goals: Manage stand under an uneven aged structure. Based on soil types and existing regeneration this stand should be capable of growing high quality northern hardwoods.



Stand 2: Species Composition by Basal Area in Sq.Ft./Ac

Planned Management Practices: None planned at this time as stand is currently growing at healthy stocking levels. Re-evaluate stand in 10 years time for possible harvest focusing on release of high quality stems through crop-tree release and further development of regeneration through release of established pockets. Inclusions of hemlock should be reserved from harvest for their habitat contribution.



STAND 3

Acres: 10
 Current Forest Type: Northern Hardwood
 Natural Community: Northern Hardwood Forest
 Site Class: I-II
 Soils: Dummerston; Well-drained fine sandy loam
 Stand Description: Stand 3 is a good quality young stand of sugar maple resulting from recent harvesting. The western portion of the stand had been a red pine plantation planted in 1928. Thinnings occurred here in 1958 & 1966 (see appendix A) with a final clearcut occurring around 1999. The eastern portion of the stand had been planted to scotch pine in 1927 and 1930. The scotch pine was thinned in 1958 and clearcut around 1999.
 Stand Health: No stand health issues were observed.
 Access/Operability: Access to the stand is readily available by the existing network of skid trails. Deep well-drained soils pose no limits to operability.



Stand 3: 2013

Silvicultural Information:

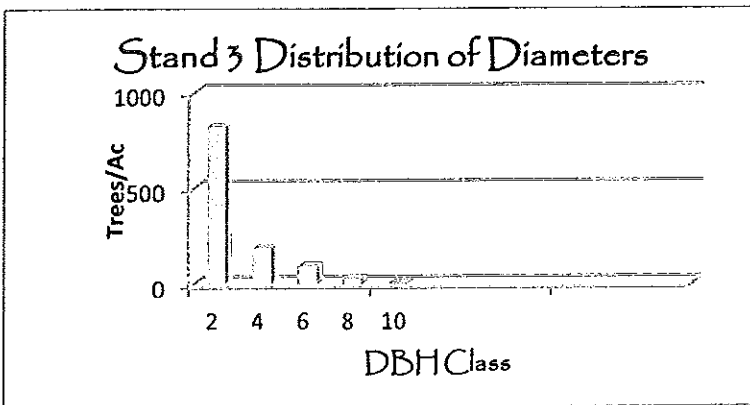
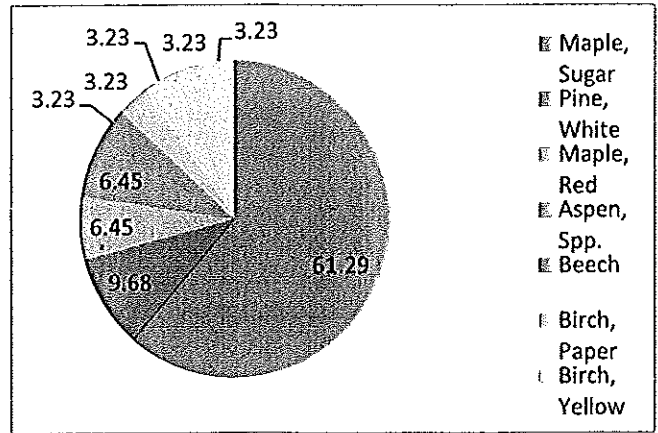
Cruise Intensity: (5) variable radius (10 factor) plots
 Age Class Distribution: Even-aged
 Regeneration: Sugar maple, white pine, red maple, aspen
 Total Basal Area per Acre: 62
 Acceptable Basal Area per Acre: 40
 Trees per Acre: 1162 trees per acre
 Quadratic Mean Stand Diameter: 3.13"

Volume Information:

Sawtimber Volume: N/A
 Cordwood Volume: N/A

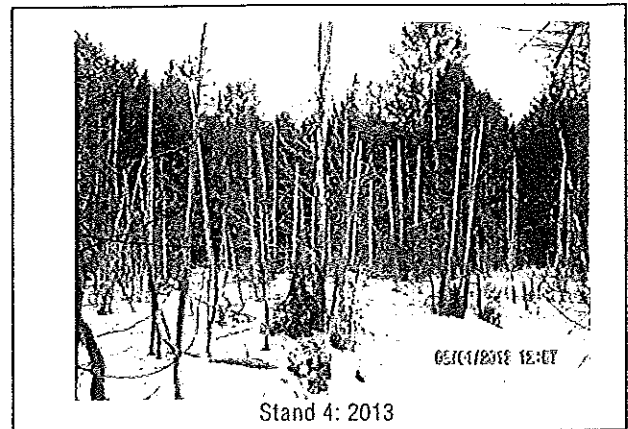
Recommended Silvicultural Plan:

Long Range Goals: The long range goal for the stand is to grow high quality northern hardwoods.
 Planned Management Practices: None planned. Allow stand to continue developing. Consider pre-commercial crop tree release when crop trees reach 6" diameter.



STAND 4

Acres: 11
 Current Forest Type: Northern White Cedar
 Natural Community: Northern White Cedar Swamp
 Site Class: III-IV
 Soils: Cabot: Poorly drained
 Stand Description: Stand 4 is a pole -sized stand of northern white cedar interspersed with active and abandoned beaver ponds.
 Stand Health: There are no known forest health problems with this stand. The invasive plant phragmites was found in an abandoned beaver pond.
 Access/Operability: Rutting, soil compaction, root shearing and erosion are all highly potential problems. Harvesting in this stand is not recommended.



Stand 4: 2013

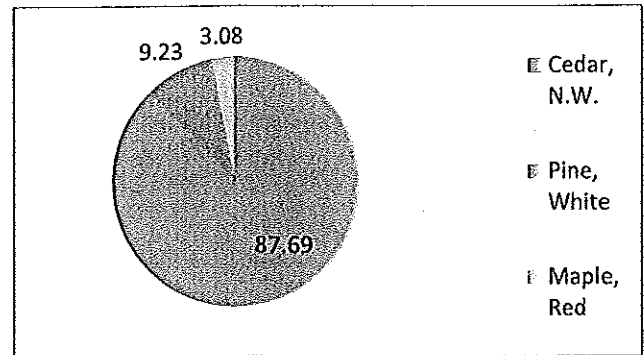
Silvicultural Information:

Cruise Intensity: (4) variable radius (10 factor) plots

Age Class Distribution: Evenaged
 Regeneration: northern white cedar
 Total Basal Area per Acre: 162
 Acceptable Basal Area per Acre: 110
 Trees per Acre: 453 trees per acre
 Quadratic Mean Stand Diameter: 8.11"

Volume Information:

Sawtimber Volume: 5.3 mbf/ac
 Cordwood Volume: 2.55 cords/ac

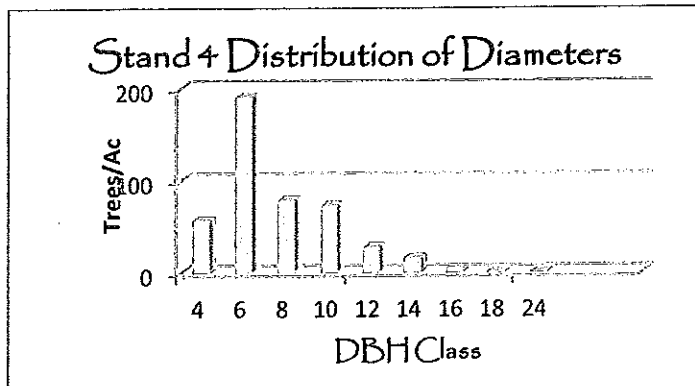


Stand 4: Species Composition by Basal Area in Sq.Ft./Ac

Recommended Silvicultural Plan:

Long Range Goals: The long range goal for this stand is to allow natural processes to determine the stands eventual composition. The ecological values of the wetland far outweighs potential timber income.

Planned Management Practices: Consider control of the invasive phragmites. Population size is sufficiently small enough to allow for control using the very selective cut stem method.



STAND 5

Acres: 4 acres
 Current Forest Type: Mixed Forest
 Natural Community: Hemlock-Northern Hardwood
 Site Class: II
 Soils: Mapped as cabot however appears to be better drained Dummerston.
 Stand Description: Stand five is a small young stand of mixed composition. Stand had been planted to scotch pine in 1927 (see appendix A) and clearcut around 1999.
 Stand Health: There are no known forest health problems with this stand

Access/Operability: Access to the stand is difficult due to the brook which separates it from the rest of the forest.

Silvicultural Information:

Cruise Intensity: (2) variable radius (10 factor) plots
 Age Class Distribution: Even-aged. Age determination difficult as majority of the present stems had become established underneath the scotch pine overstory. Overstory release occurred around 1999.

Regeneration: Balsam fir, hemlock, paper birch

Total Basal Area per Acre: 65

Acceptable Basal Area per Acre: 55

Trees per Acre: 813 trees per acre

Quadratic Mean Stand Diameter: 3.67"

Volume Information:

Sawtimber Volume: n/a

Cordwood Volume: n/a

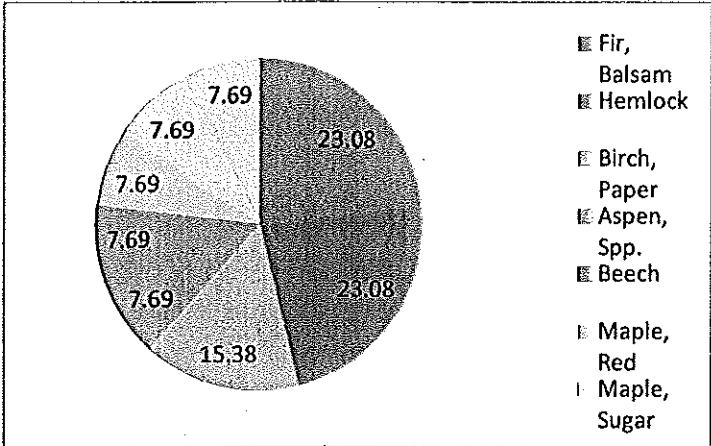
Reccomended Silvicultural Plan:

Long Range Goals: Long range goals for this stand include the development of productive mixed wood with a heavier concentration of hemlock.

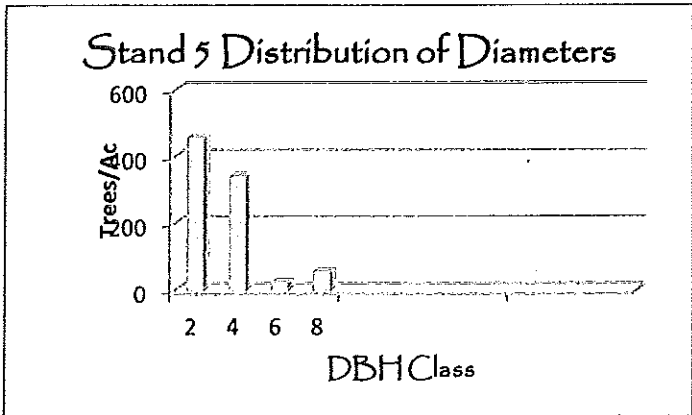
Planned Management Practices: None planned at this time due to young age of the stand.



Stand 5: 2013



Stand 5: Species Composition by Basal Area in Sq.Ft./Ac



STAND 6

Acres: 37

Current Forest Type: White Pine

Natural Community: Northern Hardwood Forest

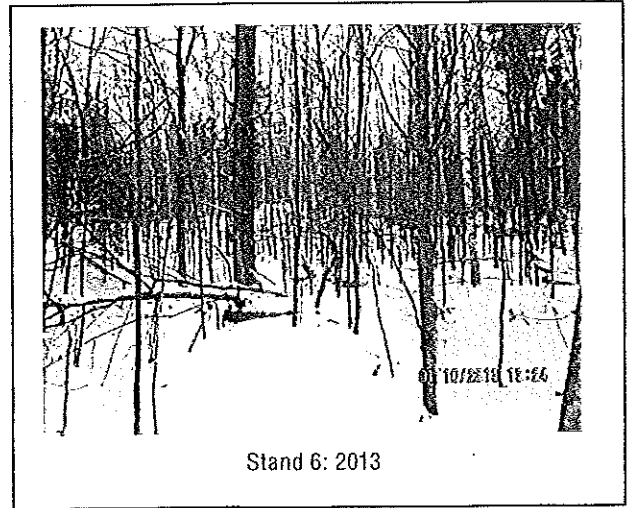
Site Class: I-II

Soils: Dummerston; well-drained fine sandy loam.

Stand Description: Stand 6 is a white pine stand planted in 1950-1955 (see appendix A) on open agricultural land. Several entries over the last 15-25 years has created conditions for establishment of northern hardwood regeneration.

Stand Health: White pine blister rust present. The stand does not appear to have been thinned early on in its development causing many of the residual trees to have less than ideal live-crown ratios. White pine trees with less than 1/3 live crown ratio generally do not have the capacity to respond to release.

Access/Operability: Access to the stand is readily available via the existing landing and skid roads. Well-drained soils present optimal harvesting conditions.



Stand 6: 2013

Silvicultural Information:

Cruise Intensity: (14) variable radius (10 factor) plots

Age Class Distribution: Even-aged (@58 years)

Regeneration: Well-established northern hardwoods

Total Basal Area per Acre: 90

Acceptable Basal Area per Acre: 70

Trees per Acre: 108 trees per acre

Quadratic Mean Stand Diameter: 12.32"

Volume Information:

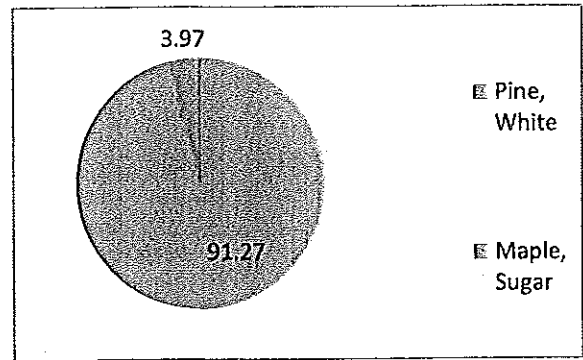
Sawtimber Volume: 11.246 mbf/ac

Cordwood Volume: 6.66 cords

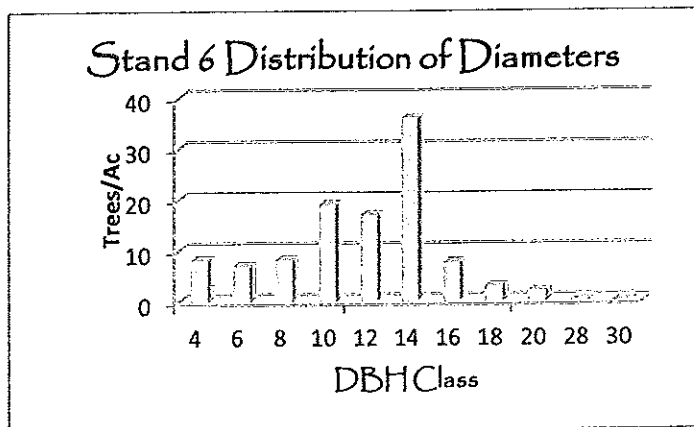
Silvicultural Plan:

Long Range Goals: The long-range goal for this stand is to shift the species composition from predominately white pine to northern hardwood.

Planned Management Practices: Recent harvesting has created dense sugar maple regeneration in portions of the stand. Areas containing regeneration could be considered for overstory removal. Where the white pine overstory is not hampering the continued development of regeneration activity is not required. A dense 2.4 acre area of the stand along the southern boundary of the forest would be a good candidate to begin the process of release. Mechanical whole-tree harvesting would be recommended to protect the majority of the regeneration.



Stand 6: Species Composition by Basal Area in Sq.Ft./Ac



2. Forest Health

In general, the Forest is healthy. There is evidence of damage to trees caused by common diseases and insects, but nothing that is a major cause for concern. However, the condition of one of the remaining white pine stands is generally poor. In a portion of this stand, (Stand 6) many trees have very thin, small crowns and there is considerable mortality (dead standing and down). This situation will need to be addressed soon as the rate of mortality will likely increase rapidly in the near future.

As the forest matures, other issues may arise that will need attention and the potential exists for significant damage by invasive plants and, especially, insects. The most important management strategy identified by Danville residents in the Town Forest Survey (86%) was to Manage Invasive Species

Few invasive species were noted when natural communities were mapped by Brett Engstrom. One, the invasive common reed, *Phragmites australis*, was found on the edge of the Rich Fen (Fig. 2, Stands 4 and 6).

GOALS OF MANAGEMENT: Management of the Town Forest will strive to reduce undesired mortality and growth loss of trees and native understory plants. Native and non-native pests as well as invasive plants will be controlled to the extent necessary to regenerate native tree species.

STRATEGIES

- Emerald Ash Borer (EAB)

The greatest potential threat by an exotic invader is that posed by the Emerald ash borer. All species of ash are affected and die soon after being attacked. EAB is now within 30 miles of our northern border, was discovered in south-central CT and western MA in 2012, and very recently was found near Concord, NH. The State Department of Forest, Parks and Rec. is now surveying for the presence of EAB in VT.

We need to be ready to survey our Town Forests (and perhaps other forests in Danville) if and when this destructive insect is detected in VT, and, to have a plan in place to salvage the ash resource when this pest arrives.

- Hemlock Wooley Adelgid (HWA)

Hemlock is an important component of several stands (1,2, and 5, Fig. 2). Consequently, as the destructive alien pest, the hemlock wooley adelgid, moves northward in VT, (HWA is now present in Windsor and Bennington Counties and spreading) it will be important to monitor these stands for its presence and to develop strategies for its management.

- Asian Longhorn Beetle (ALB)

The third exotic insect that poses a potential threat to VT forests is the Asian Longhorn Beetle . Preferred hosts are species of maple and thus it is of special concern to us in VT. The most serious outbreak is occurring in forest stands just north of Worcester, MA, where great effort is underway to control the insect and contain its spread. While not an imminent threat (it is not yet known to be present in Vermont), efforts will be made to increase awareness of the insect and its effects.

- *Phragmites australis*

The invasive common reed (*P. australis*) by the Rich Fen should be eradicated as soon as possible while the colony is still small. Selective, single stem herbicide injection treatments are suitable for such small colony patches as well as a careful broadcast method which is more cost-effective. The services of a licensed herbicide applicator will be required for this. Use these control trials as demonstrations for landowners.

Other invasive plant species are causing major ecological problems in other areas of Vermont. The forest should be surveyed regularly for these species and if detected, removed before they become well established. These species include: Japanese and bush honeysuckles, Japanese and common barberries, glossy and common buckthorns, autumn olive, and garlic mustard.

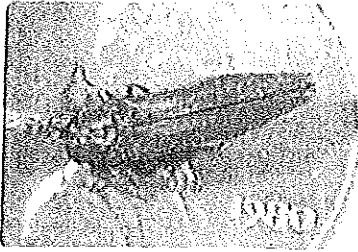
- Hypoxylon Canker of Aspen

The few aspen clones in the forest add valued diversity. However, trembling aspen can be severely damaged by Hypoxylon canker disease, and in Danville aspen clones are often heavily infected. Groups of aspen can be perpetuated by patch-cutting to encourage root sprout initiation and growth. Young stands thus derived are relatively free of the disease and are highly favored by grouse, hare and several song bird species.

PLANNED MANAGEMENT PRACTICES:

Monitor (2013-2021) for invasive plant infestations and determine whether control is practical and ecologically feasible. If feasible begin control efforts immediately using above referenced methodologies.

Emerald Ash Borer



An exotic beetle from Asia was discovered in July 2002 feeding on ash (*Fraxinus* spp.) trees in southeastern Michigan. It was identified as *Agrilus planipennis* Fairmaire (Coleoptera: Buprestidae). Larvae feed in the cambium between the bark and wood, producing galleries that eventually girdle and kill branches and entire trees. Evidence suggests that *A. planipennis* has been established in Michigan for at least six to ten years. More than 3000 square miles in southeast Michigan are infested and more than 5 million ash trees are dead or dying from this pest. This exotic pest is also established in Windsor, Ontario, Canada. In 2003, newly established populations were detected in other areas of southern Michigan and several locations in Ohio. Infested ash nursery trees were also found in Maryland and Virginia.

Identification

Adult beetles are generally larger and a brighter green than the native North American species of *Agrilus* (Fig. 1). Adults are slender, elongate and 7.5 to 13.5 mm long. Males are smaller than females and have fine hairs on the ventral side of the thorax, which the females lack. Color varies but adults are usually bronze or golden green overall, with darker, metallic, emerald green wing covers. The top of the abdomen under the wings is metallic purplish red and can be seen when the wings are spread. The prothorax, the segment behind the head to which the first pair of legs is attached, is slightly wider than the head but the same width as the base of the wing covers.

Larvae reach a length of 26 to 32 mm, are white to cream-colored and dorso-ventrally flattened (Fig. 2). The brown head is mostly retracted into the prothorax and only the mouth-parts are visible externally. The 10-segmented abdomen has a pair of brown, pincer-like appendages on the last segment.

Biology

The emerald ash borer generally has a one-year life cycle in southern Michigan but could require two years to complete a generation in colder regions. In 2003, adult emergence began in early June, peaked in late June and early July, and continued into late July. Beetles usually live for about 3 weeks and are present into mid-August. Adult beetles are active during the day, particularly when conditions are warm and sunny. Most beetles remain in protected locations in bark crevices or on foliage during rain, heavy cloud cover, high winds, or temperatures above 32°C (90°F). Beetles feed on ash foliage, usually in small, irregularly-shaped patches along the margins of leaves.

Females can mate multiple times and egg laying begins a few days after the initial mating. Females can lay at least 60 to 90 eggs during their lifetime. Eggs are deposited individually in bark crevices on the trunk or branches. Eggs hatch in 7 to 10 days.

After hatching, first instar larvae chew through the bark and into the cambial region. Larvae feed on phloem and the outer sapwood for several weeks. The S-shaped feeding gallery winds back and forth, becoming progressively wider as the larva grows (Fig. 3). Galleries are packed with fine, sawdust-like frass. Individual galleries often extend over an area that is 20 to 30 cm in length, though the length of the affected area can range from 10 to 50 cm or longer.

Feeding is completed in autumn and pre-pupal larvae overwinter in shallow chambers excavated in the outer sapwood or in the bark on thick-barked trees. Pupation begins in late April or May. Newly eclosed adults often remain in the pupal chamber for 1 to 2 weeks before emerging head-first through a D-shaped exit hole that is 3–4 mm in diameter (Fig. 4).



Figure 1. Adult emerald ash borer.

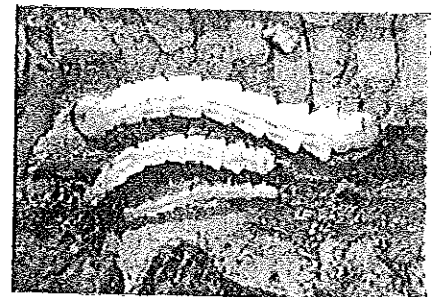


Figure 2. Second, third, and fourth stage larvae.

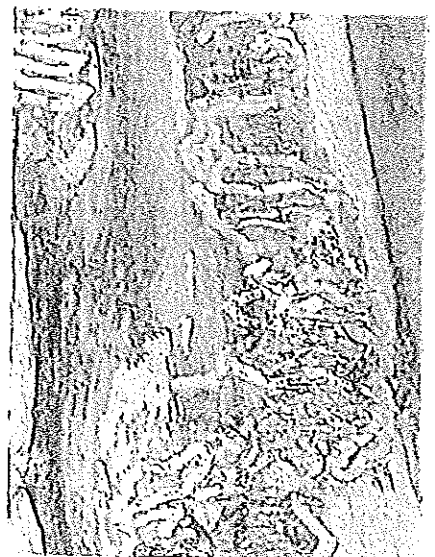


Figure 3. Galleries excavated by larvae.

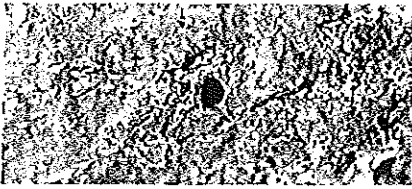


Figure 4. D-shaped exit holes where adult beetles emerged.



Figure 5. Jagged holes left by woodpeckers



Figure 6. Much of the canopy is dead on a heavily infested ash tree.

Distribution and Hosts

The emerald ash borer is native to Asia and is known to occur in China, Korea, Japan, Mongolia, the Russian Far East and Taiwan. A Chinese report indicates high populations of the borer occur primarily in *Fraxinus chinensis* and *F. rhynchophylla* forests. Other reported hosts in Asia include *F. mandshurica* var. *japonica*, *Ulmus davidiana* var. *japonica*, *Juglans mandshurica* var. *sieboldiana* and *Pterocarya rhoifolia*. In North America, this borer has only attacked ash trees. Green ash (*F. pennsylvanica*), white ash (*F. americana*) and black ash (*F. nigra*), as well as several horticultural varieties of ash have been killed.

Symptoms

It is difficult to detect emerald ash borer in newly infested trees. Jagged holes excavated by woodpeckers feeding on pre-pupal larvae may be the first sign that a tree has become infested (Fig. 5). When a tree has been infested for at least one year, the D-shaped exit holes left by emerging adults will be present on the branches and the trunk (Fig. 4). Bark may split vertically above larval feeding galleries. When the bark is removed from infested trees, the distinct, frass-filled larval tunnels that etch the outer sapwood and phloem are readily visible on the trunk and branches (Fig. 3). An elliptical area of discolored sapwood, usually a result of secondary infection by fungal pathogens, sometimes surrounds larval feeding galleries.

Serpentine tunnels excavated by feeding larvae interrupt the transport of nutrients and water within the tree during the summer. Foliage wilts and the tree canopy becomes increasingly thin and sparse as branches die. Many trees appear to lose about 30% to 50% of the canopy after 2 years of infestation and trees often die after 3-4 years of infestation (Fig. 6). Epicormic shoots may arise on the trunk of the tree, often at the margin of live and dead tissue. Dense root sprouting sometimes occurs after trees die.

Emerald ash borer has killed trees of various size and condition in Michigan. Larvae have developed in trees and branches ranging from 2.5 cm (1 inch) to 140 cm (55 inches) in diameter. Stress likely contributes to the vulnerability and rapid decline of infested ash trees. However, emerald ash borer has killed apparently vigorous trees in woodlots and urban trees under regular irrigation and fertilization regimes.

Bibliography

Yu, Chengming. 1992. *Agrilus marcopoli* Obenberger. In Xiao, G., ed. Forest insects of China. 2d ed. Beijing, China: China Forestry Publishing House; 400-401. Translation by Houping Liu, USDA Forest Service.

Jendek, E. 2002. *Agrilus planipennis* fact sheet. PDF file provided by Eduardo Jendek, Institute of Zoology, Slovak Academy of Sciences, Bratislava, Slovak Republic.

Resources

Visit the following websites for information on emerald ash borer biology, identification, management, quarantines and related topics:

1. Michigan Multi-Agency Emerald Ash Borer Web Site: <http://www.emeraldashborer.info>
2. USDA Forest Service: <http://www.na.fs.fed.us/spfo/eab/>
3. Michigan Department of Agriculture: <http://www.michigan.gov> (keyword emerald ash borer)

Contact your State Department of Agriculture, State Forester, or County Extension Office for more information.

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Steven A. Katovich, Forest Entomologist, USDA Forest Service, Northeastern Area State and Private Forestry, Forest Health Protection.

Photo credits:

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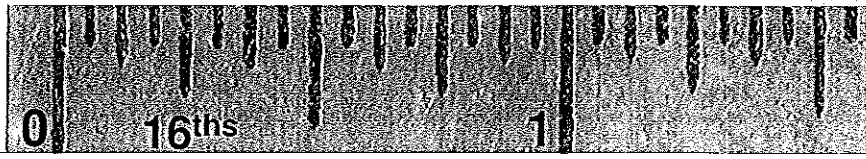
Prepared by:



USDA Forest Service
Northeastern Area,
State & Private Forestry
Newtown Square, PA

Insects in Vermont that may be confused with Emerald Ash Borer

Adapted from Jeff Hahn, University of Minnesota Extension and Val Cervenka, Minnesota Dept. of Natural Resources



Emerald Ash Borer



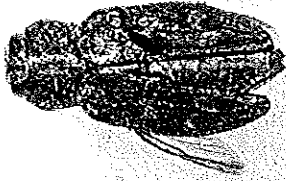
Bronze Birch Borer



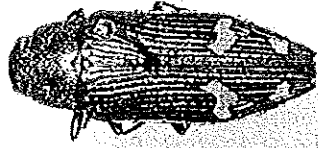
Two-lined Chestnut Borer



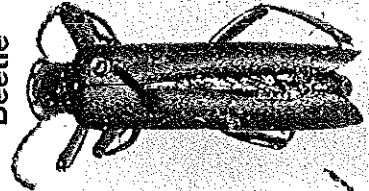
Flat-headed Apple Tree Borer



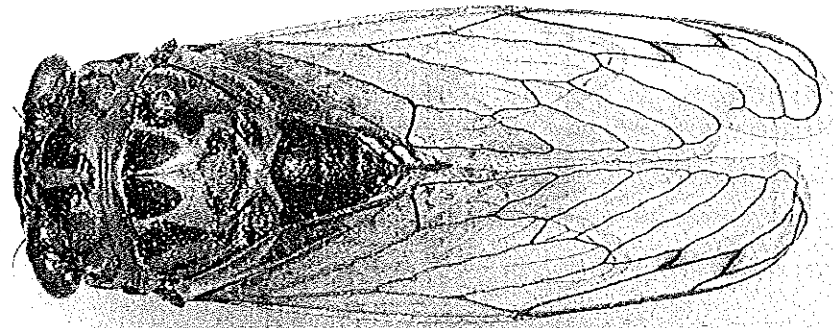
Metallic Wood Borer



Blister Beetle



Annual Cicada



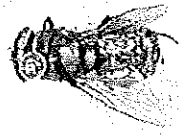
Polydrusus Weevil



Halictid Bee



Blow Fly



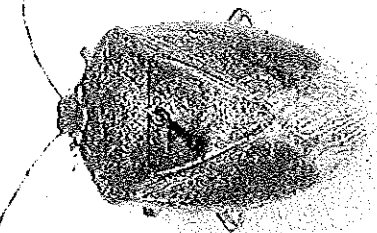
Japanese Beetle



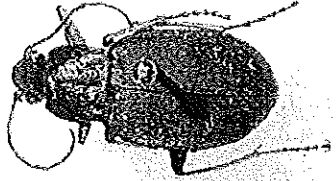
Dogbane Beetle



Green Stink Bug



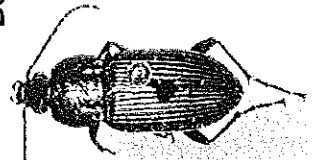
Chaenius Ground Beetle



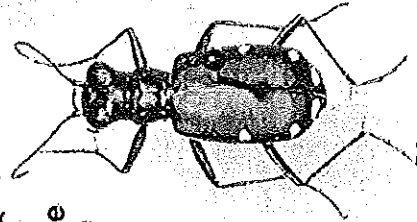
Bark Gnawing Beetle



Poecilus Ground Beetle



Six-spotted Tiger Beetle



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United States
Department of Agriculture
Forest Service
Northeastern Area
State and Private Forestry
NA-PR-09-05
Reprinted May 2010

Hemlock Woolly Adelgid

Native to Asia, the hemlock woolly adelgid (*Adelges tsugae*) is a small, aphidlike insect that threatens the health and sustainability of eastern hemlock (*Tsuga canadensis*) and Carolina hemlock (*Tsuga caroliniana*) in the Eastern United States. Hemlock woolly adelgid was first reported in the Eastern United States in 1951 near Richmond, Virginia. By 2005, it was established in portions of 16 States from Maine to Georgia, where infestations covered about half of the range of hemlock. Areas of extensive tree mortality and decline are found throughout the infested region, but the impact has been most severe in some areas of Virginia, New Jersey, Pennsylvania, and Connecticut.

Hemlock decline and mortality typically occur within 4 to 10 years of infestation in the insect's northern range, but can occur in as little as 3 to 6 years in its southern range. Other hemlock stressors, including drought, poor site conditions, and insect and disease pests such as elongate hemlock scale (*Fiorinia externa*), hemlock looper (*Lambdina fiscellaria fiscellaria*), spruce spider mite (*Oligonychus ununguis*), hemlock borer (*Melanophila fulvogutta*), root rot disease (*Armillaria mellea*), and needle rust (*Melampsora parlowii*), accelerate the rate and extent of hemlock mortality.

Hosts

The hemlock woolly adelgid develops and reproduces on all species of hemlock, but only eastern and Carolina hemlock are vulnerable when attacked. The range of eastern hemlock stretches from Nova Scotia to northern Alabama and west to northeastern Minnesota and eastern Kentucky. Carolina hemlock occurs on dry mountain slopes in the southern Appalachians of western Virginia, North and South Carolina, Georgia, and Tennessee. Eastern hemlock is also commonly planted as a tree, shrub, or hedge in ornamental landscapes. At least 274 cultivars of eastern hemlock are known to exist.

Description

The hemlock woolly adelgid is tiny, less than 1/16-inch (1.5-mm) long, and varies from dark reddish-brown to purplish-black in color. As it matures, it produces a covering of wool-like wax filaments to protect itself and its eggs from natural enemies and prevent them from

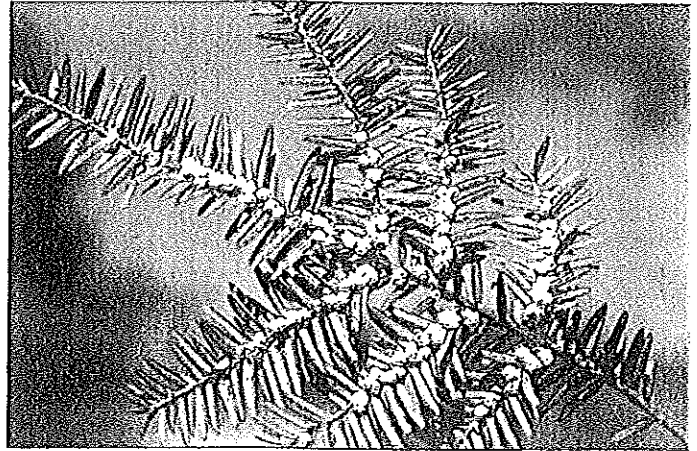


Figure 1.—Hemlock woolly adelgid ovisacs.

drying out. This “wool” (ovisac) is most conspicuous when the adelgid is mature and laying eggs. Ovisacs can be readily observed from late fall to early summer on the underside of the outermost branch tips of hemlock trees (figure 1).

Life History

The hemlock woolly adelgid is parthenogenetic (all individuals are female with asexual reproduction) and has six stages of development: the egg, four nymphal instars, and the adult. The adelgid completes two generations a year on hemlock. The winter generation, the sistens, develops from early summer to midspring of the following year (June–March). The spring generation, the progrediens, develops from spring to early summer (March–June). The generations overlap in mid to late spring.

The hemlock woolly adelgid is unusual in that it enters a period of dormancy during the hot summer months. The nymphs during this time period have a tiny halo of woolly wax surrounding their bodies (figure 2). The adelgids begin to feed once cooler temperatures prevail, usually in October, and continue throughout the winter months.

The ovisacs of the winter generation contain up to 300 eggs, while the spring generation ovisacs contain between 20 and 75 eggs. When hatched, the first instar nymphs, called crawlers, search for suitable feeding sites on the twigs at the base of hemlock needles. Once settled, the nymphs begin feeding on the young

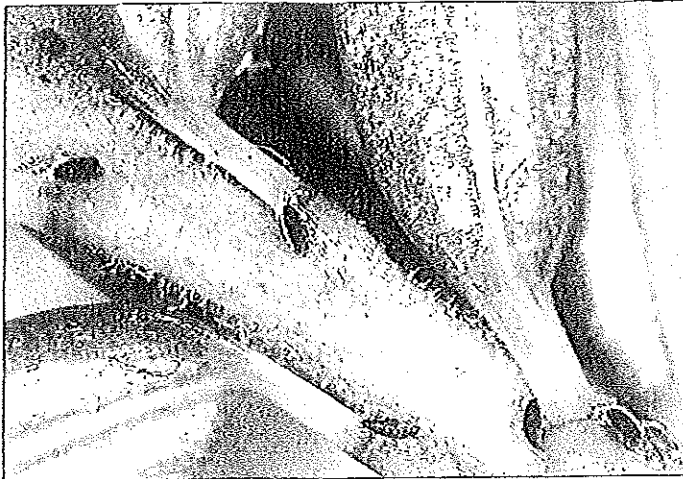


Figure 2.—Hemlock woolly adelgid nymphs in dormancy.

twig tissue and remain at that location throughout the remainder of their development. Unlike closely related insects that feed on nutrients in sap, the hemlock woolly adelgid feeds on stored starches. These starch reserves are critical to the tree's growth and long-term survival.

Dispersal and movement of hemlock woolly adelgid occur primarily during the first instar crawler stage as a result of wind and by birds, deer, and other forest-dwelling mammals that come in contact with the sticky ovisacs and crawlers. Isolated infestations and long-distance movement of hemlock woolly adelgid, though, most often occur as the result of people transporting infested nursery stock.

Control

Cultural, regulatory, chemical, and biological controls can reduce the hemlock woolly adelgid's rate of spread and protect individual trees. Actions such as moving bird feeders away from hemlocks and removing isolated infested trees from a woodlot can help prevent further infestations. State quarantines help prevent the movement of infested materials into noninfested areas.

Chemical control options, such as foliar sprays using horticultural oils and insecticidal soaps, are effective when trees can be saturated to ensure that the insecticide comes in contact with the adelgid. Several systemic insecticides have also proven effective on large trees when applied to the soil around the base of the tree or injected directly into the stem (figure 3). Chemical control is limited to individual tree treatments in readily accessible, nonenvironmentally sensitive areas; it is not feasible in forests, particularly when large numbers of trees are infested. Chemical treatments offer a short-term solution, and applications may need to be repeated in subsequent years.

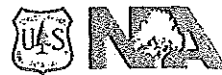


Figure 3.—Chemical treatment using the soil injection method.

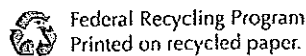


Figure 4.—Predators introduced for control in the Eastern United States, left to right (origin): *Sasajiscymnus tsugae* (Japan), *Scymnus sinuanodulus* (China), and *Laricobius nigrinus* (Western North America).

The best option for managing hemlock woolly adelgid in forests is biological control. Although there are natural enemies native to Eastern North America that feed on hemlock woolly adelgid, they are not effective at reducing populations enough to prevent tree mortality. Therefore, biological control opportunities using natural enemies (predators and pathogens) from the adelgid's native environment are currently being investigated. Several predators known to feed exclusively on adelgids have been imported from China, Japan, and Western North America and are slowly becoming established throughout the infested region (figure 4). It will likely take a complex of natural enemies to maintain hemlock woolly adelgid populations below damaging levels. Efforts to locate, evaluate, and establish other natural enemies continue.



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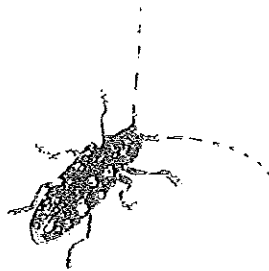


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Pesticides used improperly can be injurious to humans, animals, and plants. Follow the directions and heed all precautions on the labels. NOTE: Some States have restrictions on the use of certain pesticides. Check your State and local regulations. Also, because registrations of pesticides are under constant review by the Federal Environmental Protection Agency, consult your county agricultural agent or State extension specialist to be sure the intended use is still registered.

Pest Alert



United States
Department of Agriculture
Forest Service
Animal and Plant
Health Inspection Service

NA-PR-01-99
Revised March 2010

Asian Longhorned Beetle (*Anoplophora glabripennis*): A New Introduction

The Asian longhorned beetle (ALB) has been discovered attacking trees in the United States. Tunneling by beetle larvae girdles tree stems and branches. Repeated attacks lead to dieback of the tree crown and, eventually, death of the tree. ALB probably travelled to the United States inside solid wood packing material from China. The beetle has been intercepted at ports and found in warehouses throughout the United States.

This beetle is a serious pest in China, where it kills hardwood trees in roadside plantings, shelterbelts, and plantations. In the United States the beetle prefers maple species (*Acer* spp.), including *boxelder*, *Norway*, *red*, *silver*, and *sugar maples*. Other preferred hosts are *birches*, *Ohio buckeye*, *elms*, *horsechestnut*, and *willows*. Occasional to rare hosts include *ashes*, *European mountain ash*, *London planetree*, *mimosa*, and *poplars*. A complete list of host trees in the United States has not been determined.

Currently, the only effective means to eliminate ALB is to remove infested trees and destroy them by chipping or burning. To prevent further spread of the insect, quarantines are established to avoid transporting infested

trees and branches from the area. Early detection of infestations and rapid treatment response are crucial to successful eradication of the beetle.

The ALB has one generation per year. Adult beetles are usually present from July to October, but can be found later in the fall if temperatures are warm. Adults usually stay on the trees from which they emerged or they may disperse short distances to a new host to feed and reproduce. Each female usually lays 35-90 eggs during her lifetime. Some are capable of laying more than that. The eggs hatch in 10-15 days. The larvae feed under the bark in the living tissue of the tree for a period of time and then bore deep into the wood where they pupate. The adults emerge from pupation sites by boring a tunnel in the wood and creating a round exit hole in the tree.

For more information about Asian longhorned beetle in the United States, visit these U.S. Department of Agriculture Web sites:

www.na.fs.fed.us/fhp/alb/

www.aphis.usda.gov/plant_health/plant_pest_info/asian_lhb/index.shtml

If you suspect an Asian longhorned beetle infestation, please collect an adult beetle in a jar, place the jar in the freezer, and immediately notify any of these officials or offices in your State:

State Department of Agriculture:

- State Plant Regulatory Official
- State Entomologist

U.S. Department of Agriculture:

- Animal and Plant Health Inspection Service,
Plant Protection and Quarantine
- Forest Service

County Cooperative Extension Office

State Forester or Department of Natural Resources

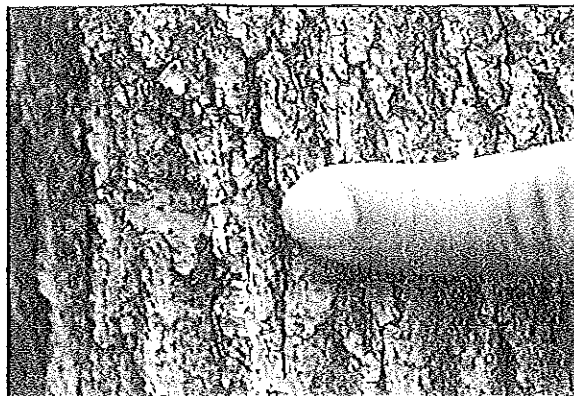
Call 866-702-9938 toll free.

Asian Longhorned Beetle

WHAT TO LOOK FOR:



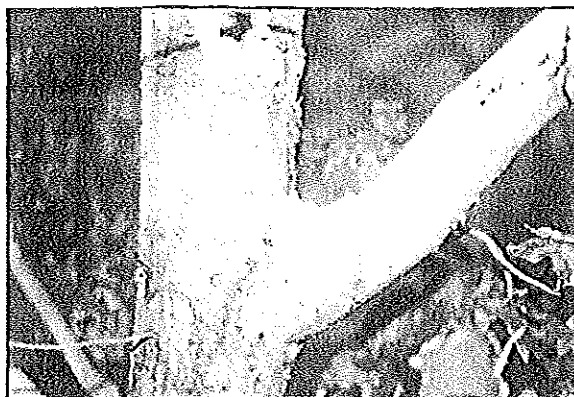
1. Adult beetles. Individuals are $\frac{3}{4}$ to $1\frac{1}{4}$ inches long, with jet black body and mottled white spots on the back. The long antennae are $1\frac{1}{2}$ to $2\frac{1}{2}$ times the body length with distinctive black and white bands on each segment. The feet have a bluish tinge.



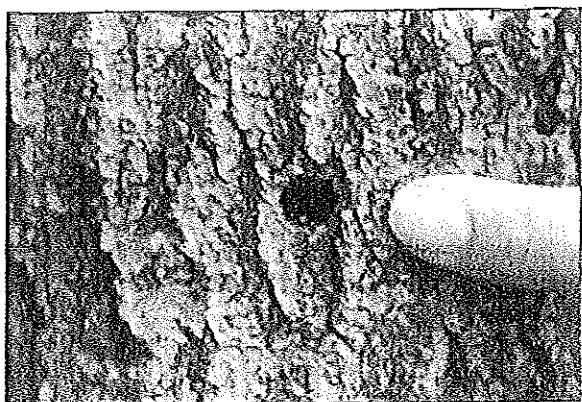
2. Oval to round pits in the bark. These egg-laying sites or niches are chewed out by the female beetle, and a single egg is deposited in each niche.



3. Oozing sap. In the summer, sap may flow from egg niches, especially on maple trees, as the larvae feed inside the tree.



4. Accumulation of coarse sawdust around the base of infested trees, where branches meet the main stem, and where branches meet other branches. This sawdust is created by the beetle larvae as they bore into the main tree stem and branches.



5. Round holes, $\frac{3}{8}$ inch in diameter or larger, on the trunk and on branches. These exit holes are made by adult beetles as they emerge from the tree.

Photo Sources:

USDA Forest Service

USDA Animal and Plant Health Inspection Service

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A small colony of *Phragmites* is present in

The Pumpkin Hill Town Forest.

(Display Copy Only)

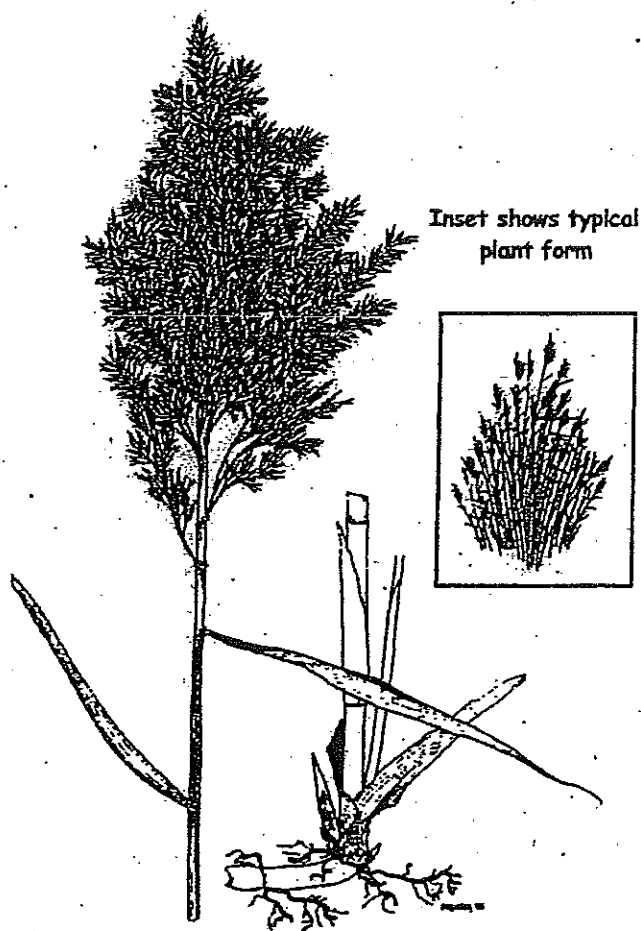
Giant or Common Reed
Phragmites australis (Cav.) Trin.
Grass Family
Vermont Class B Noxious Weed

Description: *Phragmites* is an herbaceous, perennial grass that can grow up to 15 feet (4.5 meters) in height. It has stout stems, long leaves (up to 2 feet (.6 meters)), and large feathery plumes of flowers that change from a purple-brown color in July to tan or grey by late in the season. *Phragmites* may spread by seed, although a number of populations do not produce viable seeds. Stands of *Phragmites* are also established by the spread of underground rhizomes (a thickened underground stem).

Habitat: *Phragmites* thrives in sunny wetland habitats and prefers fresh or brackish water (tidal and nontidal marshes). Although it can tolerate salt water, growth is usually stunted. In Vermont, it is known to grow on lake shores and in marshes, bogs, fens, wet meadows, roadside ditches, spoil piles resulting from dredging, and even seepage areas on highway embankments. It grows in soils with a pH range of 3.7 to 9.0 and in saturated soils or those that are seasonally, regularly, or permanently inundated up to two feet. It cannot withstand strong wave action or running water because the vertical stems break easily. *Phragmites* especially takes advantage of situations where there are numerous human disturbances to the landscape. Examples include dredging, water pollution, alteration of the natural hydrological regime and increases in nutrients, soil salinity, or sedimentation.

Threats: *Phragmites* spreads rapidly by rhizomes in disturbed areas that have moist to wet soils. It will quickly dominate in these areas, displacing the natural, diverse community with a monoculture. A *Phragmites* rhizome can extend 30 feet (9 meters) in a year. Monocultures as large as 7,000 acres have been documented.

Distribution: *Phragmites* is found in temperate regions worldwide and can be found in every state of the United States.



(Illustration by Judy Preston - The Nature Conservancy of Connecticut)

Distribution continued: Paleocological studies in Connecticut have found 3,000 year old fragments of *Phragmites*, providing evidence that it is a native plant in the Northeast. However, many scientists agree that the aggressive, invasive reed most commonly seen is a European strain imported in the early 1900s. This strain of *Phragmites* is widespread and very invasive in Vermont.

This fact sheet is one in a series on invasive, exotic plants in Vermont and is a cooperative project between the Departments of Environmental Conservation, Fish and Wildlife, and Forests, Parks and Recreation of the Vermont Agency of Natural Resources, and The Nature Conservancy of Vermont. Spring 1998; revised Winter 2003.

Treatment Methods:

Category	Method	Method Description	Considerations
MANUAL	Cutting/ Mowing	<p>Manual treatment can be moderately successful for this plant.</p> <ul style="list-style-type: none"> • Cut at least 1 times during growing season (mid May-mid October) • Repeat for 3-5 years 	<ul style="list-style-type: none"> • May be effective for small infestations. Re-sprouting will likely occur • Mowing/cutting can help reduce the population of phragmites if repeated for several years
	Foliar Application	<p>Active ingredients commonly used in herbicides: glyphosate and/or imazapyr</p> <p><i>If foliar spraying only:</i></p> <ul style="list-style-type: none"> • Foliar spray when plant is fully leafed out (May-October) • Spray leaf surfaces with low volume backpack sprayer, or high volume mist blower <p><i>If cutting and foliar spraying:</i></p> <ul style="list-style-type: none"> • Use machete, lopper, pruning shears, mower, weed whacker/brush saw • Cut in early growing season • Spray sprouts later in growing seasons with hand held sprayers, low volume backpack sprayer, or high volume mist blower <p><i>Foliar Wipe</i></p> <ul style="list-style-type: none"> • Wear a chemical resistant glove underneath an absorbent cotton glove • Moistens the glove and wipe each stem and leaf of the individual phragmites plant 	<p><i>Low Volume Backpack Sprayer</i></p> <ul style="list-style-type: none"> • Herbicides (active ingredient): glyphosate and/or imazapyr with surfactant • Used to target plants and minimize drift to desirable species <p><i>High Volume Mist Blower</i></p> <ul style="list-style-type: none"> • Herbicides (active ingredient): glyphosate and/or imazapyr with surfactant • Used for very larger and dense infestations that have little desirable, native vegetation that will be damaged by drift <p><i>Foliar Wipe</i></p> <ul style="list-style-type: none"> • Herbicides (active ingredient): glyphosate • Used for edges of infestation or in/around sensitive locations
CHEMICAL	Cut and drip	<ul style="list-style-type: none"> • Cut the stem below a node on the stem • Drip one drop of herbicide mixed with water on each stem 	<ul style="list-style-type: none"> • Herbicides (active ingredient): glyphosate • Used to target plants and minimize drift to desirable species • Very labor intensive for large patches



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III. HISTORIC RESOURCES

The Town acquired the area in 1838 as a permanent site for the Danville Town Poor Farm. Most of the Farm's dryer sites had been, or were later, cleared for pasture, crops, or hay for the Farm's use. Today, the cellar foundation and foundation remnants of several outbuildings are present near the opening maintained as a small recreational field. Old farm roads serve as trails in several portions of the Forest.

The Town of Danville has historically utilized the property for its timber resources. In the mid-1950's several plantations of red and white pines were established through the Soil Bank Program in several areas. Timber was harvested from several of these plantations in 1994-1996. (See Appendix D)

Historical evidence of human activity:

- 1) Stonewalls and old fence lines
- 2) Cellar holes and other foundations
- 3) Roadways and trails
- 4) Plantations were established in the early-mid 1950's by FFA, supported by the Federal Soil Bank Program.

GOALS OF MANAGEMENT: To inventory, document, protect and interpret the cultural and historic resources of the forest for future generations.

STRATEGIES:

- Partner with the Danville Historical Society on documentation and research of the Poor Farm cellar holes and of the history prior to acquisition of the site by the Town.
- Employ recommended practices to protect cultural resources during logging such as, designating "not to be disturbed" buffer zones, designating skid trails during bare ground conditions, minimizing stone wall crossings and restoring after operations

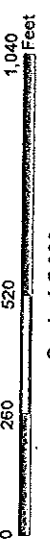
PLANNED MANAGEMENT PRACTICES:

Prior to any harvesting/recreational trail development, map existing stone walls, fence lines, farm dumps, etc. and ensure that future forest management or recreational use does not further degrade these historical remnants.

IV. RECREATION

A network of hiking, bridal, and mountain bike trails now exists on the Pumpkin Hill Forest (Fig. 5). They are informally maintained by volunteers including the local Boy Scout Troop and others. The Scouts have for many years used the

Recreation Map
Town of Danville
Pumpkin Hill Town Forest



Scale 1:5,000
1 inch equals 417 feet
VT State Plane NAD 83
Map Drawn by Matt Langlais February 2013

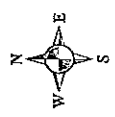
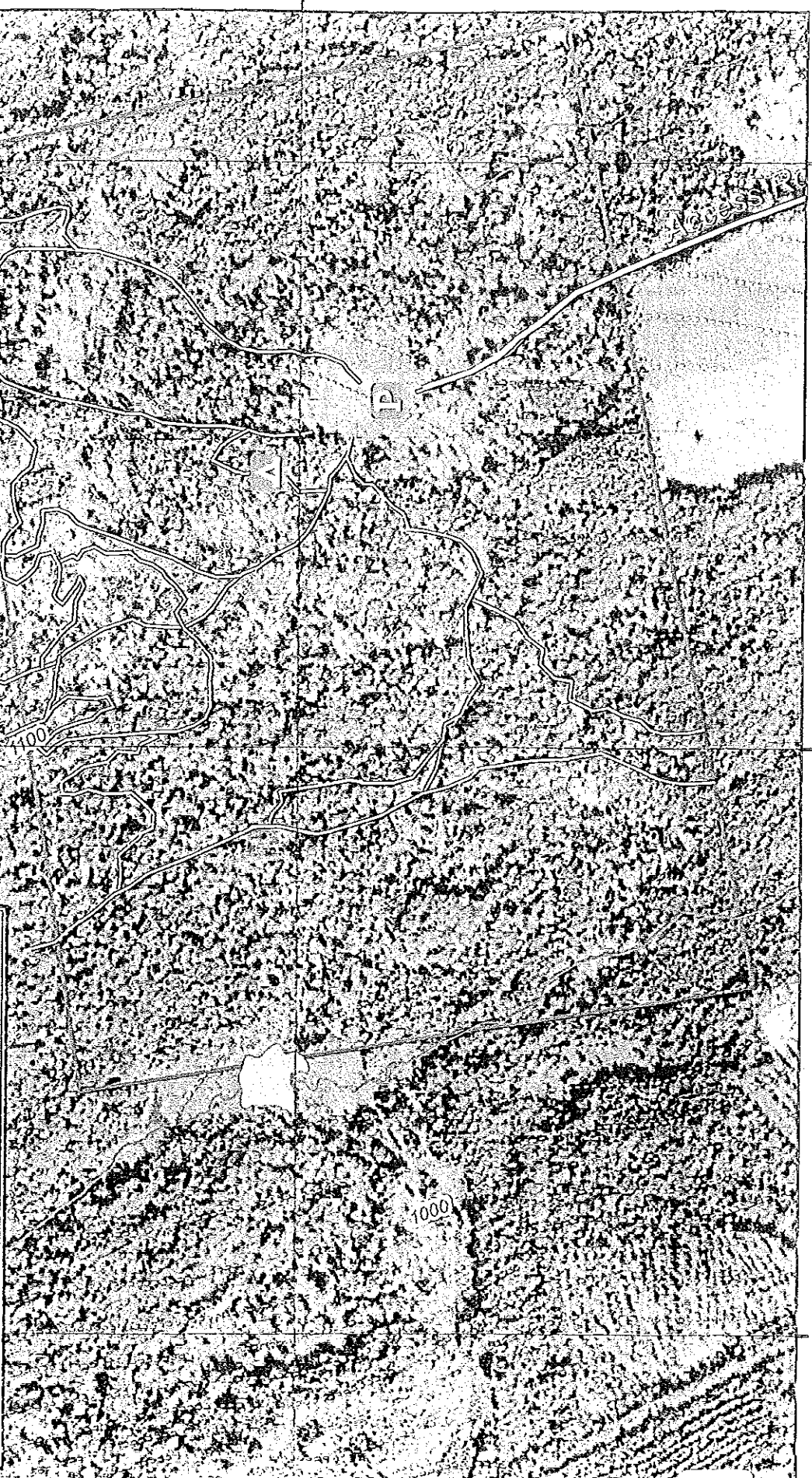


Figure 5.



Forest for camping and other activities, and in 2011 a lean-to shelter was constructed as an Eagle Scout Project. A VAST snowmobile trail runs along portions of the western boundary. Some of the hiking trails were established by Danville Middle School students and all of the Forest trails were mapped in by Nick Tanner as a Senior Project.

GOALS OF MANAGEMENT: Recreation management of the town forest will promote and provide enhanced opportunities for recreation including hiking, biking, cross-country skiing, bird-watching, hunting, and snowmobiling on approved corridors.

Management will strive for levels of recreational use that upholds the vision and that are sensitive to and respectful of the natural values of the forest

STRATEGIES:

- * Update the existing network of trails, to ensure their suitability and compatibility with management goals.
- Develop new trails as necessary to pass through areas that are interesting ecologically and scenically and will connect the ecologically unique features of the forest. However, where appropriate existing trails may be eliminated or re-routed to avoid endangering rare sites or plant species.
- Trails will be laid out in anticipation of specific uses including motorized and non motorized usage.
- Trail maps will be created or updated and made available, and trails will be named and marked for their appropriate uses.
- Hunting of game species will be permitted to licensed persons.
- Permanent tree stands and ground blinds are prohibited in the Town Forest.
- Temporary tree stands and ground blinds are allowed from the third Saturday in August through the third Saturday in December. Tree stands or blinds need to be registered with the Town.

PLANNED MANAGEMENT PRACTICES:

The Conservation Commission will be open to proposals from user groups for the establishment and maintenance of appropriate recreation trails that are consistent with the vision and goals of management.

V. ACCESS

There is one public Class 4 dirt road (Town Highway 62) that accesses the Forest from the South. Bridal trails enter the forest from abutting properties and woods roads run near the property boundaries on several sides. At this point there are no specific parking areas, however, parking traditionally has occurred in the open field near the entrance.

VI. OWNERSHIP AND MANAGEMENT

Ownership of the Pumpkin Hill Town Forest resides with the Town of Danville. All management and operational details will be handled by the Selectboard with the assistance of the Conservation Commission, who will make recommendations for management details to the Selectboard, who will then make the final decisions.

Boundary Maintenance:

The town forest boundary has not been surveyed. Over the course of 2009-2010, the Conservation Commission used a GPS to map the property based on field evidence (old fences, stone walls, landowner's boundary markings). The boundaries have been verified to the best of our knowledge, using evidence and deed research.

PLANNED MANAGEMENT PRACTICES:

1. All boundaries will be marked with "Danville Town Forest" boundary marker signs in 2013.
2. Signage will be maintained and/or changed as needed.
3. If boundary lines need to be trimmed for visibility, that will be done as necessary.

Proceeds from all activities in the Town forest will be deposited in the existing Danville Conservation Fund. Use of those funds will be for specific management and maintenance activities within the Town Forests.

VII. MANAGEMENT PLAN REVISIONS

The Pumpkin Hill Town Forest Management plan should be kept current to maintain consistent oversight and stewardship as forest conditions, recreational uses and public support change.

PLANNED MANAGEMENT PRACTICES:

1. The Selectboard will adopt the Management Plan after a public hearing.
2. The Management Plan will be reviewed and up-dated on a ten year schedule, after any major change to the Town Forest, or at any other time as needed by the Selectboard.
3. The Selectboard will consider making the Management Plan a part of the Town Plan.
4. The 10 year periodic review will be undertaken by the Selectboard and the Conservation Commission. Public hearings will be set to hear suggestions for changes and for proposed changes. Final approval of any changes is by the Selectboard.

VIII. APPENDICES:

- A. Summary of Public Involvement, Survey Document and Results
- B. Natural Community Information
- C. Bird Habitat Information
- D. Deed Research and Historical Information

APPENDIX A

Summary of Public Involvement, and the Forest Survey Document and Results

SUMMARY OF PUBLIC INVOLVEMENT

- 2007 – CC established; town forest management planning identified as top priority
- 2008 – Caledonia County Forester begins advising on initial planning
Summer Forest Celebration held (Pumpkin Hill Town Forest)
Forest and Wildlife Habitat Display at the Danville Town Fair
- 2009 - Town Forest Survey (mailed to all residents)
Presentation by Brett Engstrom on natural community mapping
Public meeting hosted to gather initial input for Town Forest
- 2010 – Jens Hilke, State of VT, hosts public meeting re: wildlife management and community involvement
Boundaries of town forests identified, flagged and GPS'd
- 2011—A lean-to was installed by Ian Blackmore as his Eagle Scout Project

Town Forest Survey

The town of Danville has two Town Forests, Pumpkin Hill Forest, located on Pumpkin Hill, and, Rodgers Lot located on North Danville Road and includes the site of the "stump dump". To gauge residents' knowledge and attitudes regarding the forests, a survey was conducted by the Danville Conservation Commission (DCC). The survey did not distinguish between the two forests and asked residents to rate the appropriateness of activities that could be conducted in either. Approximately 100 people (about 5% of Danville's population) returned the survey. The Survey Document and graphs of the results follow:

Results:

Of those surveyed, 25% did not know of either forest and 32% had never been to them. One respondent said that they have lived in Danville for 20 years and never knew that the "stump dump" was part of a town forest. There were also several comments encouraging more signage and publicity about the locations of the forests, and what they have to offer.

Currently, the Forests are used more in the summer and fall, and less in the winter and spring. Of those who use them 77% do so with family and friends, 8% with a group, and 12% by themselves. The most popular current uses and potential future uses are wildlife viewing, nature study, photography, hiking or walking, and snowshoeing and cross country skiing.

Because it is important that our town forests are utilized well, residents were asked what uses they felt were appropriate, and/or not appropriate. The survey form and the results are summarized below. Watershed protection and quality was deemed the most appropriate use for the forests, followed by hiking, cross country skiing or snowshoeing, summer recreation, and game and non-game habitat. Less popular uses included bike trails, horseback trails, hunting, creating access for the disabled, and creating scenic views. The least popular uses included snowmobile and ATV use. Managing invasive species was considered the most important management strategy (86%).

Both forests have been utilized in the past for their timber resources. The survey revealed that 70% of respondents felt it was appropriate or extremely appropriate to utilize the forests for their timber resources. We also received several comments that the forests should be left as natural as possible, be sustainably managed, and should leave some room for old growth.

The survey is just the first outreach for participation. There will be several more opportunities for Danville residents to get involved in this important community planning. From the survey it is clear that our first steps at the DCC is to create more opportunities and information for residents to increase their familiarity and usage of the town forests as they now exist so that we can plan for their future.

Danville Town Forest User Survey

For the past year, the Danville Conservation Commission has been working toward developing a management plan for Danville's two Town Forests. We've been walking boundaries; learning what features make up these lands; seeking information about how folks use these forests; and beginning to introduce these resources to the larger community.

This questionnaire will help us to understand more about how the people of Danville use our Town Forests, how they would like to see them managed, and who might have time, energy, or knowledge about how to shape a plan for these forests that will make sense for the resource and for the people of Danville. We would like your opinion on a number of questions to help us better design our management strategy for the future.

Instructions:

- All responses will be kept confidential.
- You do not need to provide your name in completing this survey, although there is a question at the end about whether you are interested in helping in the planning, development, and management of the Town Forests. If you like to have the Conservation Commission be in touch with you about this, your name and phone/e-mail would be helpful.
- This survey is completely voluntary; you may complete as much or as little of it as you wish.
- When you complete this survey, please drop it off at the Town Clerk's office or mail it to: Danville Conservation Commission, Town of Danville, PO Box 183, Danville, VT 05828.
- If you have questions about the survey, please call any of the Conservation Commission members: Tracy Zschau (684-1073), Dave Machell (748-5248), Andrea Machell (748-7138), David Houston (684-1122), Alan Parker (684-1030) or Tom Forster or Evangelyn Morse.

In this first part of the questionnaire, we want to know a few things about what you know about these forests and how you use them.

1. Which of the two Town Forests do you know the best?

Pumpkin Hill _____

North Danville Road (Site of Wood Dump) _____

Neither _____

Both about the same _____

2. How often do you make use of either of these forests? (Check one)

Never ___ Been once or twice ___ Once a year ___ More frequently ___

3. What time of year are you most likely to use either of the Town Forests? (check one)

Fall ___ Spring ___ Summer ___ Winter ___

4. Do you usually use the Town Forest(s) alone or with (Check all that apply)

___ Family

___ Friends

___ Spouse/Partner

___ Work-related visit

___ Co-workers

___ Extended family

___ Organized group

___ Other (Please specify) _____

5. In which of the following recreation activities do you or would you and/or members of your group participate in at the Danville Town Forest(s)? (Check all that apply)

- | | | |
|-------------------------------------------------------------------------|-----------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> Hiking/walking | <input type="checkbox"/> Nature study | <input type="checkbox"/> Wildlife viewing |
| <input type="checkbox"/> Photography | <input type="checkbox"/> Hunting | <input type="checkbox"/> Mountain biking |
| <input type="checkbox"/> Horseback riding | <input type="checkbox"/> Cross-country skiing | <input type="checkbox"/> Snowshoeing |
| <input type="checkbox"/> Games (horseshoes, volleyball, etc) | | <input type="checkbox"/> Picnicking |
| <input type="checkbox"/> Gathering (wild edibles, craft materials, etc) | | |
| <input type="checkbox"/> Socializing with friends/family | | |
| <input type="checkbox"/> Other (Please specify) _____ | | |

In this section, we want to understand the extent to which you believe the following management strategies and uses are appropriate or inappropriate in the Danville Town Forests.

6. Please circle the number that most closely represents your views of the appropriateness of each activity.

Management Strategies and Uses	Extremely Appropriate	Appropriate	Neutral	Inappropriate	Extremely Inappropriate
Protection of watershed	1	2	3	4	5
Sustainable timber production	1	2	3	4	5
Game species habitat improvement	1	2	3	4	5
Habitat improvement for non-game species	1	2	3	4	5
Summer recreation (camping, hiking, etc)	1	2	3	4	5
Hunting	1	2	3	4	5
Backcountry cross-country skiing/snowshoeing	1	2	3	4	5
Snowmobile use	1	2	3	4	5
All terrain vehicle (ATV) trail use	1	2	3	4	5
Improved access for persons with disabilities	1	2	3	4	5
Scenic view sheds	1	2	3	4	5
Hiking trails	1	2	3	4	5
Protection of water quality	1	2	3	4	5
Horse trails	1	2	3	4	5
Mountain bike trails	1	2	3	4	5
Allow dogs on hiking trails	1	2	3	4	5

7. For the following future management strategies, we are asking you to rate their importance.

Management Strategies and Uses	Very Important	Important	Neutral	Unimportant	Not at all Important
Establish new hiking trails	1	2	3	4	5
Establish new mountain bike trails	1	2	3	4	5
Management of invasive species	1	2	3	4	5
Establish an interpretive trail	1	2	3	4	5
Restricting ATV use on any areas of Danville Town Forest	1	2	3	4	5

8. Do you have any suggestions for additional facilities, services, or management strategies at the either of Danville's Town Forests?

9. Are you interested in working with the Conservation Commission or other groups that might have a hand in:

creating a management plan for either Town Forest?

working on trails, gathering areas, invasive species control, etc.?

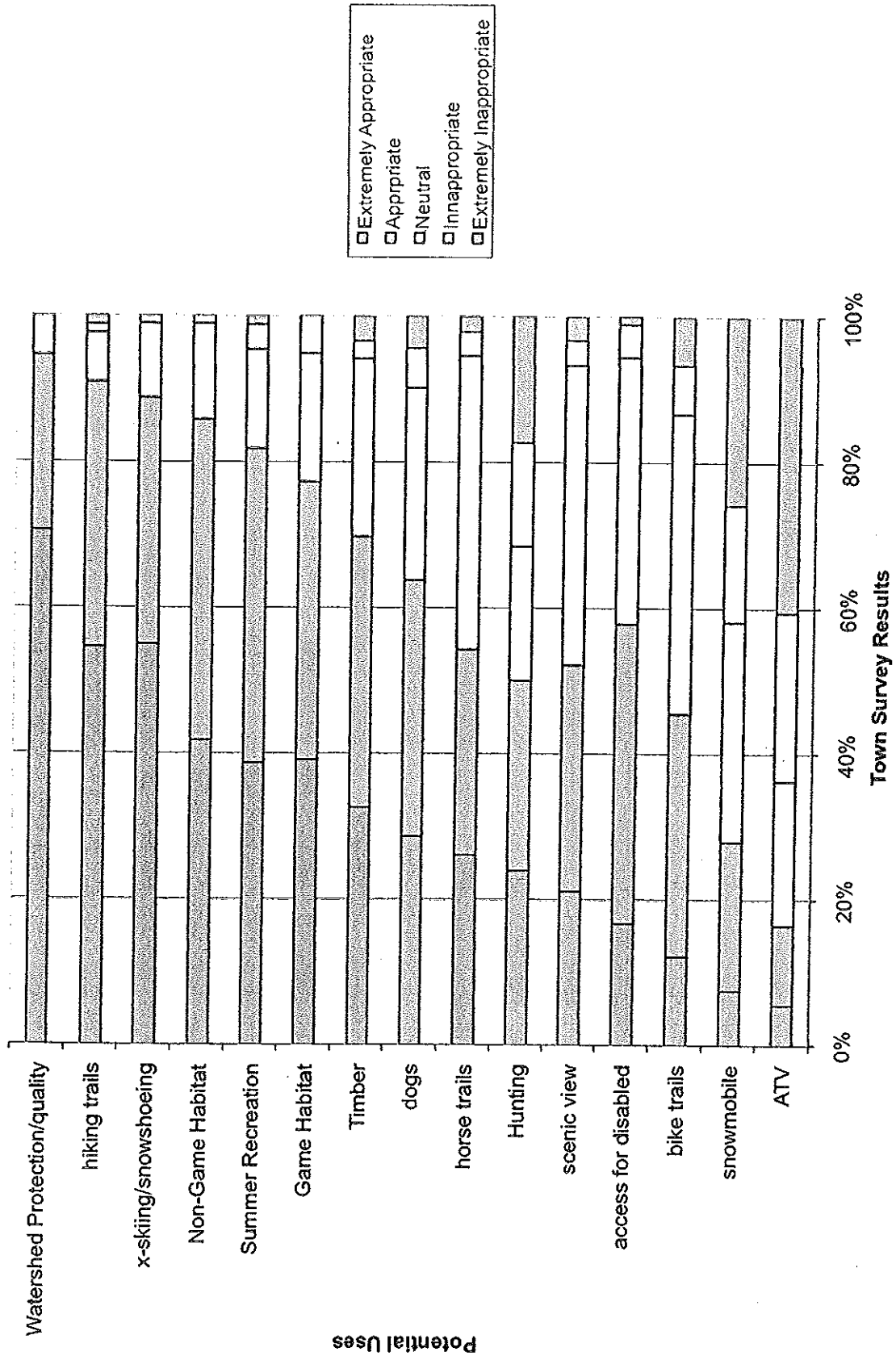
planning and organizing events designed to introduce our Town Forests to the people of Danville?

Name _____ (optional)

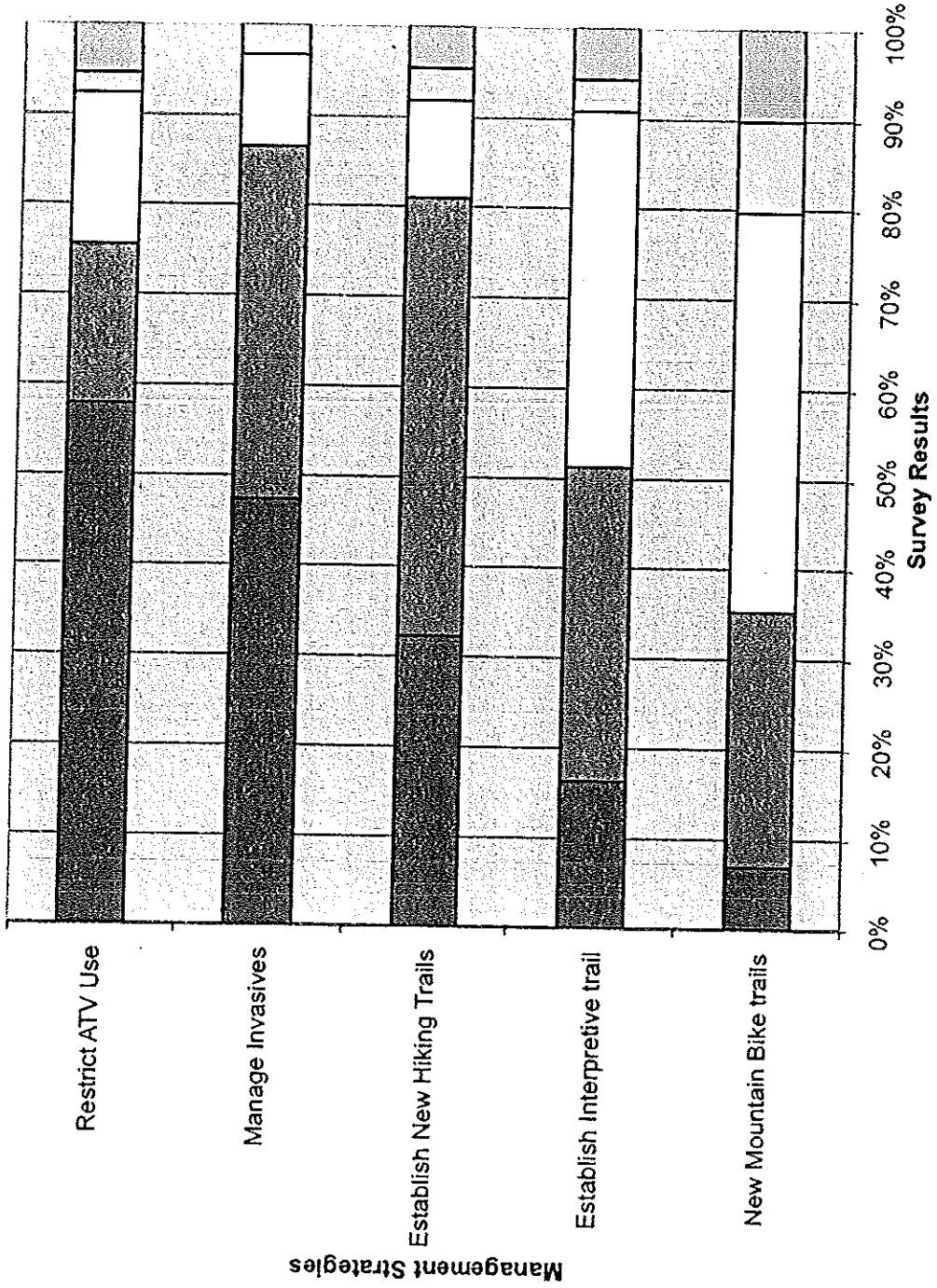
Address _____

Phone _____ e-mail _____

Survey Results for Potential Town Forest Uses



Survey of Potential Town Forest Management Strategies



- Extremely Important
- ▒ Important
- Neutral
- Unimportant
- Extremely Unimportant

APPENDIX B

Natural Communities Information

Pumpkin Hill Town Forest - natural community attribute data

Id	NC Type	NC var	NC Name	Acres	EO Rank	Significant	Descript	Soil	Condition	Notes
0	81	81	mixed n. seepage swamp/forest	1.12		Local	Narrow strand of mixed sloping seepage swamp with variable canopy of pole black ash, hemlock, yellow birch, N. white cedar, fir. Varies from 10-25m wide.	Less than or = 50cm black-brown woody, sapric muck over light gray silt & sand	Southern portion cut recently, plus open (old field) seepage wetland at far s. end.	
1	90	90ab	mixed sloping seepage forest	1.30		Local?	Up to ~50m band of sugar maple-hemlock-fir-NW cedar-yellow birch sloping seepage forest on gentle drainage slope east of narrow swamp.			
2	55	55a	semi-alluvial seep	0.63			Seepage drainage with lush <i>Glyceria striata</i> , <i>Impatiens capensis</i> , <i>Onoclea</i> + others. Includes a ostrich fern glade in middle section & oldfield seepage meadow at end.	Up to 40cm muck, sometimes muddy.	Entire area appears to have been field based on vegetation.	
3	9	9	Rich Northern Hardwood Forest	0.27			Broad drainage bottom lacking stream. Very broken canopy of white pine & sugar maple. Lots of <i>Rubus idaeus</i> . <i>Cystopteris bulbifera</i> abundant.	20+ cm deep black OA horizon.	Oldfield given the white pine in canopy	
4	64	64a	beaver meadow	0.37			Lush <i>Phalaris arundinacea</i> - <i>Solidago canadensis</i> cover. <i>Parnassia</i> , <i>Tussalago</i> , <i>Muhlenbergia mexicana</i> , <i>Bromus ciliatus</i> on old dam. Hemlock-fir snags.			
5	51	51a	N. White Cedar Sloping Seepage Forest	0.44			Mature cedar-fir seepage forest gently sloping east to brook. <i>Carex pedunculata</i> - <i>Equisetum scirpoides</i> dominant groundcover, + <i>Epipactis</i> , <i>Osmunda cin.</i> , <i>Arisaema triphylla</i> . Extends off property.	30cm black sapric muck (pH 8.2) over gray (gleyed) fine sand (pH 7.8?)	Mature, but youthful.	
6	64	64a	beaver meadow	0.20		Local	Beaver meadow with exposed mud bottom. Herbaceous veg. includes <i>Eleocharis intermedia</i> (S3 calciphile), <i>Bidens cernua</i> , <i>Carex bebbii</i> , <i>Senecio schweinitzii</i> , <i>Glyceria grandis</i> .	Exposed calcareous mud of beaver pond bottom.		Of local significance due to presence of uncommon spike-rush (<i>Eleocharis intermedia</i>)
7	51	51	Northern White Cedar Swamp	1.29		Local	Northern white cedar swamp along west side drainage. With broken cedar + fir, black spruce, white pine & hemlock, and fir common in understory regeneration. Lush moss cover. ~50% herb cover, esp. <i>Osmunda cin.</i> , <i>Rubus pubescens</i> , <i>Carex interior</i> , etc.	65 cm v. dark brown sapric woody muck over gray silt & fine sand.	Variable: some uneven-aged in excellent condition; to east dense 2nd growth.	
8	64	64a	beaver meadow	0.40			Limy beaver marsh, w/ lush <i>Carex stricta</i> , <i>Phalaris arund.</i> , <i>Typha Calamagrostis can.</i> , <i>Solidago can.</i> , <i>Eupatorium mac.</i> Cedar & fir recolonizing margins. <i>Parnassia glauca</i> , <i>Carex bebbii</i> .	50cm woody muck with top 15 cm black.	Impounded cedar swamp. Lots of <i>Phalaris</i> indicative of agricultural history of area.	
9	81	81	mixed n. seepage swamp/forest	1.31		Local	Broken canopy hemlock, spruce, red maple, black ash, fir canopy w/ dense <i>Osmunda cin.</i> - <i>Calamagrostis</i> groundcover. Only 1 cedar. West side drainage adjacent large beaver marsh.	Includes upland islet.	Nice example, though partly young. Extent of swamp estimated. Needs more survey	Yellow or showy ladyslipper present, both uncommon species in Vermont

Pumpkin Run Lowland Forest - Natural community attribute data

Id	NC Type	NC Name	Acres	EO Rank	Significant	Descript	Soil	Condition	Notes
10	54	54a Hemlock-Hardwood Swamp	0.23	Local		Hemlock-black ash sloping seepage swamp with skippy canopy of pole+ black ash, plus few yg. hemlock & yellow birch. Dense Carex scabrata @ N. end; thick Mniium-Cinna latifolia-Impatiens cap. & others. 5-15m wide; drains NW.	50cm somewhat woody muck over gray & "calf-scours" yellow silt.	Tipover hemlocks present. Intact example; not weedy.	
11	55	55 Seep	0.11	Local		Rich seep, ~15x20m, on bench at toe of major slope. Mostly shaded. Herb layer with dense Mitella nuda, Cystopteris bulbifera, Tiarella, + seep spp.	25cm v. dark brown firmish muck; 10cm olive-gray silt w/ large	Natural; large recent hemlock tipover. Nice, but unusual example.	
12	12	12 Hemlock-N. Hardwood Forest	0.85	Local		Unusual rich hemlock-northern hardwood forest set in shallow cove of gentle slope. Carex plantaginifolia abundant in swales, plus other indicator species. Carex pedunculata abundant. 1 patch Dryopteris goldiana	Wet mesic soil w/ 5cm OA over mottled silt. Well-developed pit & mound microtopo	Mature; some hardwood recently cut out of hemlock. Unusual spot.	
13	90	90ab mixed sloping seepage forest	0.01			Part of 15m wide mixed sloping seepage forest (hemlock sugar maple-fir-black ash-red maple) cutting across NW corner of property.	Wet-mesic silt loam (Cabot series).	Rutted by skidder traffic. Most of NC off property.	
14	12	12 Hemlock-N. Hardwood Forest	0.33			Small pocket (~15x50m) hemlock-n. hardwood forest in depression on broad flat. Trees on hummocks in hollow matrix. Herbs: Schizachne, Poa alsodes, Carex pedunculata, Polystichum acro., Dryopteris intermedia. Irregular topography adjacent wetlands of westside drainage, incl. v. steep-sided, stoneless, camel's hump shaped hillock SE of cedar swamp. Mixed forest incl. hemlock, fir, white spruce, white pine, & n. hardwoods. Dense fir regen frequent.	30cm black, greasy OA, over tannish silt loam B. Moist but not wet. Might hold water west.	Mature, even-aged forest. Snowmobile trail 10m to west.	polygon not visited. This forest does not fit well into classification. Some areas might be hemlock-n. hardwood forest.
15	5	5 Red Spruce-N. Hardwood Forest	20.10			Lower slopes of west side of hill: sugar maple, beech, hop hornbeam, birch with some large hemlock, both living and snags. Dense fir regeneration many places. Gently sloping cedar swamp w/ intact portion dense, even-aged mature swamp practically devoid of groundcover, and clearcut portion w/ dense moss & sedge mat. Sedges incl. Carex flava, C. hystericina, C. interior. Moss looks Campyllum stellatum.	Variable washed till; some well-drained, others poorly drained. drained till w/ few stone in higher position; less well drained below	Mostly immature due to recent logging. Forested on 1949 topo.	
16	8	8 northern hardwood-hemlock forest	16.33			Old beaver impoundment with standing dead, pole, n. white cedar. Lush sedge-moss mat as noted in clearcut upstream.	50cm sapric muck to gray fine sand. Less than or = 5% grade	Includes recent clearcut, and old cleared area now with mature canopy.	
17	51	51a N. White Cedar Sloping Seepage Forest	2.80				50cm sapric muck over gray fine sand		
18	64	64a beaver meadow	0.36				Mapped as Cabot loam.	Mature, even-aged.	
19	8	8 semi-rich northern hardwood forest	0.44			Small patch of semi-rich forest on moderate, east-facing slope leading down to eastside stream, near N. property boundary. Large butternut snag. Maldenhair fern.			

Pumpkin Hill Town Forest - natural community attribute data

NC Type	NC var	NC Name	Acres	EO Rank	Significant	Descriptor	Soil	Condition	Notes
8	8	Northern Hardwood Forest	48.11			The matrix upland forest. Much of this is plantation red and white pine forest that has been recently cut. Dense sugar maple regeneration in many areas where cut several yrs ago.	Dummerston very fine sandy loam, mapped and as seen in field. Limestone outcrops	Almost all of this formerly field, as shown on 1949 topographic map, that was planted with pines.	
64	64a	beaver meadow	0.27			Calcareous beaver marsh associated with beaver pond, one of several along eastside stream.		Temporary; was likely cedar swamp, to which will eventually return.	
64	64c	beaver pond	0.17	Local		Small (~20x20m) beaver pond with deltaic muddy sandbar prograding into it along incoming stream. Uncommon <i>Eleocharis intermedia</i> on bar. Dense <i>Chara</i> (hardwater indicator) in deepest water, plus <i>Potamogeton</i> (<i>alpinus</i>)	Water with sandbar	Temporary, as most beaver ponds are. Likely was cedar swamp	Of local significance due to presence of uncommon spike-rush (<i>Eleocharis intermedia</i>)
64	64a	beaver meadow	0.38			Calcareous beaver marsh adjacent tiny rich fen along eastside stream. Long beaver dam backs up a narrow (2-3m) openwater impoundment. Dense standing dead, pole, cedar. <i>Phalaris arundinacea</i> & <i>Carex stricta</i> dominating thick herb cover.		<i>Phalaris</i> and <i>Phragmites</i> likely result of agricultural landuse in drainage, though <i>Phragmites</i> maybe native	
63	63	Rich Fen	0.07	Local		Very small (~10x30m) rich fen on very gentle slope leading into beaver impounded marsh. Lush <i>Carex lasiocarpa</i> dominates peat mat, + <i>Carex interior</i> , <i>C. flava</i> , <i>Solidago uliginosa</i> , stunted patch of <i>Typha latifolia</i> , and loose patches of <i>Phragmites</i>	50cm brown, fibrous peat (can squeeze out muddy water) over olive-gray silt. Supersaturated	Natural, with no trees growing in open mat. <i>Muhlenbergia glomerata</i> & <i>Parnassia</i> fen indicators present	
64	64a	beaver meadow	0.24			Old calcareous beaver marsh with tiny pond. Pickup sticks of downed cedar & other trees. 50m ² pool of shallow water in 2005, with <i>Leersia oryzoides</i> . <i>Lobelia</i> kalmii present.		Formerly cedar swamp.	
51	51a	N. White Cedar Sloping Seepage Forest	0.16			Sloping cedar seepage forest immediately east of cedar swamp on eastside drainage. Needs more survey work.			
51	51	Northern White Cedar Swamp	3.36	Local		Dense, pole n. white cedar swamp with big, leafy liverwort & big <i>Mnium</i> in some hollows; <i>Rhytidiadelphus triquetrus</i> common moss. Includes <i>Parnassia</i> (rare), <i>Carex castanea</i> , <i>Cirsium muticum</i> (rare). Needs more survey	1m brown (black near surface) sapric-woody peat over gray silt/clay.	Young trees result of heavy cutting regeneration. This polygon likely includes sloping cedar	
5	5	Red Spruce-N. Hardwood Forest	1.16			Small flat in valley bottom with young sugar maple, white ash, fir, cedar and lot of <i>Osmunda</i> (<i>cin.</i> & <i>regalis</i>). With stream cutting deeply along west side, flat appears to be glaciofluvial deposit.	Moderately well-drained loamy soil	Young forest. Needs more survey. Does not fit well into classification.	

Pumpkin Hill Town Forest - Natural community attribute data

Id	NC Type	NC Name	Acres	EO Rank	Significant	Descript	Soil	Condition	Notes
29	12	Hemlock-N. Hardwood Forest	5.47			Hemlock-northern hardwood forest in NE corner. Some areas secondary n. hardwoods-fir forest, esp. in corner.	Mapped as Cabot loam, poorly drained. Only lowest portion likely this soil type	Recently thinned.	vegetation changes caused by land use history. East polygon property boundary ~40m east of where my GPS
30	90	90ab mixed sloping seepage forest	7.73			Mixed seepage forest: cedar-fir-white ash-balsam poplar broken canopy. Geum (macrophyllum), Dryopteris cristata, Rubus pubescens, Osmunda all common herbs. Am. elm seedlings present. Upper portion with logged white pine canopy. Rhamnus alnifolia co	Cabot silt loam	Recently thinned old field forest.	forest needs refinement. Drawn NC boundary extends up minor drainage, well into mapped Dummerston soil.

Rare and uncommon plants attribute data
Pumpkin Hill Town Forest

Id	Com_name	Species	S ₁ Rank	EO Rank	Date_1	Observer	Way point	Notes
0	Swamp Thistle	<i>Cirsium muticum</i>	S3	E	8/17/2005	Brett Engstrom	75	Noted as rare in young cedar swamp/sloping seepage forest on east side drainage. With <i>Parnassia glauca</i> , <i>Carex castanea</i> , <i>Senecio aureus</i>
1	Back's Sedge	<i>Carex backii</i>	S3	D?	9/3/2008	Brett Engstrom	281	10 genets w/ withered fr. stems missing achenes, in 10m2 area, partial shade of secondary hardwood (sugar maple-paper birch) forest, w/ <i>C. communis</i> , <i>C. pedunculata</i> , <i>C. arctata</i> , <i>C. intumescens</i> , <i>Rubus idaeus</i> , <i>Anemone virg.</i> , <i>Smilacina</i> race.
	Matted							Numerous (50+) fruiting plants growing in full sun out of muddy exposed beaver pond bottom. Associated spp.: <i>E. obtusa</i> , <i>Glyceria grandis</i> , <i>Spartanium</i> sp., <i>Impatiens capensis</i> , <i>Bidens cernua</i> , <i>Muhlenbergia mexicana</i> , <i>Senecio schweinitzii</i> , <i>Carex bebbii</i>
2	Spikerush	<i>Eleocharis intermedia</i>	S2S3	B?	9/3/2008	Brett Engstrom	296	One plant w/ single fruiting capsule, either <i>C. reginae</i> or <i>C. pubescens</i> ; in excellent condition cedar swamp on westside drainage. Associated spp.: <i>Osmunda cin.</i> , <i>Rubus pubescens</i> , <i>Dalibarda repens</i> , <i>Carex interior</i> , <i>Saxifraga pensyl.</i>
3	yellow or showy ladyslipper	<i>Cypripedium sp.</i>	S3	E	9/3/2008	Brett Engstrom	299	
4	yellow or showy ladyslipper	<i>Cypripedium sp.</i>	S3	E	9/3/2008	Brett Engstrom	304	3 clumps of either <i>C. reginae</i> or <i>C. pubescens</i> growing in seep feeding mixed sloping seepage forest/swamp.
5	Hay Sedge	<i>Carex argyrantha</i>	S2	B?	10/8/2008	Brett Engstrom	550	10 vigorous fruiting genets in 50m2 area, w/ 10-20 fr. culms/genet, along trail. Culms up to 1 m tall. Many of perigynia already fallen. Growing among rank blackberry, goldenrod, <i>Muhlenbergia mex.</i> Partial shade. Part of larger population.
6	Hay Sedge	<i>Carex argyrantha</i>	S2	B?	10/8/2008	Brett Engstrom	551	~75 fruiting genets along ~100m of lower stretch, Pop's Path. Only along edge of trail, on moderate, SW-facing slope. Soil: old field fine sandy loam w/ 5cm A horizon. Dense sugar maple sapling-pole woods w/ broken supercanopy white pine
7	Goldie's Fern	<i>Dryopteris goldiana</i>	S4	D	10/8/2008	Brett Engstrom	557	One patch in unusual rich hemlock-hardwood forest with rich seep. With <i>Cystopteris bulbifera</i> , <i>Carex plantaginea</i> , <i>Adiantum pedatum</i> , etc.
8	Swamp Thistle	<i>Cirsium muticum</i>	S3	A	10/10/2008	Brett Engstrom	567	Large population with many old fruiting stalks (last year's), in full sun of fenny openings in mixed sloping seepage swamp. Associated spp.: <i>Carex interior</i> , <i>Senecio aureus</i> , <i>Prunella vulgaris</i> , <i>Ranunculus septentrionalis</i> , <i>Typha latifolia</i>
9	Swamp Thistle	<i>Cirsium muticum</i>	S3	E	10/10/2008	Brett Engstrom	572	One set of basal leaves in logged N. white cedar sloping seepage forest along eastside drainage. Found further downstream as well.
10	Mountain Fly-honeysuckle	<i>Lonicera villosa</i>	S3	D?	10/10/2008	Brett Engstrom	576	One 3x3m2 dense patch in open portion of mixed sloping seepage forest, all former field. With abundance of <i>Rhamnus alifolia</i> . Cabot silt loam soil.
11	Matted Spikerush	<i>Eleocharis intermedia</i>	S2S3	E	10/10/2008	Brett Engstrom	578	Fruiting genets growing on exposed, muddy sandbar in beaver pond. Associated spp.: <i>Glyceria grandis</i> , <i>Bidens cernua</i> . East side drainage.

3/19/2009

APPENDIX C
Bird Habitat Information



Forest Bird Habitat Assessment

**Pumpkin Hill Town Forest
Danville, VT**

**Prepared by
Katie Manaras
October 26, 2010**

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Introduction

The purposes of this document are to 1) provide an assessment of forest bird breeding habitat on the Pumpkin Forest, one of two town forests in the town of 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 96 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.

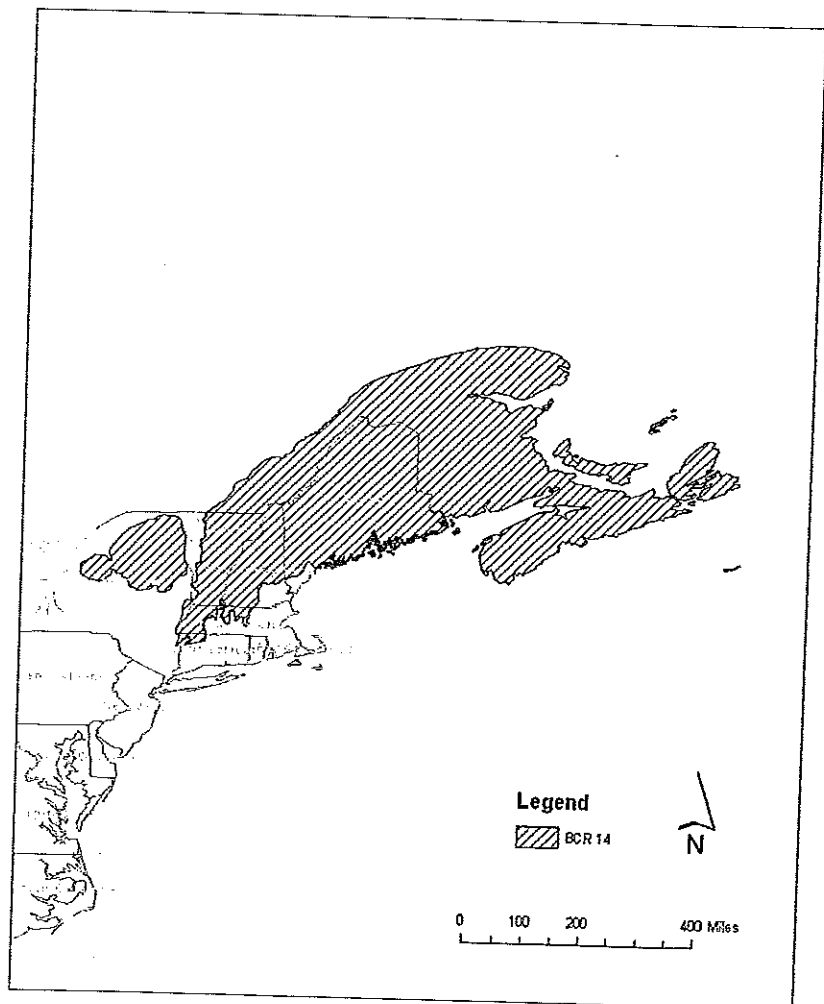


Figure 1 - BCR 14

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 Pumpkin Forest is roughly 90% forested, with the remainder of the land mostly in agricultural use or open land (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.

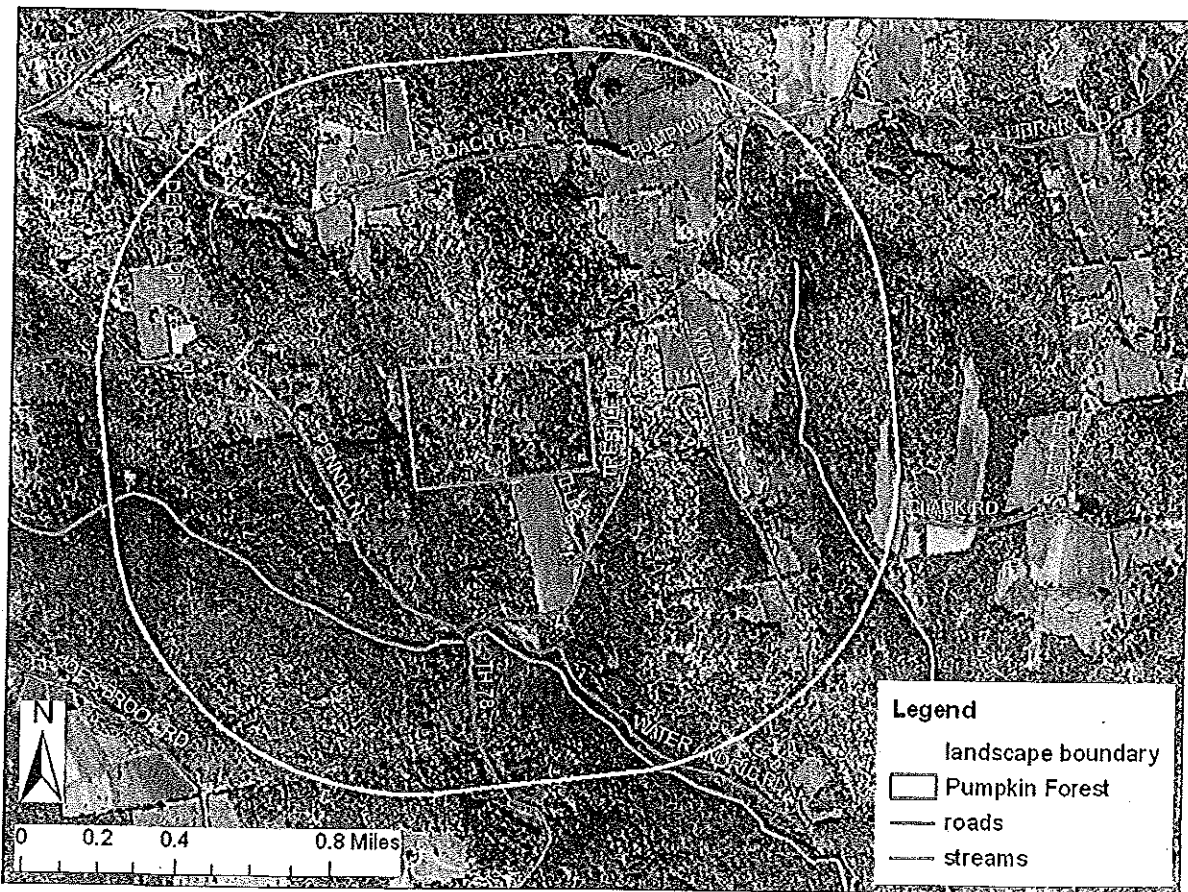


Figure 3. 2,500 acre landscapes surrounding the Town Forest.

Some young forest habitat is available on the landscape, including a small patch in the town forest itself. 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 target amount 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.

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 4 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 ignarius* 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 of 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 92 acres

Description

This habitat unit accounts for the entire property, excluding patches of young forest and open land at the parking area, and two small wetland patches.

Assessment of Current Conditions

Forest Canopy (>30 ft height)

Dominant Tree Species: *white pine, yellow birch, paper birch, American beech, sugar maple*
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. Hardwoods dominate in higher, drier sites on the property.

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). Here, white pines are generally older and taller than the hardwoods, creating a “super-canopy” that emerges above the hardwoods.

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).

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): *moderate*

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



Figure 4. An overstory of white pine with well-developed understory and midstory layers of hardwood trees offers nesting opportunities for a diversity of bird species.

30 ft of the ground. This habitat unit appears to be transitioning between an old-field white pine forest and a northern hardwood forest featuring more shade-tolerant tree species such as sugar maple and beech. Those hardwood species are abundant in the understory, most likely in response to the break-up of the white pine canopy. The multiple canopy layers create opportunities for birds that nest at many canopy heights. For example, blackburnian warbler, which nests in the high canopy in coniferous trees, and black-throated blue warbler, which nests in the understory in hardwood seedlings and saplings, were both observed in the area. In one area in the north-central part of the forest, a red pine plantation was removed, and now a stand of sugar maple poles is developing.

Dominant Understory/ Midstory Species: *sugar maple, red maple, stripped maple, white ash, yellow birch, American beech*

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, stripped maple and beech are 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*

Coarse woody material appears to be minimal in this habitat unit, most likely due to the young age of the forest. Large woody material on the forest floor is not only important to cycle nutrients, keep soil healthy and support a community of soil and log-dwelling invertebrates and amphibians. It is also used by forest birds as a perch for singing or – in the case of ruffed grouse – a perch for their mating display, also called drumming.

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

Smaller diameter material, particularly when aggregated into piles, provides potential cover, foraging areas, and singing perches.

Leaf Litter: high

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

- White-throated sparrow
- Veery
- Northern parula
- Blackburnian warbler
- Eastern wood-pewee
- Black and white warbler
- Black-throated green warbler
- Black-throated blue warbler
- Ruffed grouse
- Ovenbird

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).

White pine may become naturally less abundant on the property over time, as the forest matures. Retaining inclusions of white pine, hemlock, and other softwood species will help to maintain bird diversity on the property.

2. Early-successional habitat – approximately 2 acres

Area Description

Patches of regenerating forest are located on either side of the open field which serves as a parking and picnic area.

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, where small dense hardwood stems reach heights of between 5 and 15 feet. This habitat type can be the result of either forest clearing or field abandonment.

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

Dominant Understory/ Midstory Species: *red maple, white pine, blackberry and raspberry*

Disturbance-dependent birds are known to nest in blackberry and raspberry as well as woody saplings and shrubs. These fruit bearing plants offer an important food resource as well. While most migratory birds' diet are invertebrate-based during breeding season, they tend to be fruit-based during the post-breeding season (variable by species, but generally August and September), when the birds are preparing energetically for a long migration to their wintering grounds.

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
- White-throated sparrow

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. It is recommended that the current area (about 2 acres) be maintained or expanded to up to 4 acres in size.

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.

3. Wetlands – approximately 1 acre

Area Description

This habitat unit includes a cedar swamp and adjacent fen in the northeast corner of the property. Both the cedar swamp and fen are unique on the property, adding biodiversity by representing natural communities not found elsewhere on either town forest. Fens are considered rare in Vermont, occupying a small number of sites and a small total area in the state. While cedar swamps are not rare, per se, they are restricted by climate and geology to a finite number of sites.

The beaver flowage to the west of the property is not described here, but it is addressed in the management options, since activity on the property could affect the wetland. A Canada warbler (bird of high conservation concern) was observed in the old beaver pond, from the edge of the property.

Assessment of Current Conditions

Forest Canopy (>30 ft height)

Dominant Tree Species: *northern white cedar, white ash*

Dominant Tree Size Class(es): *pole*

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

This area appears most suitable for birds with a preference for semi-open canopy conditions and understory growth (for example, black-throated blue warbler, veery).

Snags and Cavity Trees: *low*

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): *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.

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

Dominant Understory/ Midstory Species: *balsam fir, willow*

Forest Floor

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

Logs >10" in diameter on the ground would provide male ruffed grouse with more drumming site opportunities.

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

Smaller diameter material, particularly when aggregated into piles, provides potential cover, foraging areas, and singing perches for birds of the lower forest layers.

Leaf Litter: low

Leaf litter is low here due to the dominance of coniferous trees. Wood thrush, veeries and ovenbirds are more likely to be found in upland hardwood and mixed forest sties on the property.

Additional Habitat Features

A small fen (wetland fed by nutrient-enriched groundwater) is adjacent to the cedar swamp. This area is dominated by herbaceous plants such as cattails and sedges. Birds of open areas, such as American goldfinch (not a responsibility species) are likely to use this area. White-throated sparrows may find suitable nesting sites along the shrubby edge.

Responsibility Bird Species Observed

- Black-throated blue warbler
- Veery

Desired Future Habitat Conditions

This small area is unique on the property and current conditions are desirable. Managing the area passively (as a biological reserve) will allow the structure to continue to diversify naturally over time.

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 the wetlands and in a buffer around them to protect biodiversity and water quality values.**
- ✓ **Additional wetlands:** There is a large beaver flowage to the west of the property, near the northwest corner. Most of this wetland is thought to fall outside the property (according to the town's tax maps), but no survey was done. A small hemlock swamp (not mapped) was noted near the beaver flowage.

4. Open land - approximately 1 acre

Description and Management Options

This habitat unit represents the open land around the parking and picnic area at the end of Town Highway 62. Because the area does not appear to be suitable breeding habitat for any responsibility birds, it may be managed for other goals, such as aesthetics and recreation. It is possible that American woodcock use the area in the early spring to perform their elaborate mating display, and mowing the grass will not interfere with this use.

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

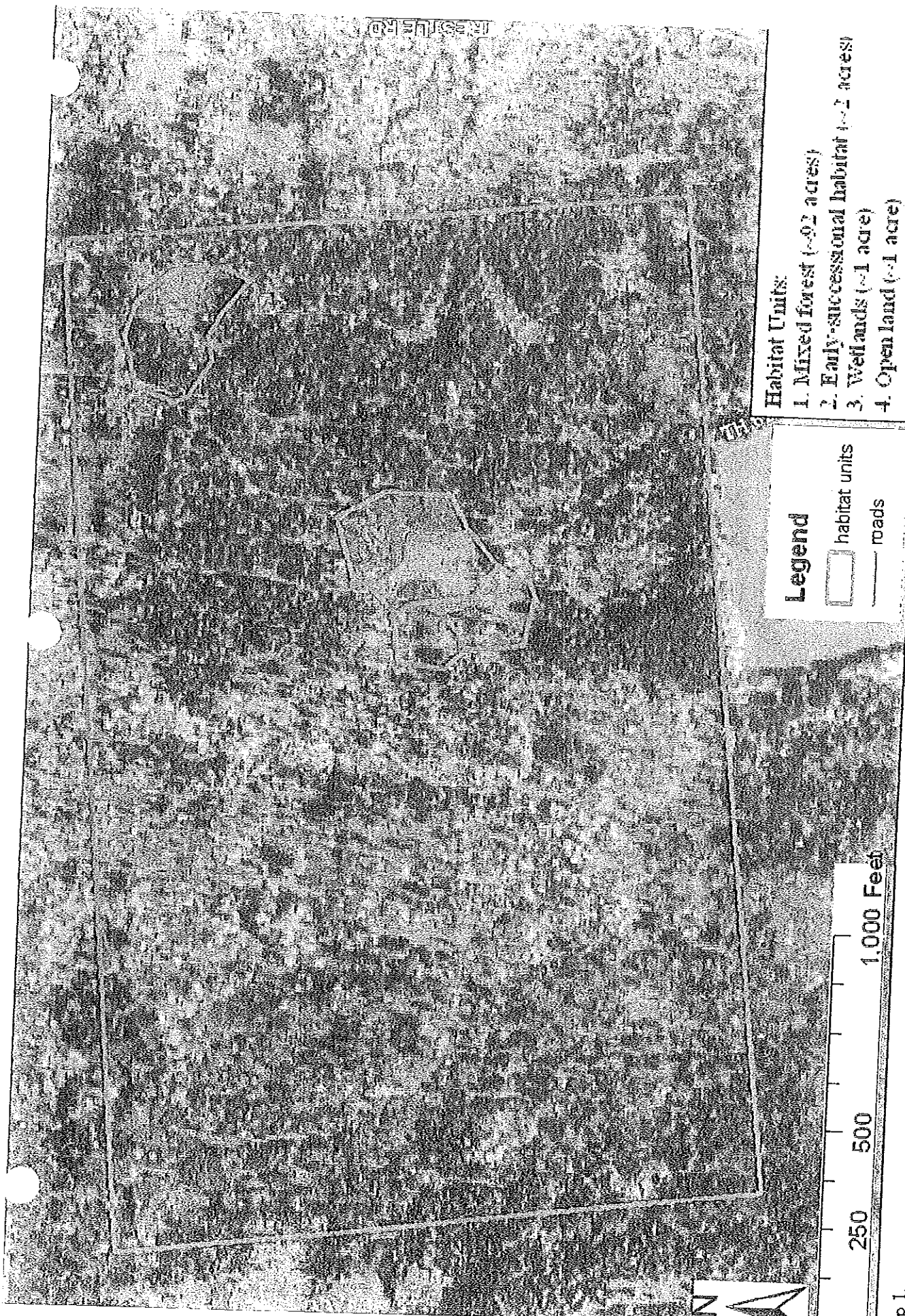


Audubon VERMONT

Bicknell's Thrush	Louisiana Waterthrush
Wood Thrush	Northern Parula
Canada Warbler	Blackburnian Warbler
Bay-breasted Warbler	Black-throated Green Warbler
American Woodcock	Ovenbird
Olive-sided Flycatcher	Yellow-bellied Flycatcher
Rusty Blackbird	Gray Jay
Cape May Warbler	Palm Warbler
Chestnut-sided Warbler	Northern Flicker
Veery	Black-backed Woodpecker
Eastern Wood-Pewee	Tennessee Warbler
Purple Finch	White-throated Sparrow
Yellow-bellied Sapsucker	Mourning Warbler
American Redstart	Spruce Grouse
Boreal Chickadee	Magnolia Warbler
Black-throated Blue Warbler	Alder Flycatcher
Chimney Swift	Nashville Warbler
Ruffed Grouse	Lincoln's Sparrow
Blackpoll Warbler	Swamp Sparrow
	Blue-headed Vireo
	Scarlet Tanager

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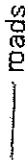
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Habitat Units

1. Mixed forest (~92 acres)
2. Early-successional habitat (~2 acres)
3. Wetlands (~1 acre)
4. Open land (~1 acre)

Legend

-  habitat units
-  roads



Map 1.

**Pumpkin Hill Town Forest
Danville, Vermont**

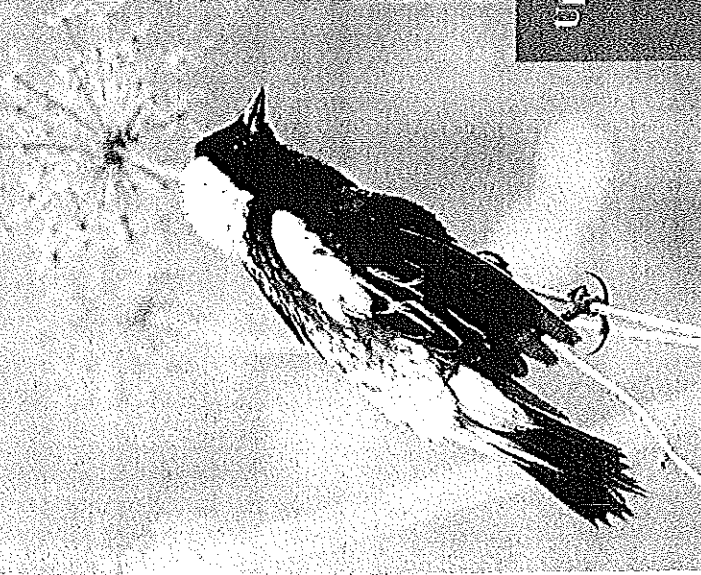


Audubon VERMONT

Prepared 10/26/10 KM

Not a survey. All boundaries approximate

Bobolink



Birds That Nest in Grasslands

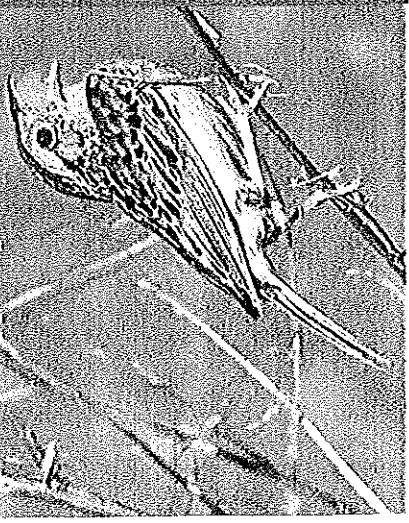


Field Sparrow

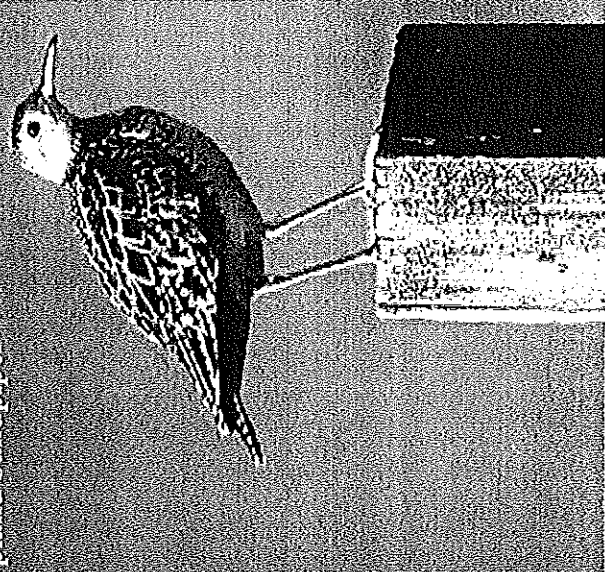
Savannah Sparrow



Grasshopper Sparrow

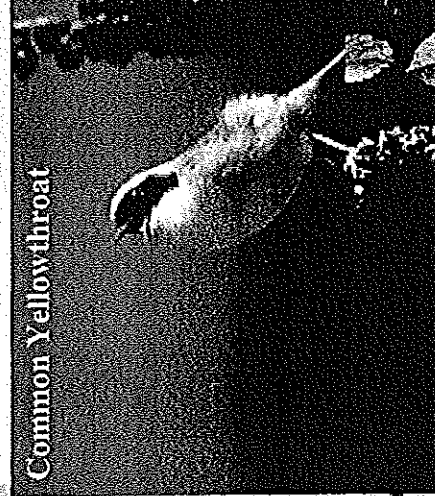
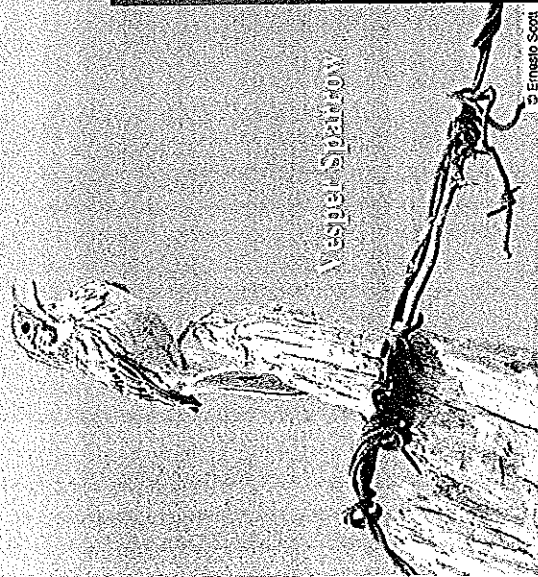


Upland Sandpiper



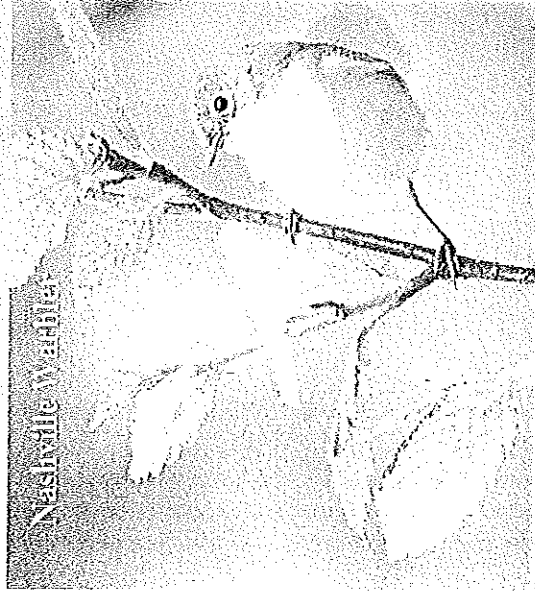
Habitat Enhancement for Bird Diversity
The Fairbanks Museum and Planetarium, 2011

Birds That Nest in Shrub Habitat



Habitat Enhancement for Bird Diversity
The Fairbanks Museum and Planetarium, 2011

Birds of Early Successional Forest



Nashville Warbler



Indigo Bunting



Chestnut-sided Warbler



White-throated Sparrow

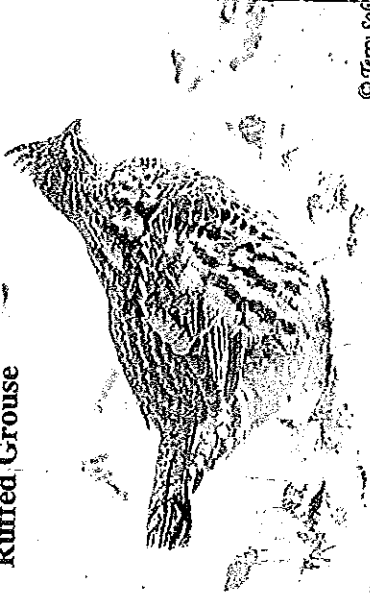


Rose-breasted Grosbeak

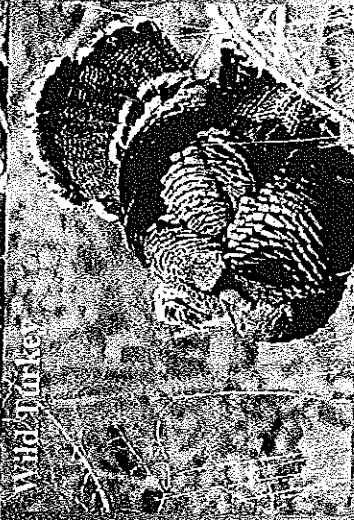
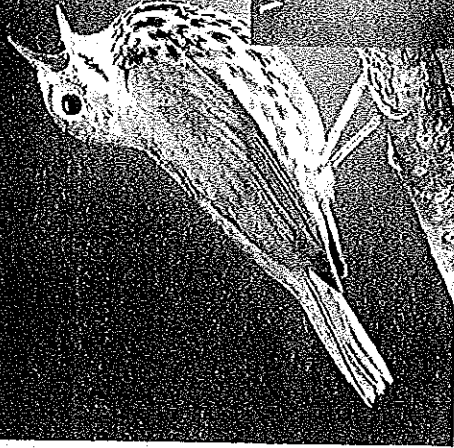
Habitat Enhancement for Bird Diversity
The Fairbanks Museum and Planetarium, 2011

Birds That Nest on the Forest Floor

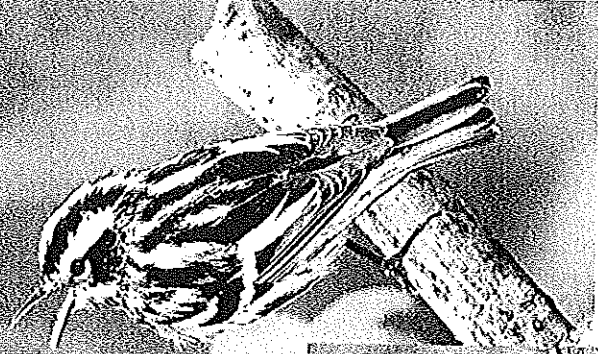
Ruffed Grouse



Ovenbird



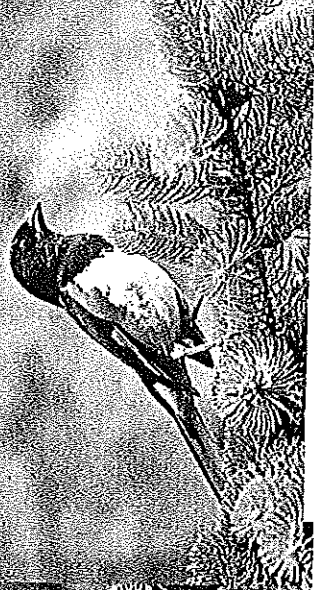
Black-and-white Warbler



White-throated Sparrow

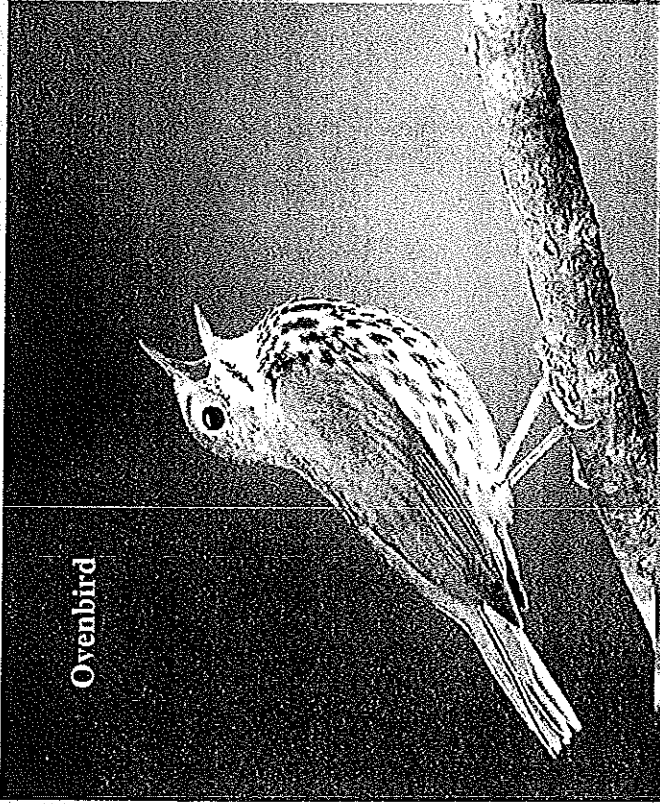


Eastern Towhee

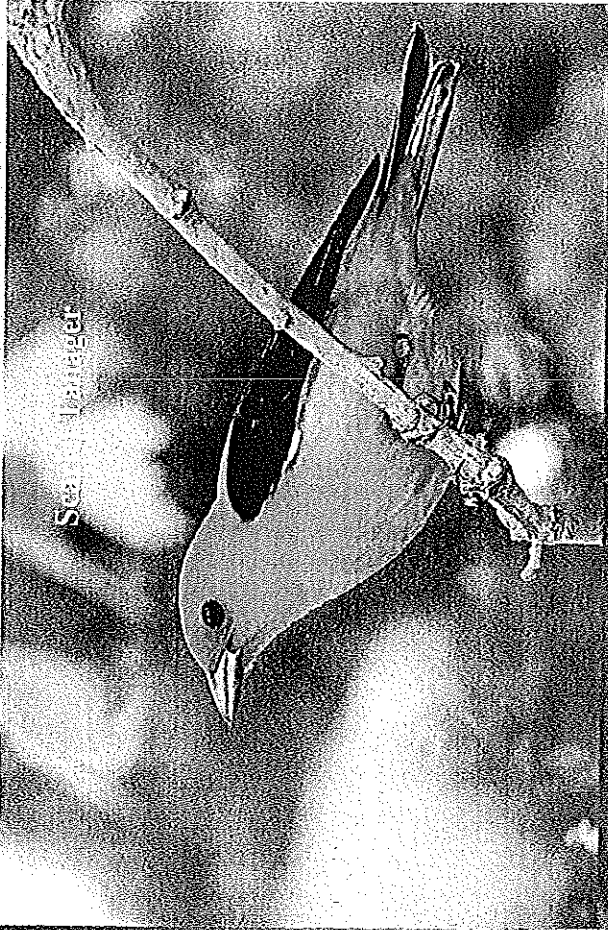


Habitat Enhancement for Bird Diversity
The Fairbanks Museum and Planetarium, 2011

Birds of Deep Deciduous Forest



Ovenbird



Seaside Sparrow



Wood Thrush



Red-eyed Vireo

Habitat Enhancement for Bird Diversity
The Fairbanks Museum and Planetarium, 2011

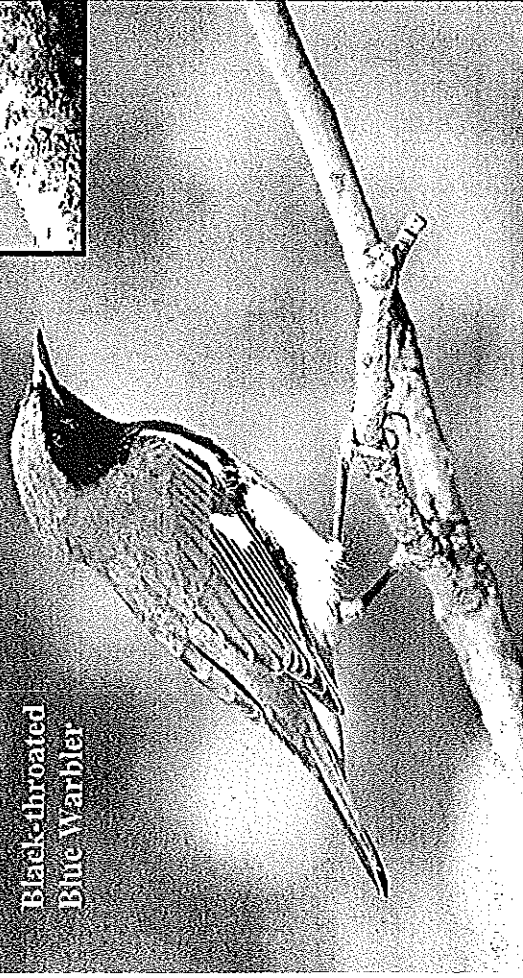
Birds That Nest in Dense Understory



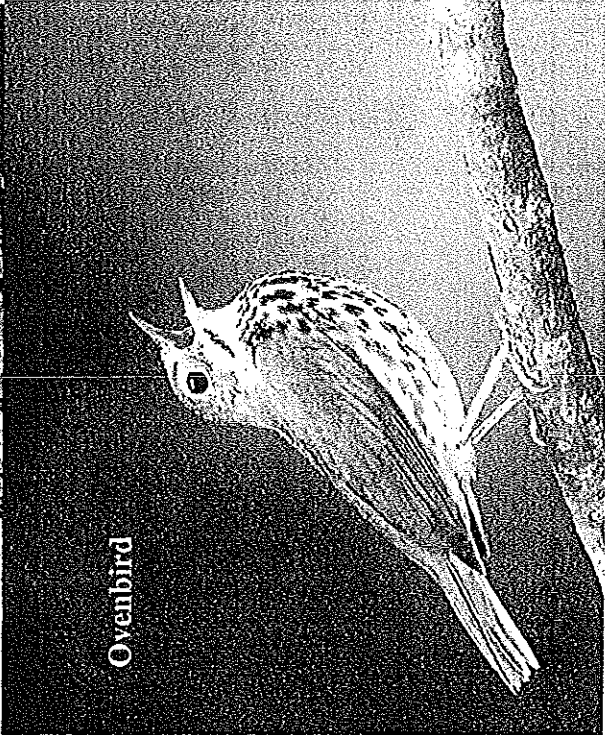
Wood-pewee



Nighthawk Warbler

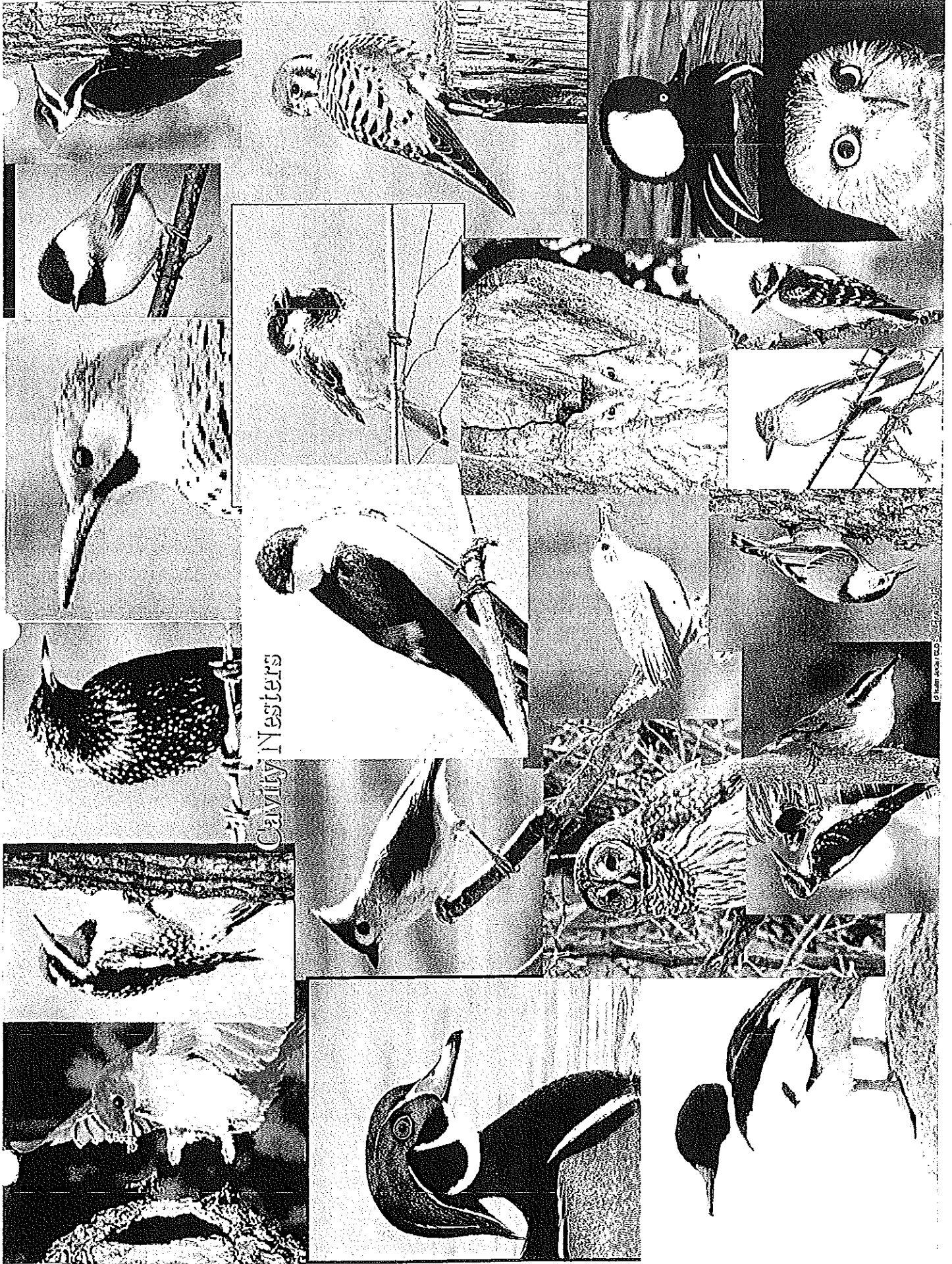


Black-throated Blue Warbler



Ovenbird

Habitat Enhancement for Bird Diversity
The Fairbanks Museum and Planetarium, 2011



Cavity Nesters

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APPENDIX D

**Deed Research and Historical
Information**

Appendix A

DANVILLE Vermont
AUGUST 27, 1960

Department of Forests and Parks
Montpelier, Vermont

Gentlemen:

We, the undersigned selectmen of the Town of DANVILLE, Vermont, wish to designate the following land which we own as a municipal forest in accordance with Sections 7088 to 7091 inclusive of the Vermont Statutes as amended.

Description:

Meadow known as the "Town Ponds" located on the westerly part of Danville, which land has been in the possession of the Town of Danville for well over one hundred years. Approx. 125 acres.

Also ten acres meadow, known as the "Larree Lot" located on the westerly part of Danville, acquired by Tax Collector's Fred S. Torrey on 1, 1951, recorded in Book 11, Page 26.

The above is in addition to the Horton Rodger Place of 117 acres.

Yours very truly,

W. J. [Signature]
[Signature]
[Signature]

Selectmen
of the
Town of

APPROVED:

Albert W. Gottlieb
ALBERT W. GOTTLIEB
State Forester
September 6, 1960
Date

Appendix A

Sheet No. 1

COOPERATOR'S WOODLAND RECORD

Date farm planned _____ Original V. F. S. Request _____ S. C. D. No. _____
 Owner or farm name Devville Jean Forman Town Devville Tenn Photo No. _____
 Manager or operator _____ V. F. S. No. 303-230
 Correspondence address Mountain Hill, Devville, Vermont and Diamond Hill Tel. No. _____
 Acres in total farm 243; in natural woodland _____; in plantations _____
 Acres woodland grazed _____ Total acres woodland planned _____
 Soils map (is) (is not) available. Woodland (is) (is not) important in farm economy. Cooperator's interest is (high) (low).
 Production is planned for home use _____; commercial sales _____; protective cover _____; wildlife _____; sugar bush _____
 County Forester (is) (is not) needed _____
 Notes: 1-25-57. Found notes that they added 117 acres to above.

WORK RECORD

Date	Area (Acres)	Work Done	Total Volume Harvested	Man days Involved	Value			Buyer
					Stump	Rd. side	Mill	
2-7-47	125	Reconn.-advice						
4--50	5	Pltg.-Pn						
5--51	5	Pltg.-Pn						
5--52	5	Pltg.-Pn						
6-30-56	2	Pltg.-Pn-700-4 Yr. old.						
7-30-56	1	Prog.	2 cda. pulp					
7-30-57	15	Thng. plnts.	141 cda. pulp		141.			
	15	Pltg.-Pn						
	20	Harvest	14,750 bd. ft.		216.75			
Total plantings		27,000 trees (1500-12.8)						

*List by products and species - lumber, pulpwood, fuelwood, maple syrup, other.

NOTES ON LOGGING CHANGE RECOMMENDATIONS, ETC.

2-21-53. See 125 acres. Firry were entered before our time, loading in mill; older plantations need thinning; balance of open land is being planted yearly - mostly done has trust fund. Annual increment is used for forestry.
 4-14-53. Forget to order trees.
 ? ? ? Natural stand on the bulk of the area was logged and dispersed before our time, but is coming on well. Older plantations need thinning and spruing. This area has the old Jean Form - no longer needed.
 3-17-55. Nothing to report yet.
 2-21-56. Nothing to report yet.
 6-30-56. Planted 2 acres to 2 1/2, 4 years old. Mixed layers of plantings, and 2 cda. of pulp.
 2-1-57. Selection authorized to acquire additional 100 ac. private forest.
 7-30-57. Reported that the county had added 117 acres to total - not at 243 acres.
 4-24-58. In working. See to 2 acres.

Appendix A

CONSERVATION PLAN MAP

Prepared by U. S. Department of Agriculture, Soil Conservation Service, cooperating with Soil Conservation District

Owner	Address	State	Soil Conservation District
Operator	Address	County	Phase
Township	Acres	County	Plan No.
Photo No.		County	Date Prepared

Scale 1" = 660' App



