Forest Bird Habitat Assessment

Canton Land Conservation Trust
Canton, CT

161.94 Mapped Acres




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Prepared for: Canton Land Conservation Trust

Prepared by:
Audubon Connecticut
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Bird photos courtesy of Patrick Comins, Audubon Connecticut and AJ Hand (left to right): Black-throated Blue Warbler, Scarlet Tanager, Wood Thrush, and Black-throated Green Warbler.
All other photos are from this property and are courtesy of Ferrucci & Walicki, LLC unless otherwise noted.

Background

Breeding bird surveys have shown that the forests of New England are globally important for bird populations. Connecticut's **forests are home to some of the highest concentrations of bird species breeding in the continental United States;** they are a "nursery" for approximately 70 species of neo-tropical migratory birds. Although some of these birds are still common in our area – **many are experiencing long-term population declines and have been identified by Audubon Connecticut as *Priority Species*.** Audubon Connecticut's Forest Bird Initiative focuses its conservation efforts on ***Priority Species*** giving us an opportunity to keep these species common before they become threatened or endangered.

Since 85% of our region's forests are privately-owned, large blocks of forest may be owned by hundreds of individual landowners with different priorities. Even the smallest properties can be critical parts of large forested landscapes that provide high-quality habitat for breeding birds. **Small actions by individual forest landowners can have a significant impact on maintaining large blocks of high quality habitat for future bird populations.** Audubon Connecticut is partnering with foresters, the Department of Energy and Environmental Protection, and the Connecticut Agricultural Experiment Station, to provide **technical assistance and educational opportunities for landowners** who want to make a difference for birds in their forests. If you are interested in taking the next steps in improving and diversifying your woods with birds in mind, specific activities may be eligible for cost-share through the USDA Natural Resources Conservation Service (NRCS). The NRCS is a federal agency whose mission is to help farmers and landowners complete activities that improve conservation values on their properties.

Habitat assessments and bird surveys are provided to qualifying landowners free of charge due to generous support from the U. S. Forest Service, the Northeast State Foresters Association and individual donations.

Purpose

Information in this report is presented from the landscape level to the property level. This assessment was conducted by an Audubon biologist, Connecticut Agricultural Experiment Station technicians, and a Connecticut licensed forester in order to:

- Determine what birds are currently utilizing the habitats on the property.
- Describe and assess current forest bird habitat conditions on the property.
- Make recommendations for protecting and improving habitat for a suite of priority forest birds.

Birds and Habitat Types

The Bird Watcher's Dozen, listed on page 3, is a representative subset of Connecticut's Priority Birds. These species are relatively common in CT and were the birds we focused on during your habitat assessment. A forest with suitable habitats for these species likely provides habitats for a wide range of additional species.

The Birdwatcher's Dozen - Connecticut

American Woodcock
Call: Peent
Habitat: Deciduous woods with a dense understory. Requires some open areas for courtship display.

Black-throated Blue Warbler
Song: Beer, beer, beer, bee
Habitat: Deciduous or mixed woodlands with 50-80% canopy cover and a dense shrub understory. Sensitive to forest fragmentation.

Black-throated Green Warbler
Song: Zee, zee, zee, zoo, zee
Habitat: Strongly associated with Hemlocks. Prefers a closed canopy and uneven-aged woodlands.

Chestnut-sided Warbler
Song: Please, please, please to meetcha
Habitat: regenerating deciduous woods of 5-10 years old.

Eastern Wood Pewee
Song: Pewee or wee ooh
Habitat: Prefers deciduous woods with a nearly closed canopy and an open mid-story. Snags serves as foraging perches.

Louisiana Waterthrush
Song: Hey, hey, hey, watch where your going
Habitat: Forages along woodland streams, nests adjacent to stumps and other woody debris, prefers a nearly closed canopy.

Pileated Woodpecker
Song: Key, key, key, key, key....loudest in the middle
Habitat: Requires large trees for nesting and roosting cavities. Forest block size and the presence of snags are also important.

Red-eyed Vireo
Song: Here I am, where are you
Habitat: Requires moderate understory vegetation. Forages in the mid-story and canopy. Often found near canopy gaps.

Scarlet Tanager
Song: A scratchy cheerily, cheerilo; the call sounds like chick burr.
Habitat: Uneven aged deciduous woods (oaks and maples) with a mostly closed canopy.

Veery
Song: a descending spiral of notes
Habitat: Deciduous woods with a moderately closed canopy and a dense understory. Uses woody debris for nest sites and shelter. Often found in riparian areas.

Wood Thrush
Song: Eolay, ching, ching
Habitat: Deciduous or mixed woods with a closed canopy and a moderate mid-story and shrub layer. Likes a fairly open forest floor with damp soil.

Worm-eating Warbler
Song: an insect like trill
Habitat: Found on slopes with mature deciduous or mixed trees. Prefers a closed canopy and a shrubby understory.

Developed by Audubon CT with support from NEFA and USFS. Photos by AJ Hand, P Comins, and C Folsom-O'Keefe.

Priority Birds

We share our northern forests with as much as 90% of the global breeding populations of dozens of species of migratory birds, including the Scarlet Tanager, Wood Thrush, Black-throated Blue Warbler, and Worm-eating Warbler (Partners in Flight). We have a responsibility to look out for the future of these birds because our forests are the core of their breeding range. Audubon Connecticut refers to these birds as **Priority Species**. Fortunately, because these birds are still common in our region, we have the opportunity to protect and enhance their breeding habitat now before they become threatened or endangered. Knowing which species are or may be nesting on your property is a great way to ensure that you're making a positive difference. A full list of species observed on your property during the habitat assessment can be found in Appendix A.

Connecticut Priority Birds					
Mature Hardwoods/Mixed Forest	Confirmed	Potential	Young Hardwoods /Mixed Forest	Confirmed	Potential
American Redstart	X		Canada Warbler		
Black-and-white Warbler	X		Chestnut-sided Warbler	X	
Blackburnian Warbler	X		Eastern Whip-poor-will		
Black-throated Blue Warbler	X		Northern Flicker		X
Blue-gray Gnatcatcher		X	Ruffed Grouse *		X
Blue-headed Vireo	X		Forest Edges/Dense Shrubs		
Broad-winged Hawk	X		Baltimore Oriole		X
Brown Creeper	X		Black-billed Cuckoo		X
Cerulean Warbler			Blue-winged Warbler	X	
Eastern Wood Pewee	X		Brown Thrasher		
Hairy Woodpecker *	X		Eastern Towhee	X	
Hermit Thrush	X		Gray Catbird		X
Hooded Warbler			Indigo Bunting	X	
Northern Goshawk			Orchard Oriole		
Ovenbird	X		Prairie Warbler		
Pileated Woodpecker *	X		Rose-breasted Grosbeak	X	
Purple Finch		X	Yellow-billed Cuckoo		
Red-eyed Vireo	X		Riparian Corridors or Wetlands		
Red-shouldered Hawk	X		Barred Owl *		X
Ruby-throated Hummingbird	X		Eastern Kingbird		X
Scarlet Tanager	X		Eastern Screech Owl *		X
Sharp-shinned Hawk		X	Great-crested Flycatcher	X	
Veery	X		Least Flycatcher		
Winter Wren		X	Louisiana Waterthrush	X	
Wood Thrush	X		Willow Flycatcher		
Worm-eating Warbler			Mature Softwood Forest		
Yellow-throated Vireo		X	Pine Warbler	X	
			Black-throated Green Warbler	X	

* denotes year-round residents.

How the Assessment Was Done

For the purposes of this report, your property was broken into four areas with distinct land use and land cover types after superimposing the property boundaries over an aerial photograph. We then used a three-pronged approach to evaluate each stand: a biologist from Audubon Connecticut observed which birds were present, a consulting forester [from Ferrucci & Walicki] conducted a qualitative assessment of vegetation and natural features, and a team from The Connecticut Agricultural Experiment Station (CAES) completed a quantitative inventory of vegetation and structural attributes by sampling one point approximately every 5.5 forested acres. A total of 28 sample points were taken. These observations and data were combined into the assessment of your entire property. The Audubon Connecticut bird observations can be found in Appendix A and the CAES quantitative assessment can be found in Appendix B.

Property Summary

Overall this property provides an excellent variety of habitats for many species of birds. Many species of interior forest and forest edge breeding birds were noted during our visit to the property. The mixture of upland mixedwood forest, along with some small open/semi-open areas, small pockets of forested wetland, and a small open water pond all provide important potential food and nesting resources for many species. There are also scattered large diameter trees in the upland hardwood stand.

Right: The large white pine tree in the center of the picture was noted in the south-central portion of Area 1. It has this “wolf” or “cabbage pine” form due to multiple infestations by an insect called the white pine weevil. This is an indication that this tree germinated and became established in full or nearly full sunlight.

Invasive plants are an issue in places on the property and should be addressed in a phased approach. Invasive plants can provide structural complexity that can be beneficial to some nesting and migrant birds so some invasive plants could be allowed to persist over time until native plants can be re-established.

Left: Much of the vegetation in this wet area near the parking lot is composed of non-native invasive plants. Over time, reducing populations of invasives and encouraging the development of native plants can improve habitat conditions on the property.

Hemlock trees on the property currently look to be in fair health though both hemlock scale and hemlock woolly adelgid were noted. Monitor hemlock and consider removing them if they begin to decline. Where safety is not an issue some dead/dying/declining hemlock trees could be left standing so they can help provide habitat as snags and eventually downed woody material. Replanting with some softwoods if necessary can help retain a softwood component if the hemlock are killed.

Landscape Context

The composition of the landscape that immediately surrounds your property affects how wildlife will use the property. Heavily forested landscapes, with large connected blocks of mature forest, will likely contain the suite of forest priority birds. The value in each category highlighted in **color** is the value that best describes this area. The values below are for the 2500 acres surrounding your property.

Feature	Value for forest birds			Comments
	Good	Fair	Low	
% Forest Cover	**>70% of area**	50-70% of area	<50% of area	Very little development surrounds the property, and most of the land is forested.
Forest Block Size	**>2500 acres**	500-2500 acres	<500 acres	Development, parcelization and fragmentation are uncommon, and the forest block is larger than 2,500 acres. Adjacency and proximity to other conserved (CLCT and MDC) parcels is helpful.
% Established Forest >20 years (with some old forest >100 years)	**>80% of forest**	70-80% forest	<70% forest	Based on the aerial photo it appears as though most of the forest in this area is established forest
% Young Forest <20 years	3-5% of forest	5-10% of forest	**<3% or >10% forest**	There appears to be minimal amounts of young forest in this area (<3%).

Landscape Description

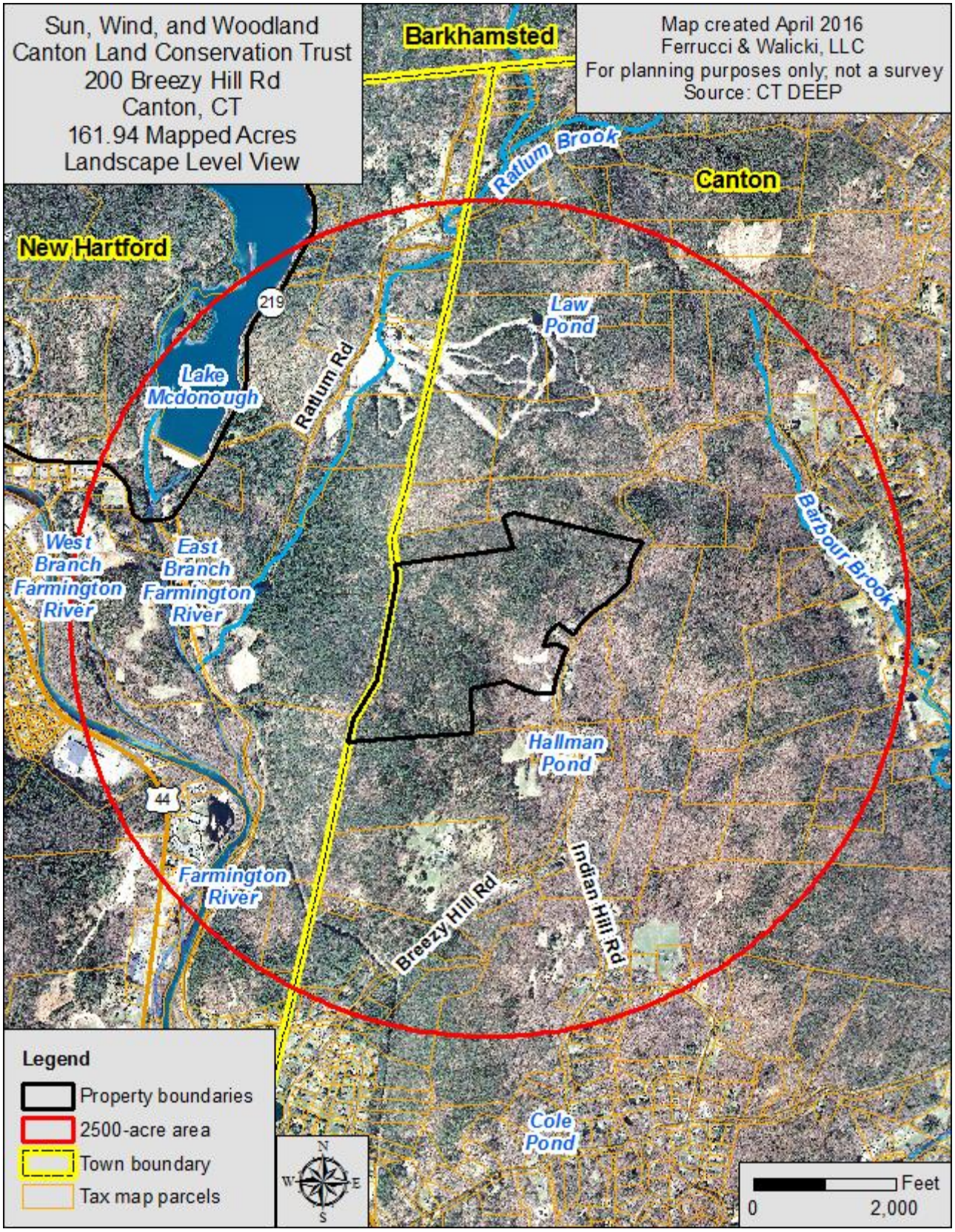
As seen on the maps on pages 7 and 8, this property plays an important role on a landscape level. It is one of several properties that the Canton Land Conservation Trust has conserved within a fairly large contiguous area of forest. In addition to the properties conserved by CLCT, the property is also near the Metropolitan District Commission's New Hartford/Barkhamsted property, which is a very large actively managed watershed forest.

Development is fairly limited and includes a ski area (Ski Sundown) to the north, and small clusters of development to the east and west. Most of the development east of the property is moderately sized residential lots, and the development to the west is the more concentrated downtown area of New Hartford.

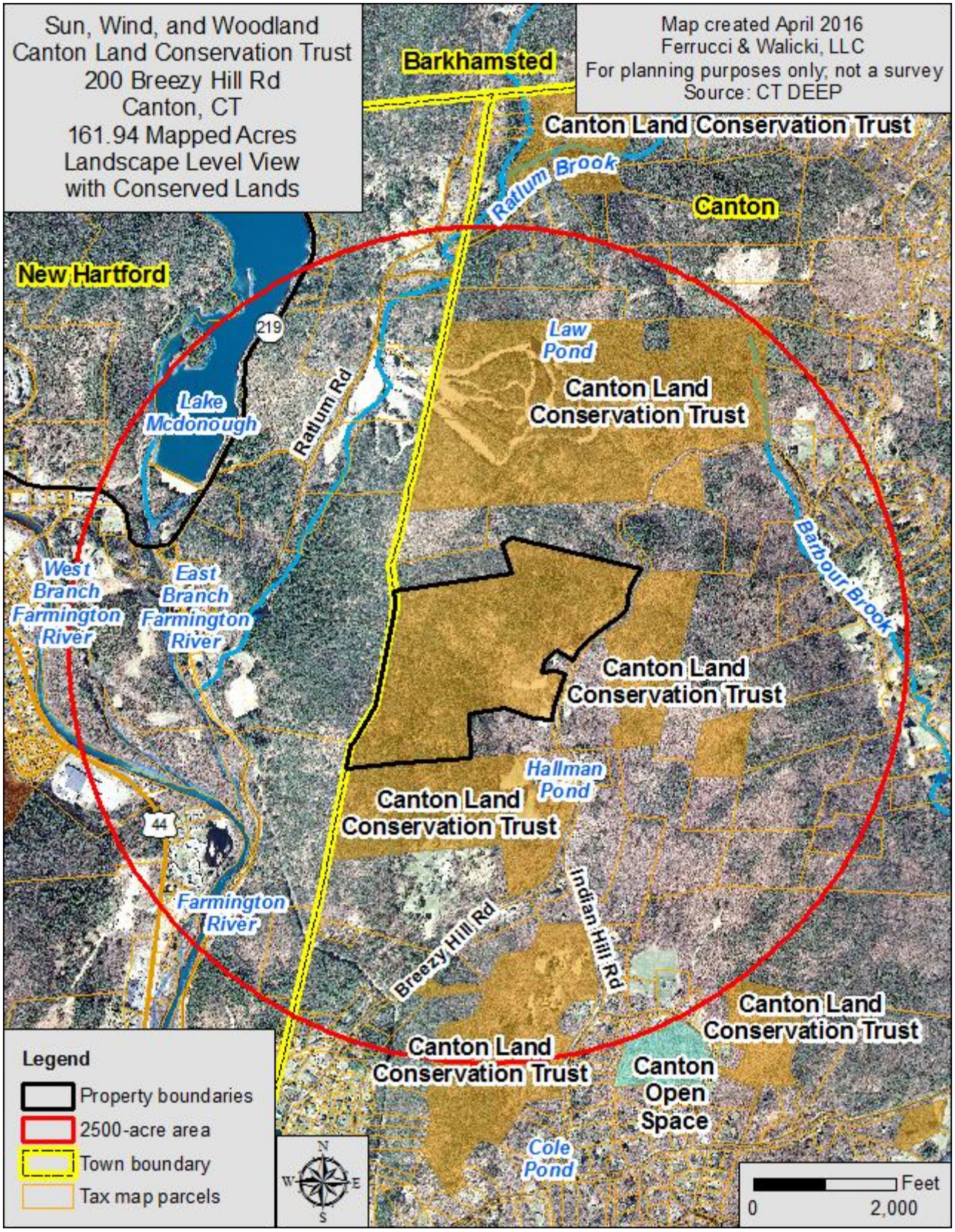
The location of the property in the context of its surroundings is important. It is within a relatively large "green" space, which can help it act as a magnet for wildlife – particularly migrating and nesting birds which can see it from the air. In addition to the location of the property and the softwood component in the forest, the forested wetlands, ephemeral streams, potential vernal pools, small open pond, and managed open areas all provide additional habitat opportunities.

The water features, open and semi-open areas, and the softwood forest features are important on the micro and macro landscape levels. Continuing to protect water quality and soil integrity while maintaining and enhancing the health, diversity and structural complexity of native vegetation on this property will enhance habitat quality.

Landscape Context Maps



Nearby Conserved Properties



Property Narrative

General Description

This +/- 162-acre property is located east of Routes 44 and 219 along the western boundary of Canton, Connecticut. As evidenced by open fields, stone walls, old stumps and skid roads, and a well-maintained trail system, this property exhibits a history of use by people. The land's history of human use has helped to shape this property into what we see today.

Right: Many of the canopy gaps created during recent forest management activities have encouraged the development of good quality regeneration. Here in the south-central part of Area 1, this stump is surrounded by white pine and black birch seedlings that are beginning to become established. This condition helps improve the structural diversity on the property by creating dense understory vegetation.

This property has a mix of habitats with several features that are beneficial for a variety of birds. Our visit took place in the middle of May, which is during spring migration and nearing the breeding season for most birds. Birds noted during our visit to the property are either breeding on the property or are utilizing the habitats during migration while heading further north to breed. The mixture of upland mixedwood[1] forests, forested wetlands, open/semi-open areas, a small open water pond, and some edge habitat along maintained areas all help to provide a diversity of cover, nesting sites, and foraging areas for breeding birds.

Snags (standing dead trees) and cavity trees were found scattered throughout the property. Coarse and fine woody material were also present, but in lower numbers. Continuing to recruit these features by leaving snags and cavity trees where safety is not a concern, and by continuing to cut trees and leaving as much of their tops whole or mostly whole as possible will help provide additional habitat diversity.

The quality of the vertical and horizontal structure on this property varies, but overall provides good to excellent quality habitat.

The coarse and fine woody material (above) and excavated tree (right) provide sources of habitat landowners frequently overlook.

[1] Mixedwood indicates a condition where overstory trees are composed of between 25-75% softwood and the rest hardwood.

Buildings, Roads, and Yards

Habitat loss and degradation caused by human development are some of the leading threats to Connecticut's wildlife. Forests become fragmented when they are broken into small, unconnected patches. Causes may include residential and commercial development, roads, houses, and lawns. Think about the following features to keep your forest intact and functioning for birds.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Building Envelope	Small	Moderate	Large	N/A
Lawn	Small	Moderate	Large	N/A
Landscaping	Lots of native plants and nectar sources	**Some native plants**	Few or no native plants	Can increase the amounts of nectar and mast producing species near the parking area and open, maintained areas
Forest roads and trails	**All <20' wide**	Most < 20' wide	Many >20' wide	
Forest edges	All soft edges	**Some soft edges**	No soft edges	Currently there are some soft edges, (including near one of the vernal pools), and there may be potential to create more especially surrounding the open areas.

Plant Diversity

Forest birds rely on a diversity of native plants for food, cover, and as nest sites. Maintaining a variety of native plants and controlling non-native, invasive plants benefits birds in your woods.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Native plant diversity	**High**	Moderate	Low	This property has a good diversity of native species
Invasive plant infestation	None	**Low**	Moderate to severe	Invasive plants were found very densely in pockets but are not uniformly present on the property. Rose, barberry, garlic mustard, bittersweet, knotweed, honeysuckle, and burning bush were all noted here.
Soft mast native fruits and berries	Abundant	**Some**	Absent	Black cherry, lowbush blueberry, huckleberry, shadbush, and some apple trees are found in places, but are not uniformly distributed.
Softwood pockets in hardwood stands	**Present**		Absent	Pockets of overstory white pine and hemlock and pine regeneration provide softwood diversity. Where feasible, releasing existing softwood from overtopping hardwood competitors can enhance that feature.

Forest Structure

Well-developed forest structure can be a signature of a healthy forest and key to supporting a wide diversity of living things in your woods. It's not mess; it's structure!

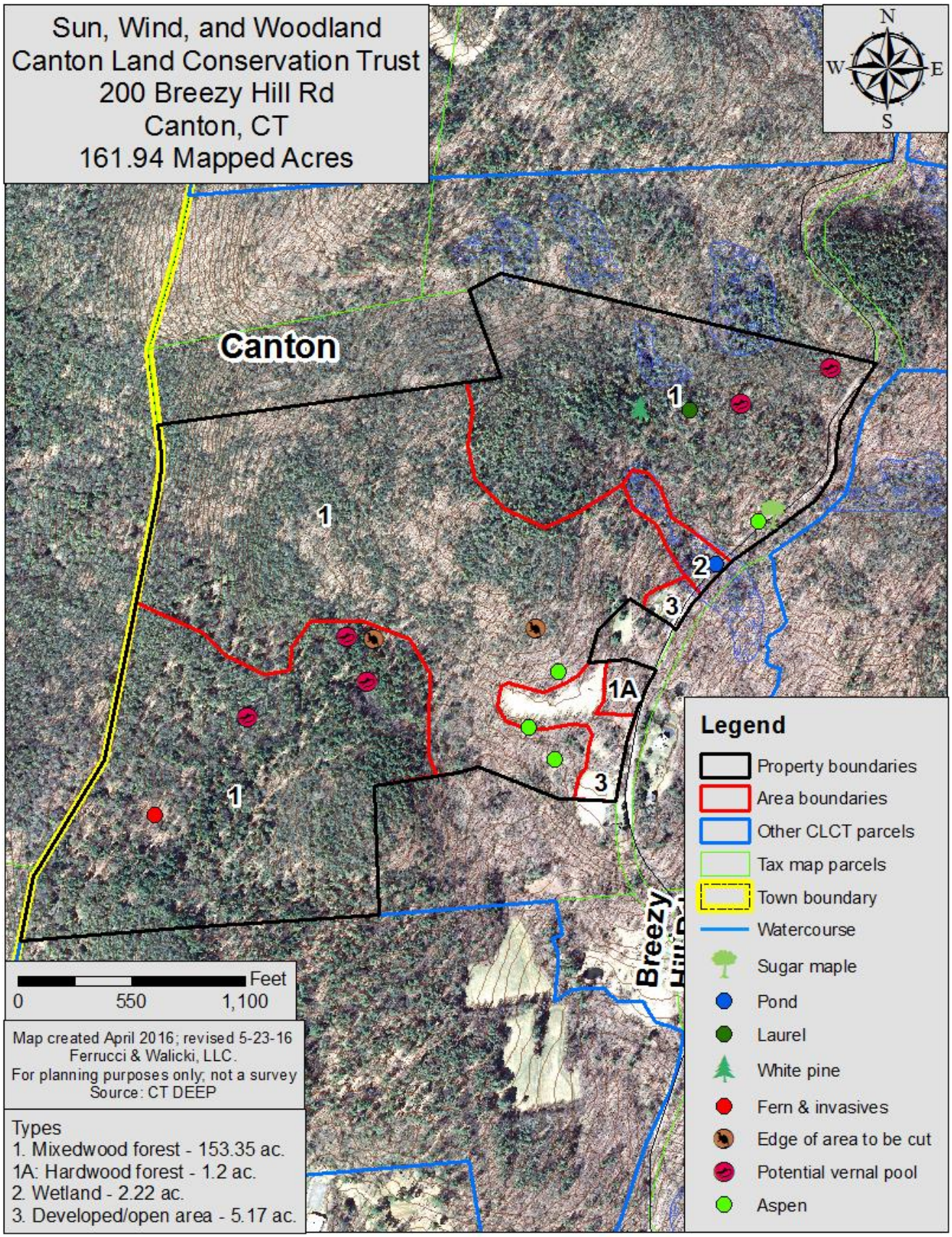
Feature	Condition			Comments
	Good	Fair	Needs Work	
Understory	Dense	**Moderate density**	Sparse	A well-developed understory of desirable native species is present in places on the property, but is not uniform throughout.
Midstory in mature forests	Dense	**Moderate density**	Sparse	The midstory is moderately dense in places and fluctuates between moderately dense and dense with pockets where it is sparse. White pine and hemlock dominate the midstory.
Canopy gaps in mature forests	**Present**		Absent	Regeneration in gaps on this property is great!
Leaf litter	**Present**		Absent	
Snags and cavity trees	Many	**Some**	Few or none	Present in varying levels throughout the property, but generally in relatively low-moderate numbers
Downed dead wood	Many	**Some**	Few or none	Some coarse and fine woody material is present, but it is not uniformly distributed.
Big trees	**Present**		Absent	

Other Habitats

These habitats add diversity and habitat value for birds within forested landscapes.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Waterways and riparian areas	**Good condition**	Fair condition	Poor condition	
Wetlands	**Good condition**	Fair condition	Poor condition	
Meadows	> 1 acre AND mowed every 2-3 years	**> 1 acre OR mowed every 2-3 years**	< 1 acre AND mowed every year	Where feasible, consider attempting to convert areas with invasive plants to native species using a phased approach.
Hayfields	Grassland bird-friendly		NOT Grassland bird-friendly	N/A

Property Features Map



Stand Descriptions and Recommendations

For the purposes of providing recommendations, the property was broken into four distinct land use and land cover types. These include mixedwood and hardwood forested stands, a partially forested wetland, open water, and maintained areas near the parking area. The Property Features Map on page 12 shows the locations of the areas and some of the interesting features we noted during our visit. Each area is special and can offer unique habitat opportunities.

The following descriptions and recommendations contain language that you may wish to become more acquainted with. Some unfamiliar terms can be looked up in the glossary at the end of the report and may include words used by foresters to describe woodlands or different management activities. Becoming more accustomed to this language will help you in communicating your property goals.

Area 1 & 1A: Mixedwood forest (153.35 ac.) and hardwood forest (1.2 ac.) – Area 1 is the largest stand and combined with the small area of hardwood along Breezy Hill Road labeled 1A, makes up all of the upland forest on the property. For the purposes of this section the majority of the description will be about Area 1. This area is in one contiguous block and makes up the vast majority of the property by itself. There are three parts of Area 1 noted on the map on page 12, and that is just to show the difference in amounts of softwood cover. All three areas are mixedwood forest and will be discussed as one unit.

Generally the topography is flat to gently sloping with some moderately steeper sections (especially in the north) and the soils are well-drained, though there are portions of the stand with poorly-drained soils. As noted on the map, there were several potential vernal pools identified during our visit.

This is generally a two-aged stand which has a well-developed, fairly tall, mostly closed canopy as well as pockets of seedling/sapling and small pole-sized trees. Portions of the area were harvested several years ago, and for the most part canopy gaps that were created during the harvest have regenerated very nicely. Regeneration in these areas includes a mix of black birch and white pine seedlings and saplings with some hemlock as well. In addition,

Above: One of the places where a canopy gap did not have the desired effect occurred here in the south-central portion of the stand. Functional understory shown here is minimal for birds and most other wildlife.

pockets of lowbush blueberry were noted in the openings, many of which were still getting enough sunlight to have produced flowers and likely later in the season, fruit.

Above: A pocket of vigorously growing white pine regeneration (left) and the canopy gap above it (right) are a common site in many parts of the south-central portion of Area 1 where forest management activities recently took place. Though there were some regeneration failures such as the one shown at the bottom of page 13, overall, tree regeneration has responded well.

The most commonly found overstory species include a mix of oaks, hickory, black birch, yellow birch, red maple, white ash (declining), white pine, hemlock, and an occasional aspen and white birch among other species. Mast producing species throughout this area include oak and hickory (hard mast) and black cherry (soft mast). Some chestnut oak was noted in the northern portion of this stand where the soils are poorer quality. There were a fair amount of snags and some cavity trees found in this area. Canopy closure is variable in the area where the harvest took place and ranges from completely closed to small openings. In the openings/small canopy gaps, again, the softwood regeneration was excellent. The overstory in the hardwood dominated forest of Area 1A is predominately maple.

Midstory tree species include American hornbeam (a.k.a. musclewood), black birch, white pine, hemlock, and some shadbush along with some taller shrubs including mountain laurel (more prevalent in the north). The midstory is moderately dense to dense. The healthiest of the softwoods in this forest layer appears to be the white pine. As mentioned earlier, hemlock health is generally poorer than the pine. Both hemlock woolly adelgid and elongate hemlock scale (non-native invasive insect pests) were noted on hemlock during our visit.

A functional[2] understory (i.e. vegetation from 0-5 feet tall) is lacking in some parts of the stand, but is developing nicely in others. Where understory vegetation is present, species frequently include fern, many herbs, lowbush blueberry, huckleberry, mountain laurel, and a variety of tree seedlings and small saplings. Tree species noted in the understory include white pine, black birch, red maple, beech, hemlock and striped maple. In general, minimal amounts invasive plants were noted and their presence was greatest around edges of the maintained areas near the parking lot. Some pockets of lowbush blueberry appear to be productive as they are receiving sufficient amounts of sunlight from the canopy gaps above them.

A dense midstory and understory are important features for forest nesting birds in our area because the vast majority of these birds nest between ground level and 30 feet above the ground. Continuing to provide

[2] "Functional" in this case refers to bird habitat. Usually it refers to the ability of a certain feature to provide cover, forage, nest location or other requirements for breeding.

regeneration, native shrubs, and other features that occur in these layers can help provide quality habitat for a variety of species of birds and other wildlife. This can be done by periodically creating small canopy gaps similar to those that were made during the previous forest management activity.

Above: The understory in portions of the northern blocks of the stand are less functional and in places such as this in the north-central portion of Area 1, the understory is absent altogether. Over time, continuing to create canopy gaps to encourage the development of native tree and shrub regeneration can help maintain and improve structural complexity on the property which provides habitat for a variety of species of birds and other wildlife.

Forest birds that were present in this stand include Red-shouldered Hawk, Broad-winged Hawk, Ruby-throated Hummingbird, woodpeckers, Eastern Wood-pewee, Great-crested Flycatcher, Blue-headed Vireo, Red-eyed Vireo, Common Raven, Brown Creeper, Hermit Thrush, Wood Thrush, Veery, Ovenbird, Louisiana Waterthrush, Blue-winged Warbler, Black-and-white Warbler, Nashville Warbler (which may have been a migrant), American Redstart, Blackburnian Warbler, Black-throated Blue Warbler, Pine Warbler, Black-throated Green Warbler, Rose-breasted Grosbeak, and Scarlet Tanager among others. It is possible that more species use this area during the breeding and migration seasons as well. A Northern Waterthrush was noted in Area 1A.

Recommendations for Areas 1 and 1A:

Treat invasive plant species where noted. Where invasives are dense, if feasible, consider using a phased approach to replace the invasive plants with native species that can provide nectar, mast and cover over time.

A crop/mast tree release in this area would allow more growing space for desirable species including oak, cherry, hickory, and yellow birch. Increasing the growing space for these species can maintain and/or enhance the vigor of individual trees, which in turn can lead to an increase in production of flowers and mast. This is beneficial for birds because they can eat some of the additional mast, or feed on insects that may be feeding on the flowers. Sunlight reaching the forest floor may also stimulate the growth of an understory that attracts some species such as the Veery, particularly in wet areas. Release the crowns of crop/mast trees on at least three sides removing vegetation within 10 to 15 feet around the existing crown. If this is to be done, attempt to avoid areas with heavy infestations of invasive plants and/or treat invasive plants prior to cutting trees in the overstory.

Consider creating additional canopy gaps and/or expanding existing gaps to increase the structural diversity in the stand. Again, if this is to be done, attempt to avoid areas with heavy infestations of invasive plants and/or treat invasive plants prior to cutting trees in the overstory. Focus gaps over existing desirable regeneration (tree seedlings or **blueberry**) and/or in areas that contain a high percentage of poor quality trees in the overstory. Canopy gaps encourage the development of additional size and age classes of trees which diversifies structure and provides additional options for cover, and potentially nesting and forage. Canopy gaps also frequently

increase the presence of insects which are a critical source of protein for birds during the nesting season. Interior forest breeding birds such as Scarlet Tanager and Eastern Wood-Pewee will often be found feeding in and on edges of small gaps within the forest (both of which were noted in this stand during our visit).

Monitor ash noted in the stand and elsewhere on the property. Consider removing declining white ash (especially those that may create a safety hazard near the parking area) while leaving some for future snags as long as doing so will not compromise safety for visitors to the property.

Where healthy shagbark hickory exist, consider releasing these trees on the east, west and especially the southern facing side so that their trunks will receive direct solar radiation during the growing season. This can not only enhance vigor and potentially mast production, but also can help provide daytime roosting areas for bats.

If feasible, consider creating small canopy gaps over pockets of mountain laurel in the northern portion of the stand. Simultaneously cut the mountain laurel to encourage its sprouting response. This can help diversify the size and age class of the laurel and creates low-growing, dense vegetation that can provide good cover and potential nesting areas for species like Black-throated Blue Warbler which was noted in this stand during our visit.

Above: Mountain laurel such as this pocket in the central-eastern portion of Area 1 has become somewhat tall and leggy. If desired, creating canopy gaps above pockets of declining laurel and cutting laurel simultaneously can stimulate its sprouting response and create dense, low-growing vegetation which provides great cover and potential nesting areas.

If feasible, consider attempting to regenerate pockets of aspen where noted. If a reasonable area to do this is found, creating gaps of at least a 75' radius can enhance the chances that the aspen with regenerate. Dense aspen sprouts can serve as excellent habitat for a variety of species of birds and other wildlife including Ruffed Grouse and Woodcock. Attempting to incorporate patches of aspen into the area adjacent to the field that is to be cut in the near future can help ensure successful regeneration of this species.

Where pockets of softwoods (i.e. pine and hemlock) exist in this stand, consider releasing vigorous looking softwood from overtopping competition where it makes sense to do so based on overstory composition and condition. Maintaining and enhancing a softwood component within a hardwood forest, especially when there

can be groups of softwood as opposed to scattered individuals can be beneficial for a variety of species including Black-throated Green Warbler, Blackburnian Warbler, Pine Warbler, and Brown Creeper (all of which were noted in this stand).

Left: The white cottony blobs at the bases of the needles on this hemlock in the south-central portion of Area 1 are the outer covering of the hemlock woolly adelgid which was found throughout the property and appears to be having some impact on hemlock health. Wherever feasible, releasing some healthy-looking hemlock from competition can potential increase those trees' vigor, which in a forested setting is the best way to help ensure the health of hemlock trees.

Where feasible, retain snags, cavity trees, and some large diameter trees. If necessary consider felling some competing trees to ensure continued vigor of large diameter trees.

In the portions of Area 1 that are adjacent to the maintained open areas, consider first treating invasive plant species then softening the edges along the forest/semi-open area boundary by cutting groups of trees along the edge and allowing the cut areas to regenerate. If desired, consider retaining scattered windfirm desirable species including oak and cherry to enhance flower and mast potential. If feasible, consider planting some native shrubs in cut areas to augment structure, nectar, and mast production. If this is to be done, make sure it's done outside of the breeding season and it could be done in a phased approach in late winter/early spring prior to migrants arriving. At the time of our visit this practice was planned and may have already been completed by the time this report is being written. Whenever the cut occurs, follow up monitoring to ensure that invasive plants do not become established in this area is critical.

If trees are to be cut, consider leaving the tops of felled trees whole or mostly whole to provide additional fine woody material. Where possible, periodically pile 2-3 tops together to enhance the functionality of that feature.

Allowing Area 1A to continue to develop probably makes sense given its location adjacent to Breezy Hill Road and also because it is such a small stand.

Area 2: Wetland (2.22 ac.) – This area is found on the eastern property boundary along Breezy Hill Rd. There is a small open water pond with an associated forested wetland just uphill (west) of the pond. Vegetation surrounding the pond is fairly dense. The overstory in this area is mostly red maple, and aside from the area directly over the pond, the canopy is mostly closed. Midstory vegetation is a mix of red maple and shrubby species including taller specimens of sweet pepperbush. The understory is dominated by sweet pepperbush and many herbaceous species.

Right: The open water pond along Breezy Hill Road provides an additional source of habitat not found elsewhere on the property.

Bird species noted in this stand include Eastern Phoebe, American Redstart, Ovenbird and Chipping Sparrow among others. As in Area 1, it is possible that more species use this area during the breeding season for at least of part of their

habitat requirements, especially while the pond still has water.

Recommendations for Area 2:

Attempt to control any populations of invasive plants if found.

Monitor the area surrounding the pond. Attempt to ensure vegetation surrounding the pond remains as dense with native species as it was during our visit. Dense vegetation along the pond provides excellent cover, potential nesting areas, and great places from aerial insectivores can "sally forth" as they feed on insects over the water. If necessary consider augmenting naturally occurring vegetation with additional shrubs including highbush blueberry/cranberry, winterberry, spicebush, northern arrowwood or other water loving viburnums to increase native sources of nectar, cover and mast.

Area 3: Open/developed area (5.17 acres) – This area can be found near the parking lot in the southeastern portion of the property. It contains the parking lot and the maintained open fields and hedgerows adjacent to it. Trees in this area include apple trees and a mix of hardwoods including some aspen, ash, oak, and maple among other species in the hedgerows. The current transition from open area to forest is very abrupt and creates a "hard edge". This condition will be "softened" creating a more gradual transition once the planned activity to create additional early successional habitat along the northwestern edge of this area is completed.

Above: The "hard edge" or abrupt transition from the open area to the mature forest that lines it can be enhanced with the cutting that may occur in portions of the area surrounding the open area. Tree regeneration and shrubs along edges can help "soften" them creating more of an edge effect which provides additional cover, forage and nesting opportunities for a variety of species of birds and other wildlife.

Invasive plants are relatively dense in areas along the edge of this area and the area. Invasives including multiflora rose, Japanese barberry, Asiatic bittersweet, garlic mustard, burning bush, and honeysuckle were all noted in this area or near the edges of it.

Bird species noted in this area include Red-shouldered Hawk, woodpeckers, Gray Catbird, Chestnut-sided Warbler, Indigo Bunting and Eastern Towhee among others.

Recommendations for Area 3:

Continue to monitor and treat invasive plants, and remove them using a phased approach as feasible. Wherever possible, consider replacing invasives with native species that serve similar structural purposes (i.e. dogwoods, viburnums, more apple trees etc.).

Monitor the health of the apple trees. If the trees become overtopped by other hardwood species consider cutting the overtopping trees if the apple is healthy enough to be able to respond to being released. Consider pruning if necessary to increase production of flowers and fruit.

Continue to maintain the area as open. Currently the area is mowed annually. If ground conditions will permit, consider modifying the mowing regime so that the area is cut once annually in early spring prior to migrant arrivals. If this is to be done, the grasses etc. can provide some structure and a potential seed source for year round residents during winter.

Create a softer edge by cutting patches or groups of trees along existing edges and allowing the areas to regenerate. If this is to be done, be sure to treat invasive plants in the area and adjacent areas prior to cutting. In addition, following the cutting, monitor for invasive plants and do not allow them to become established. If necessary, consider augmenting natural regeneration in the cut area with targeted plantings of species than can provide additional sources of nectar, mast and cover including apple trees.

Consider removing the declining ash trees adjacent to the parking area for safety.

Summary of Recommendations

Some of these recommendations may not be able to be completed without some cost (i.e. the activities may be non-commercial). In order to complete the treatments, there may be cost-share funding available through the USDA Natural Resources Conservation Service (NRCS) to help offset those costs. Additional information about some of these programs can be found at:
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ct/programs/farmbill/?cid=nrcs142p2_011038

All areas: Monitor for invasive plant species and treat them before they become widely established. Follow up treatments and monitoring are always recommended. In areas where trees will be cut, consider leaving the tops of felled trees whole or mostly whole to provide temporary structural components for birds and other wildlife. **Whenever possible, attempt to limit tree cutting during times of the year when birds may be nesting (i.e. April 15-August 15).** If any of these recommendations are undertaken, we strongly recommend keeping the public informed of what is happening with signage and tours explaining what is happening and why. Where feasible and desirable, consider using volunteer labor to achieve desired results especially with invasive plant treatments.

Areas 1 & 1A: Continue to treat invasives; crop and/or mast tree release; create additional canopy gaps to improve structural diversity; release blueberry; monitor ash; retain and release any healthy softwoods noted; release shagbark hickory; regenerate laurel; incorporate aspen into the cut to be done along the edge of the open area; retain snags, cavity trees and some large diameter trees; follow through with planned activities to regenerate a portion of the forest to "soften the edge" along the open area; consider creating brush piles; consider allowing Area 1A to continue to develop without active management.

Area 2: Attempt to treat invasives if found; monitor pond edges and augment with plantings if needed.

Area 3: Continue to treat invasives; maintain apple trees; continue to keep area open; consider modifying mowing regime; soften edges; consider planting desirable native flowers and shrubs to increase nectar, structure and mast potential; consider removing declining ash trees adjacent to parking area.

Additional Property Recommendations:

- ☒ Call a forester to arrange a visit and discuss updating the mgmt. plan. Cost-share funds may be available through the USDA Natural Resources Conservation Service (NRCS) to help offset the costs of plan development. See description of NRCS in the **Terms and Explanations** section below.
- ☒ Update your existing forest management plan to include consideration for birds.
- ☐ Learn the *Birdwatcher's Dozen* by sight and sound.
- ☒ Start bird monitoring on my property.
- ☒ Learn more about invasive plants and develop a plan for monitoring and control.
- ☒ Talk with my neighbors about what I learned. Have a conversation about opportunities to coordinate management across property boundaries.
- ☒ Keep interior forest intact; avoid subdividing forest (or plan subdivisions that maintain maximum continuous forest cover), minimize construction of new roads or trails greater than 20 feet wide, and keep new buildings close to existing roads.
- ☒ Promote a diversity of forest age classes from very young (<20 years; <10% of the property) to very old (>20 years with some forest >100 years; >75% of the property) across the property and landscape.
- ☒ Promote a dense understory and midstory of native trees and shrubs.
- ☒ Retain biological legacies including large-diameter (24"+ DBH) living trees, snags, and downed deadwood.
- ☒ Retain tree tops on site during timber harvests and avoid or minimize lopping slash.
- ☒ Contact Audubon Connecticut for follow up assistance, to review a new or updated management plan, or to consult on the implementation of one of our recommendations.

Above: An excellent pocket of regeneration in the south-central portion of Area 1. Over time, given the right growing conditions, these trees may become the next forest on the property!

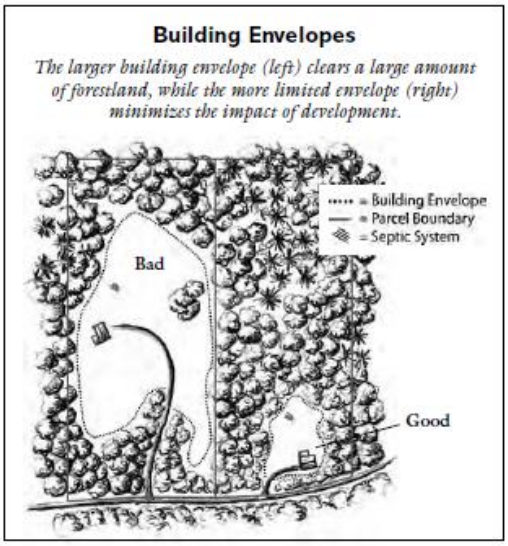
Terms and Explanations

Big Trees: Live trees greater than 19 – 24 inches diameter at breast height (DBH which is measured 4.5 feet above ground level).

Importance for Forest Birds: Big trees are a key characteristic of old forests and high-quality mature forest habitat for songbirds. Researchers in Wisconsin found priority birds were more abundant and successful in forests with >10% of the live basal area in big trees (19+ inches DBH) than in forests with fewer big trees (Managed old-growth silvicultural study (MOSS), Wisconsin Department of Natural Resources, 2013). Structurally-sound, large-diameter trees are important stick nest sites for woodland raptors, such as the Northern Goshawk. If retained as legacies, these large trees can also provide cavity nest sites for large woodland birds including owls and Pileated Woodpeckers.

Building Envelope: Open space cleared around a house or other building.

Importance for Forest Birds: The 200-300 feet into the woods surrounding clearings and openings associated with development, such as houses, are noisier, less sheltered, and vulnerable to invasion by domestic animals and nest predators and parasites. The impacted area also favors a new group of relatively tough, generalist omnivores such as raccoons, jays and crows that outcompete and may prey on more specialized mature forest priority species, such as Wood Thrush and Black-throated Blue Warbler. Keeping building envelopes small is one way to minimize this negative impact on surrounding forest habitat.



Source: *Community Strategies for Vermont's Forests and Wildlife: A Guide for Local Action. Vermont Natural Resources Council. 2013. Drawing by Jeannie Sargent.*

Canopy: The uppermost layer(s) of tree foliage in the forest. Many second or third growth stands in CT contain similar aged trees and have a relatively uniform canopy height.

Importance for Forest Birds: Forest birds have specific habitat requirements for breeding and nesting. Canopy density, height, distribution, and species mix all impact the quality of habitat the canopy provides and in turn can affect the species of birds that may use the area.

Canopy Gap: A canopy gap is an opening in the canopy of a mature forest ranging in size from one tree crown up to 1/4 acre.

Importance for Forest Birds: Birds such as the Eastern Wood-Pewee forage in canopy gaps, which also allow sunlight to reach the forest floor through the upper canopy stimulating new growth in understory and midstory. Gaps created where trees fall, blow over, or are cut down are a normal and important part of a healthy forest and high-quality mature forest habitat.

Crop Tree: A tree that has been selected as desirable to manage into the future.

Importance for Forest Birds: See description of *Importance for Forest Birds* for *Crop Tree Release* below

Crop Tree Release: A silvicultural treatment in which individual trees or groups of trees are given additional growing space and sunlight by removing competition from adjacent trees. Removing adjacent trees that are competing with the crowns of crop trees is important to maintain vigor of crop trees. Crop tree release frequently works best when the trees are released from competition on at least 3 sides of the crown (out of 4 sides that can be likened to the cardinal directions) and at least 10-15 feet of growing space is created.

Importance for Forest Birds: Crop tree release (CTR) is a relatively small scale treatment that increases the vigor of individual trees or small groups of trees, which in turn can provide additional mast, as well as additional vegetation for nesting, cover and forage. In addition, CTR can provide coarse and fine woody material and can stimulate regeneration on the forest floor, which can in turn enhance structural diversity providing additional habitat opportunities.

Downed Deadwood: Coarse woody material (CWM) are downed logs and branches >4 inches in diameter. Fine woody material (FWM) are limbs and branches <4 inches in diameter including slash.

Importance for Forest Birds: CWM provides perch sites for singing (e.g. by Ovenbird) and other male courtship displays, and provides habitat for the insects and other arthropods that are a significant part of the breeding season diet of many birds. Ruffed Grouse tend to use CWM >8 inches diameter as drumming perches. When aggregated in piles (e.g. tree tops or slash piles) FWM offers a nesting substrate and cover for Louisiana Waterthrush and Veeries. Scattered individual pieces have minimal habitat value.

Forest Block: A large area of contiguous forest cover.

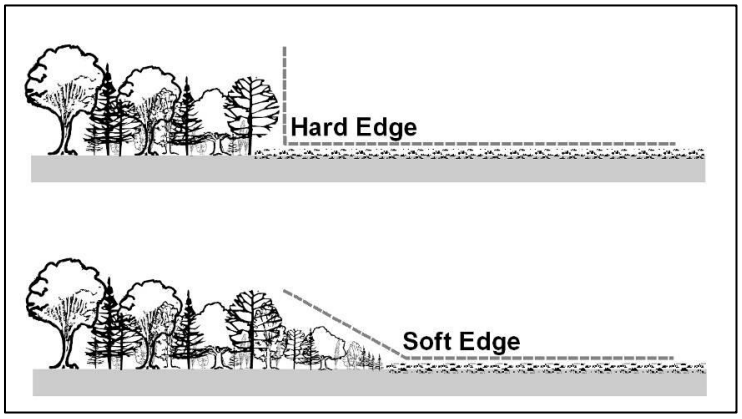
Importance for Forest Birds: Very large (>2500 acres) blocks of contiguous forest provide the highest quality habitat for interior-nesting birds like Wood Thrush that reproduce more successfully away from edges and development. Large blocks also likely contain the full range of habitat types and conditions required to support most or the entire suite of priority birds. Smaller forest patches >500 acres in size provide important habitat in more fragmented landscapes and can connect larger patches. Patches <500 acres in size can still support breeding birds in heavily forested landscapes and are important habitat during the migration season. Think about your land as it fits within a larger mosaic.

Forest Cover: Area of land that is forested or wooded.

Importance for Forest Birds: Heavily forested landscapes (70+% forest cover) provide the greatest quantity, diversity, and quality of habitat for priority birds compared to fragmented and/or developed landscapes with lower percentages of forest cover.

Forest Edge: The boundary between forest and open land, such as a field or backyard.

Importance for Forest Birds: The transition from low herbaceous vegetation to tree canopy can be considered either a "soft" or "hard" edge. A soft edge is 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 helps to 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 young forest habitat bird species including Chestnut-sided Warbler and Blue-winged Warbler.

Forest Structure: The density and physical orientation of live and dead vegetative, woody, and herbaceous plants and trees in a forest. See horizontal structure and vertical structure for more in-depth descriptions of different views of forest structure.

Importance for Forest Birds: Diverse forest structure can provide many habitat requirements for forest birds. Increasing the complexity of the forest structure through the maintenance or enhancement of tree and plant species diversity, the creation of canopy gaps, the establishment of regeneration, and the retention and recruitment of snags, cavity trees and woody material on the ground can all help to improve not only ecological diversity and forest health, but also can improve bird habitat.

Fragmented Forest: Forest that is broken into small, unconnected patches primarily due to some form of development (e.g. residential, commercial, or major roads).

Importance for Forest Birds: Fragmentation increases the occurrence of "generalist" wildlife species, such as raccoons and skunks, and the parasitic Brown-headed Cowbird both of whom decrease nesting success of interior-nesting forest birds. Fragmentation also decreases connectivity. Larger landscapes are better for forest interior birds and act as wildlife corridors for mammals and migrating bird populations. Isolated islands of habitats are at greater risk to loss of biodiversity.

Hardwood Forest: A forest dominated by broad-leaved (i.e. deciduous) trees which lose their leaves in the fall.

Importance for Forest Birds: Some breeding birds are associated with hardwood forests, such as Chestnut-sided Warbler, Eastern Wood-Pewee, and Scarlet Tanager.

Horizontal Structure: The arrangement of different habitat types across the landscape.

Importance for Forest Birds: A landscape with mature and young forest habitats, open fields, and wetlands would be rich in horizontal diversity. Landscapes with greater horizontal diversity support a greater diversity of breeding forest birds and other wildlife.

Interior Forest: Forest condition that occurs with increasing distance from a forest edge.

Importance for Forest Birds: As perceived from a bird's perspective, interior forest conditions begin to occur approximately 200-300 feet from a forest edge. At this distance, negative edge-associated effects such as nest predation, parasitism, and creep from invasive plant species generally no longer occur. Interior-nesting species, such as Scarlet Tanager, Wood Thrush, Ovenbird, Black-throated Blue Warbler, and Red-eyed Vireo, have greater reproductive success when they nest away from forest edges.

Invasive Plant: A plant that is able to establish on many sites, grow quickly, and spread to the point of disrupting native ecosystems. Often non-native.

Importance for Forest Birds: Non-native, invasive plants, such as bush honeysuckles, bittersweet, Autumn olive, burning bush, buckthorn, and Japanese barberry, present a variety of threats to forest health in Connecticut and the northeast. Although some species of native forest birds successfully use these shrubby, woody plant species as nesting sites and eat their fruits, the fruits generally have low nutritional value and the invasive plants reduce the diversity of other nesting and foraging options in forest ecosystems. Many invasive plants can form dense uniform stands that outcompete and can crowd out native plants. The threat is exacerbated by its impacts on native insect populations that may require certain plants for food and in turn pollinate these native plants. This can eliminate two forms of food

resources for bird populations. Overall, non-native, invasive plant species degrade the quality of native forest bird habitat in our region.

Leaf Litter: Dead plant material such as leaves, bark, and twigs that has fallen to the ground.

Importance for Forest Birds: 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 Ovenbird, Veery, and Wood Thrush diets during the breeding season. Ovenbirds also rely upon a deep layer of deciduous litter for constructing their ground nests, and nest site selection is strongly associated with this habitat variable.

Mast Tree: A tree that produces seeds, nuts, or fruit eaten by wildlife. There are two general categories of mast: hard mast and soft mast. Hard mast includes oak acorns and nuts including hickory, beech, walnut, hazelnut and other nut producing trees and shrubs. Soft mast includes all fruits produced by shrubs and trees including blackberries, raspberries, blueberries, huckleberries, apples, shadbush, and black cherry among others.

Importance for Forest Birds: See description of *Importance for Forest Birds* for *Mast Tree Release* below

Mast Tree Release: This is basically the same silvicultural practice as described in *Crop Tree Release* toward the beginning of this section except it focuses on the release of mast trees specifically. The method of releasing the trees from competing vegetation is the same.

Importance for Forest Birds: Mast – both hard and soft – can be an important source of food for birds. Even trees that produce large nuts like acorns which many songbirds do not eat because the nuts are too large can still provide valuable food sources for birds due to the volume of insects that feed on leaves and flowers.

Mature Forest Habitat: For birds a forest is considered structurally mature when the forest canopy is greater than 30 feet tall.

Importance for Forest Birds: Many priority birds breed in mature forest habitats where they find nest sites, cover, and food. Typically, the quality of mature forest habitat increases for forest birds as a forest ages and structure diversifies. Pole stands – the youngest type of mature forest habitat - are typically structurally simple and attract a small suite for forest birds including Ruffed Grouse and American Redstart. Older stands with understory and midstory layers, canopy gaps, large trees, snags, and logs, attract a much greater diversity of birds including Black-throated Blue Warbler, Wood Thrush, Canada Warbler, and Black-throated Green Warbler.

Midstory: Live, woody vegetation in the 6-30 foot height range including trees and shrubs.

Importance for Forest Birds: High stem and foliage densities of woody plants in this forest layer provide nest sites, foraging substrates, and protective cover for many forest birds. Stand-wide coverage is desirable but not necessary; well distributed patches are sufficient. The majority of priority bird species nest and/or forage within the first 30 feet of the forest floor. Nests of Wood Thrush, American Redstart, Black-throated Green Warbler, and Red-eyed Vireo are most commonly found in the midstory level.

Mixed Forest: A forest made up of hardwood and 25-75% softwood tree species.

Importance for Forest Birds: Some breeding birds are associated with mixed forests, such as Black-throated Blue Warbler, Wood Thrush, and Worm-eating Warbler.

Natural Resources Conservation Service (NRCS): An agency that is a branch of the USDA whose mission is to help farmers, ranchers and landowners achieve conservation goals on their properties.

Importance for Forest Birds: NRCS helps to fund on-the-ground activities to improve habitat conditions for wildlife, including birds.

Poletimber: Trees that are between 4.5 inches and 11 inches in diameter measured outside the bark at 4.5 feet above the ground.

Importance for Forest Birds: Frequently poletimber has foliage in lower canopy strata (i.e. in the midstory) than sawtimber-sized trees. If the midstory foliage is dense enough, forest breeding birds can use it for nesting, forage and cover. Species such as Wood Thrush use poletimber stands for nesting and as singing perches.

Sawtimber: Trees that are 11 inches or greater in diameter measured outside the bark at 4.5 feet above the ground.

Importance for Forest Birds: Sawtimber is often the largest and most mature trees in the forest and provide larger scale structure within a variety of forested habitat types. Sawtimber also tends to have greater capacity for seed/fruit production.

Silviculture: The art and science of growing trees. This is the study that forestry and forest management is based on.

Importance for Forest Birds: Many of the silvicultural techniques that are traditionally used in forestry are beneficial for creating and maintaining quality bird habitat when applied appropriately.

Snags and Cavity Trees: Snags are standing dead or partially dead trees that are relatively stable. Cavity trees may be alive or dead.

Importance for Forest Birds: Snags provide opportunities for nesting cavity excavation by Yellow-bellied Sapsuckers and Northern Flickers, and existing cavity trees provide potential nesting cavities for owls. Aspen and birch species are frequently chosen as trees to excavate. Cavities are often made in trees with the heartwood and sapwood decay fungi. Branches on snags may be used as foraging perches and nest sites. Suggested targets for snags and cavity trees combined are ≥ 6 per acre, with one tree >18 inches DBH and 3 >12 inches DBH.

Soft Mast: Soft fruits and berries.

Importance for Forest Birds: Fruits including cherry, apple, *rubus* species (e.g. blackberry and raspberry), dogwood, shadbush, and others are important food sources for forest birds. In the late summer and early fall, after fledging and before migrating, many birds feed on these fruits and the insects that are attracted to them in order to build up critical fat reserves needed to endure long fall migrations.

Softwood Forest: A forest dominated by coniferous trees, usually "evergreen" (the exception being tamarack), with needles or scale-like leaves.

Importance for Forest Birds: Some breeding birds are associated with softwood forests, such as Magnolia Warbler and Blue-headed Vireo. Other birds, such as Blackburnian and Black-throated Green Warbler, are associated with small clusters of softwood trees called inclusions in hardwood stands. For this reason, maintaining or increasing the softwood component in hardwood stands increases their overall habitat value.

Stand: Forested area on a property with relatively uniform vegetation composition, age class, size class, density, and site quality so as to be considered relatively homogenous.

Importance for birds: Birds require a variety of habitat types depending on the species for different stages of life and activities throughout the year (i.e. breeding, nesting, foraging etc.). Having a diversity of stand types, and features within stands can help provide quality habitat for different species and needs within birds' life cycles.

Understory: Live vegetation in the 1-5 foot height range, including tree seedlings and saplings, shrubs, and herbaceous vegetation.

Importance for Forest Birds: High stem and foliage densities of woody plants in the understory provide nest sites, foraging substrates, and protective cover for many forest birds. Stand-wide coverage is desirable but not necessary; well distributed patches are sufficient. Herbaceous plants may also be used by songbirds for foraging and nesting, but generally less so than woody plants. Species in this layer frequently used by birds include sugar maple, American beech, hobblebush, mountain laurel, *rubus* species, and striped maple. Black-throated Blue Warbler and Wood Thrush place nests in this layer, and Canada Warbler and Veery tend to nest on or near the ground, concealed by dense understory growth. The best breeding habitats for Prairie Warbler and Chestnut-sided Warbler are patches of dense, low growth with <30% overstory cover in patches >1 acre in size (young forest habitat conditions).

Vertical Structure: The complexity of vegetation and other structures as they are vertically arranged in the forest.

Importance for Forest Birds: A forest with a well-developed understory, midstory, and canopy exhibits complex or diverse vertical 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 the microtopography of the forest floor, add to the complexity of vertical structure.

Young Forest Habitat: Forest patches greater than one acre in size dominated by a high density of seedlings, saplings, and shrubs less than 20 feet tall.

Importance for Forest Birds: Several priority birds and many other wildlife species use young forests during all or part of their life cycle. Chestnut-sided Warbler, American Woodcock, and Blue-winged Warbler all use young forests during the breeding season. Although these species may be found in patches smaller than one acre in size, research has shown that abundance and nesting success is greater in larger patches. Young forest habitats include regenerating patchcuts, clearcuts, and old fields. Early-successional young forest habitats dominated by shade intolerant species such as aspen and paper birch are particularly valuable for woodcock and grouse. Shrublands that will never mature into forest, such as those associated with beaver wetland complexes, can also attract species associated with young forest habitats since they have a similar vegetative structure. Recent research has also shown the importance of young forest habitats as post-breeding habitat for birds that nest in mature forest, such as Worm-eating Warbler and Red-eyed Vireo. Young forest provides dense, protective cover for juveniles, and can also provide abundant sources of soft mast, which are important pre-migration food sources. Young forest habitats are ephemeral; they generally only persist 10-15 years where forest regenerates after a patch or clear-cut and slightly longer on old field sites. Due to natural forest succession and development, the amount of this habitat type is decreasing in our region, which is a threat to the species associated with it.

Appendix A - *Bird species observed during habitat assessment. The numbers at the tops of each column indicate the area in which the birds were noted. The numbers in the column indicate the numbers of individuals noted.*

CONNECTICUT FOREST BIRD LIST Name: Patrick Comins Date: 05/19/16 Property: Canton		**1**	**1a**	**2**	**3**	**total**	**NOTES**
Canada Goose	*Branta canadensis*					**0**	
Mute Swan	*Cygnus olor*					**0**	
Wood Duck	*Aix sponsa*					**0**	
American Black Duck	*Anas rubripes*					**0**	
Mallard	*Anas platyrhynchos*					**0**	
Hooded Merganser	*Lophodytes cucullatus*					**0**	
Common Merganser	*Mergus merganser*					**0**	
Ring-necked Pheasant	*Phasianus colchicus*					**0**	
Ruffed Grouse	*Bonasa umbellus*					**0**	**could nest**
Wild Turkey	*Meleagris gallopavo*					**0**	**may nest**
Great Blue Heron	*Ardea herodias*					**0**	
Green Heron	*Butorides virescens*					**0**	
Turkey Vulture	*Cathartes aura*					**0**	
Black Vulture	*Coragyps atratus*					**0**	
Osprey	*Pandion haliaetus*					**0**	
Bald Eagle	*Haliaeetus leucocephalus*					**0**	
Sharp-shinned Hawk	*Accipiter striatus*					**0**	**could nest**
Cooper's Hawk	*Accipiter cooperii*					**0**	**May nest**
Northern Goshawk	*Accipiter gentilis*					**0**	
Red-shouldered Hawk	*Buteo lineatus*	**1**			**1**	**2**	
Broad-winged Hawk	*Buteo platypterus*	**1**				**1**	
Red-tailed Hawk	*Buteo jamaicensis*					**0**	**May nest**
American Kestrel	*Falco sparverius*					**0**	
Peregrine Falcon	*Falco peregrinus*					**0**	
Killdeer	*Charadrius vociferus*					**0**	
Spotted Sandpiper	*Actitis macularius*					**0**	
American Woodcock	*Scolopax minor*					**0**	
Rock Pigeon (i)	*Columba livia feral*					**0**	
Mourning Dove	*Zenaida macroura*	**3**				**3**	
Black-billed Cuckoo	*Coccyzus erythropthalmus*					**0**	**May nest**
Yellow-billed Cuckoo	*Coccyzus americanus*					**0**	
Eastern Screech Owl	*Megascops asio*					**0**	**may nest**
Great Horned Owl	*Bubo virginianus*					**0**	**May nest**

		1	1a	2	3	total	NOTES
Barred Owl	*Strix varia*					0	may nest
Eastern Whip-Poor-Will	*Caprimulgus vociferus*					0	
Chimney Swift	*Chaetura pelagica*					0	may nest in area
Ruby-throated Hummingbird	*Archilochus colubris*	1				1	
Belted Kingfisher	*Megaceryle alcyon*					0	
Red-bellied Woodpecker	*Melanerpes carolinus*	1			1	2	
Yellow-bellied Sapsucker	*Sphyrapicus varius*	3				3	
Downy Woodpecker	*Picoides pubescens*	2			1	3	
Hairy Woodpecker	*Picoides villosus*	2				2	
Northern Flicker	*Colaptes auratus*					0	may nest
Pileated Woodpecker	*Dryocopus pileatus*					0	may nest
Eastern Wood-Pewee	*Contopus virens*	1				1	
Acadian Flycatcher	*Empidonax virescens*					0	
Alder Flycatcher	*Empidonax alnorum*					0	
Willow Flycatcher	*Empidonax traillii*					0	
Least Flycatcher	*Empidonax minimus*					0	
Eastern Phoebe	*Sayornis phoebe*			1		1	
Great Crested Flycatcher	*Myiarcuscrinitus*	2				2	
Eastern Kingbird	*Tyrannus tyrannus*					0	
White-eyed Vireo	*Vireo griseus*					0	
Yellow-throated Vireo	*Vireo flavifrons*					0	may nest
Blue-headed Vireo	*Vireo solitarius*	8				8	
Warbling Vireo	*Vireo gilvus*					0	
Red-eyed Vireo	*Vireo olivaceus*	5				5	
Blue Jay	*Cyanocitta cristata*	4				4	
American Crow	*Corvus brachyrhynchos*	2				2	
Fish Crow	*Corvus ossifragus*					0	
Common Raven	*Corvus corax*	1				1	
Purple Martin	*Progne subis*					0	
Tree Swallow	*Tachycineta bicolor*					0	may nest in area
N. Rough-winged Swallow	*Stelgidopteryx serripennis*					0	
Bank Swallow	*Riparia riparia*					0	
Cliff Swallow	*Petrochelidon pyrrhonota*					0	
Barn Swallow	*Hirundo rustica*	2				2	
Black-capped Chickadee	*Poecile atricapillus*	8		3	2	13	
Tufted Titmouse	*Baeolophus bicolor*	5			2	7	
Red-breasted Nuthatch	*Sitta canadensis*					0	
White-breasted Nuthatch	*Sitta carolinensis*	1	1			2	
Brown Creeper	*Certhia americana*	1				1	
Carolina Wren	*Thryothorus ludovicianus*					0	

		1	1a	2	3	total	NOTES
Winter Wren	*Troglodytes hiemalis*					0	may nest
House Wren	*Troglodytes aedon*					0	may nest
Blue-gray Gnatcatcher	*Polioptila caerulea*					0	may nest
Golden-crowned Kinglet	*Regulus satrapa*					0	could nest
Eastern Bluebird	*Sialia sialis*					0	may nest in area
Hermit Thrush	*Catharus guttatus*	6				6	
Wood Thrush	*Hylocichla mustelina*	1				1	
Veery	*Catharus fuscescens*	4				4	
American Robin	*Turdus migratorius*				3	3	
Gray Catbird	*Dumetella carolinensis*				1	1	
Northern Mockingbird	*Mimus polyglottos*					0	may nest in area
Brown Thrasher	*Toxostoma rufum*					0	
Europen Starling (i)	*Sturnus vulgaris*					0	may nest in area
Cedar Waxwing	*Bombycilla cedrorum*					0	may nest in area
Ovenbird	*Seiurus aurocapilla*	14		2		16	
Worm-eating Warbler	*Helmitheros vermivorum*					0	
Louisiana Waterthrush	*Parkesia motacilla*	1				1	
Northern Waterthrush	*Parkesia noveboracensis*		2			2	
Golden-winged Warbler	*Vermivora chrysoptera*					0	
Blue-winged Warbler	*Vermivora cyanoptera*	1				1	
Black-and-white Warbler	*Mniotilta varia*	7				7	
Nashville Warbler	*Leiothlypis ruficapilla*	1				1	May have been migrant
Connecticut Warbler	*Oporornis agilis*					0	
Mourning Warbler	*Geothlypis philadelphia*					0	
Common Yellowthroat	*Geothlypis trichas*				2	2	
Hooded Warbler	*Setophaga citrina*					0	
American Redstart	*Setophaga ruticilla*	6		1		7	
Cerulean Warbler	*Setophaga cerulea*					0	
Northern Parula	*Setophaga americana*					0	
Magnolia Warbler	*Setophaga magnolia*					0	
Blackburnian Warbler	*Setophaga fusca*	8				8	
Yellow Warbler	*dendroica petechia*					0	may nest in area
Chestnut-sided Warbler	*Setophaga pensylvanica*				2	2	
Black-throated Blue Warbler	*Setophaga caerulescens*	3				3	
Pine Warbler	*Setophaga pinus*	8				8	
Yellow-rumped Warbler	*Setophaga coronata*					0	could nest
Prairie Warbler	*Setophaga discolor*					0	
Black-throated Green Warbler	*Setophaga virens*	12				12	
Canada Warbler	*Cardellina canadensis*					0	
Eastern Towhee	*Pipilo erythrophthalmus*				2	2	

		1	1a	2	3	total	NOTES
Chipping Sparrow	*Spizella passerina*			1	2	3	
Field Sparrow	*Spizella pusilla*					0	
Savannah Sparrow	*Passerculus sandwichensis*					0	
Song Sparrow	*Melospiza melodia*					0	Likely nests
Swamp Sparrow	*Melospiza georgiana*					0	
White-throated Sparrow	*Zonotrichia albicollis*					0	
Dark-eyed Junco	*Junco hyemalis*					0	
Scarlet Tanager	*Piranga olivacea*	5	3			8	
Northern Cardinal	*Cardinalis cardinalis*				1	1	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	1				1	
Indigo Bunting	*Passerina cyanea*				3	3	
Bobolink	*Dolichonyx oryzivorus*					0	
Red-winged Blackbird	*Agelaius phoeniceus*					0	May nest
Eastern Meadowlark	*Sturnella magna*					0	
Common Grackle	*Quiscalus quiscula*	1				1	
Brown-headed Cowbird	*Molothrus ater*	4				4	
Orchard Oriole	*Icterus spurius*					0	
Baltimore Oriole	*Icterus galbula*					0	may nest
Purple Finch	*Haemorhous purpureus*					0	May nest in some years
House Finch	*Haemorhous mexicanus*					0	Likely nests
American Goldfinch	*Spinus tristis*	3				3	
House Sparrow (i)	*Passer domesticus*					0	may nest in area
Total		38	3	5	13	48	

Appendix B – *CAES Data*

The pages below contain summaries of quantitative data collected from your property by the CT Agricultural Experiment Station

Sun, Wind, & Woodland, Canton LCT

153.4 acres of assessed forest land
28 sample points across property

Quantitative habitat descriptions

The following pages provide a quantitative assessment of habitat features found on your property. The assessments were completed using a series of systematically located points across all of the forested area on your property, but does not include open fields and wetlands without trees (e.g., marshes).

At each point, we evaluated a range of habitat features on a 1/20 acre plot using the criteria shown below. These values were pooled to capture the range of conditions found across the entire property (pages B2-B8).

Forested portions of properties are often composed of distinct stands (also referred to as "areas" in this report) with relatively uniform vegetation composition, age class, size class, density, and site quality so as to be considered relatively homogenous. For example, the vegetation and structural attributes in conifer stands usually differ greatly from adjacent hardwood stands. Each stand may provide unique opportunities for providing habitat for a distinct suite of priority forest birds. The final pages include summaries at the stand level.

2015 Connecticut Agricultural Experiment Station habitat assessment team (l to r): Amanda Massa (Team Leader), Sarah Kucharski, Sarah Tolbert, and Supervising Technician J.P. Barsky.

CAES
The Connecticut Agricultural Experiment Station
Putting Science to Work for Society since 1875

Category criteria for 1/20 acre plots (26.33 ft or 8.03 m radius)

Vegetation cover, canopy closure, soft mast

Absent - covered <5% of plot
Low - covered 5-30% of plot
Medium - covered 30-70% of plot
High - covered >70% of plot

Canopy height

Short - trees <20 ft tall
Medium - trees 20-60 ft tall
Tall - trees >60 ft tall

Nesting and wetland features

Absent - not found within plot
Inside - observed within plot
Outside - observed outside of plot

Habitat features

Absent - not found within plot
Low - few leaves / one or two pieces of coarse woody debris
Medium - average leaf litter/several pieces of coarse woody debris
High - thick leaf litter / many pieces of coarse woody debris

Sun, Wind, & Woodland, Canton LCT

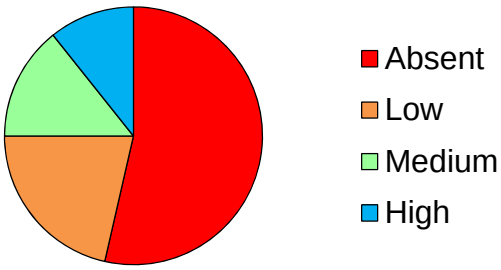
Property summary (153.35 acres, 28 sample points)

Groundlayer vegetation cover (0-5 feet tall)

	Absent	Low	Medium	High
Native herbaceous	54%	21%	14%	11%
Native shrubs	21%	54%	18%	7%
Non-native species	93%	7%	0%	0%

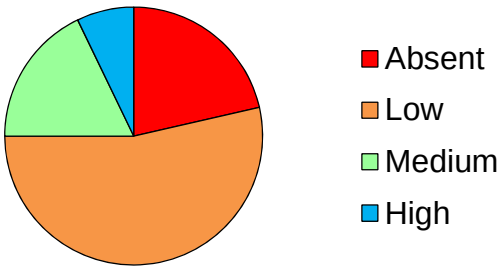
	Hardwood	Mixed	Conifer
Species mix	25%	57%	18%

Native herbaceous



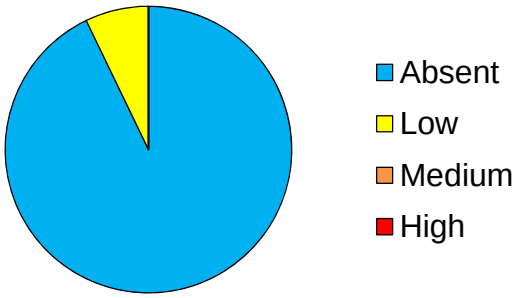
Native herbaceous plants are ideal for foraging and provide cover for species such as the Veery. Typical examples include: asters, mayflowers, goldenrods, skunk cabbage, sarsaparilla, and jewelweed. These plants should be encouraged as they serve as a food source for invertebrates that are consumed by some birds, as well as providing sources of nectar, seeds, and fruit.

Native shrubs < 5 ft tall



Native shrubs are relatively small woody plants that may bear fruit or host insects that provide seasonal forage for birds. Shrubs also provide a structural base for nests and cover from predators and weather for birds such as the Veery and Black-Throated Blue Warbler. Some examples of native shrubs are beaked hazelnut, brambles, mapleleaf viburnum, mountain-laurel, and witch-hazel.

Non-native species < 5 ft tall



Non-native plant species may provide nesting opportunities, but because they decrease the overall diversity and quality of native habitat, it is desirable to replace them with native species. In addition, they do not support as many insect as native plants. Common examples of non-natives are: Japanese barberry, Oriental bittersweet, multiflora rose, Japanese stiltgrass, and winged euonymus.

Sun, Wind, & Woodland, Canton LCT

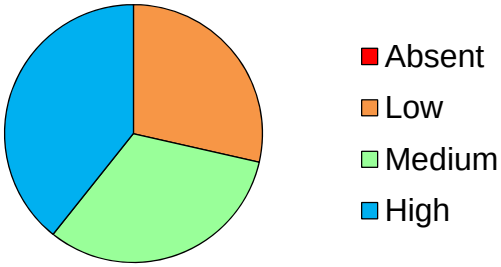
Property summary (153.35 acres, 28 sample points)

Midcanopy vegetation (5-30 feet tall)

	Absent	Low	Medium	High
Midcanopy cover	0%	29%	32%	39%

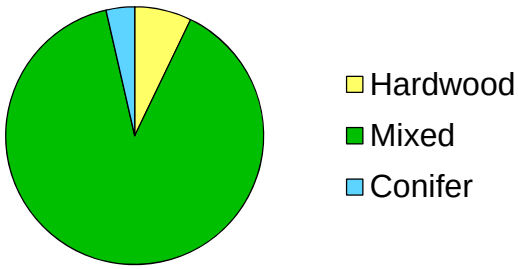
	Hardwood	Mixed	Conifer
Species mix	7%	89%	4%

Midcanopy cover



Midcanopy cover consists of all tree and shrub foliage within the 5-30 ft zone above the forest floor. High midcanopy cover (foliage density) provides cover, nesting, and foraging for species such as the Red-Eyed Vireo and Wood Thrush. Typical midcanopy species include: red maple, hemlock, birch, witch- hazel, and spicebush, and shadbush.

Midcanopy type



Midcanopy type is defined as the predominant type of trees and large shrubs found in the midstory (5-30 ft zone). Three types are recognized: hardwood (deciduous), conifer (evergreen), or mixed (hardwood and conifer). Seed or fruit producing species provide a seasonal food source and seeds for regeneration. Conifers provide important thermal cover during the winter months and cover from predators year-round.

Sun, Wind, & Woodland, Canton LCT

Property summary (153.35 acres, 28 sample points)

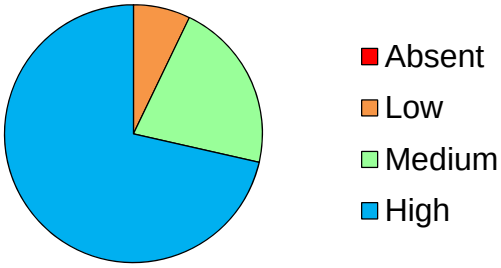
Upper canopy vegetation (>30 feet tall)

	Absent	Low	Medium	High
Upper canopy cover	0%	7%	21%	71%

	Short	Medium	Tall
Canopy height	0%	11%	89%

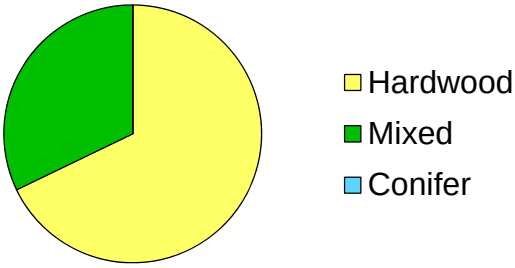
	Hardwood	Mixed	Conifer
Species mix	68%	32%	0%

Upper canopy cover



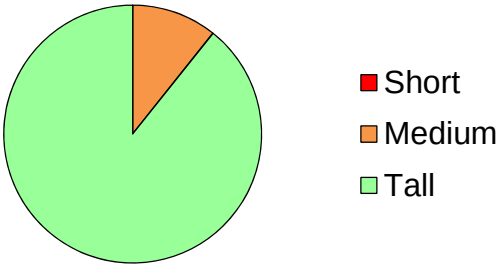
Upper canopy cover is an estimate of horizontal area covered by tree crowns, i.e., the shade cast by trees at high noon. Low cover allows abundant sunlight to reach the forest floor and often has dense herbaceous and shrub layers. Medium cover provides conditions for the maintenance of a midstory. Stands with high cover usually have sparse midstories with few, if any, herbaceous plants and tree seedlings.

Canopy type



Canopy type is defined as the predominant type of trees that are taller than 30 ft. To encourage diversity of food resources, and in turn a diversity of bird species, trees that produce soft mast should be maintained as a valuable food resource. Maintaining yellow birch is crucial for birds with an insectivorous diet. Conifers should be encouraged in hardwood stands and vice versa.

Canopy height



Canopy height influences nesting site potential in all forest stages. Increasing vertical stratification (any different heights) tends to increase diversity of bird species. Shorter tree heights favor species such as the Chestnut-Sided and Worm-Eating Warblers, while species such as the Scarlet Tanager and Pileated Woodpecker prefer taller woods with taller trees.

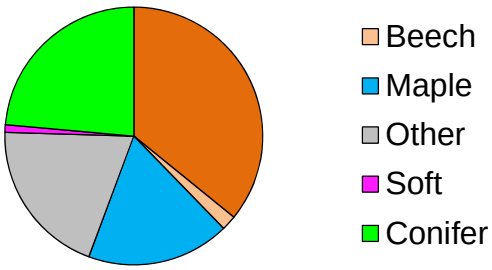
Sun, Wind, & Woodland, Canton LCT

Property summary (153.35 acres, 28 sample points)

Forest composition - basal area (feet^2/acre)

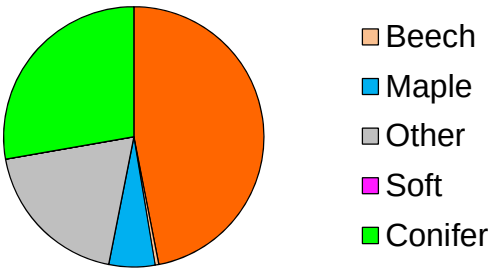
	Hard mast		Dry seeds				
	Oak	Beech	Maple	Other	Soft	Conifer	Total
Pole (5-11" diameter)	14	1	7	8	0	9	38
Saw (>11" diameter)	35	0	4	14	0	21	75
Total	49	1	11	22	0	30	113

Poletimber



Poletimber is a term used to describe trees four to ten inches in diameter. They often will the gaps when larger trees die - thus forming the upper canopy trees of future forests. Retaining higher proportions of hard and soft mast trees, while limiting dry seed trees, will promote a healthy, diverse mix of species.

Sawtimber



Sawtimber trees are 11 inches in diameter or greater. They are often the largest and most mature trees in the forest and have the greatest seed/fruit production. By varying the amount of sawtimber present in a woodland through active forest management, landowners can aid in providing diverse habitats for many priority bird species.

Hard mast - species that produce nuts such as oaks, hickories, and beech.

Soft mast - species that produce fruits such as cherries, shadbush, sassafras, and blueberries.

Dry seeds - species that produce small, dry seeds such as maples, birches, aspens.

Conifers - evergreen species that produce dry seeds and also provide thermal cover such as pines, hemlocks, and cedars.

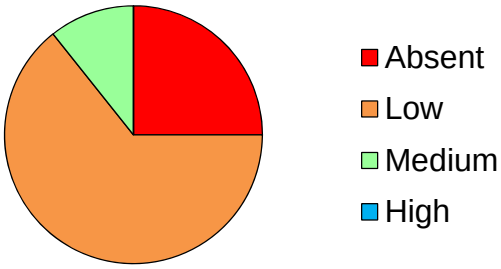
Sun, Wind, & Woodland, Canton LCT

Property summary (153.35 acres, 28 sample points)

Habitat features

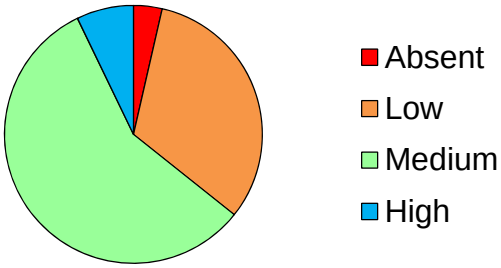
	Absent	Low	Medium	High
Coarse woody material	25%	64%	11%	0%
Leaf litter	4%	32%	57%	7%
Soft mast	68%	25%	7%	0%

Coarse woody material



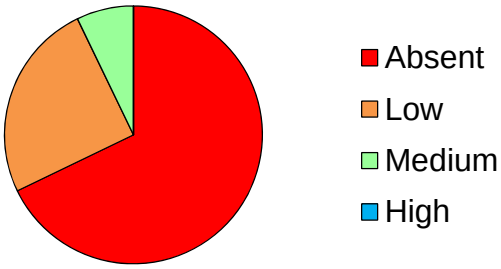
Coarse woody material (CWM) is comprised of downed trees and branches with diameters of 4 inches or greater. CWM may function as a perch site for singing birds, a substrate for wood-rotting fungi, and a habitat for insects and other invertebrates that provide a protein-rich diet for birds during the breeding season and when feeding their chicks.

Leaf litter



Leaf litter is the distribution, amount, and depth of deciduous leaves and needles that cover the ground. Leaf litter is an important habitat for insects and invertebrates. It is also important for ground nesters like the Ovenbird which makes its nest from leaves and downed materials. Equally important, litter leaf reduces the risk of soil erosion during periods of heavy rainfall.

Soft mast



Soft mast is an estimate of potential fruit production that includes berries and drupes. Soft mast trees produce a valuable food resource for not only small birds, but for many mammalian species. Examples of soft mast producing species include trees (blackgum, sassafras, cherry, dogwood), shrubs (blueberry, viburnums, spicebush, raspberries, blackberries), and vines (grape, Virginia creeper).

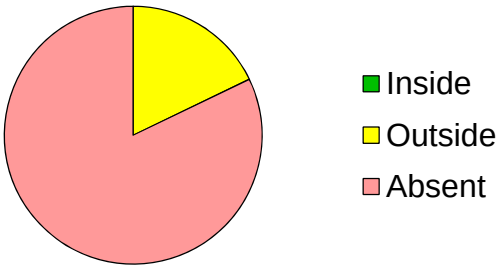
Sun, Wind, & Woodland, Canton LCT

Property summary (153.35 acres, 28 sample points)

Nesting features

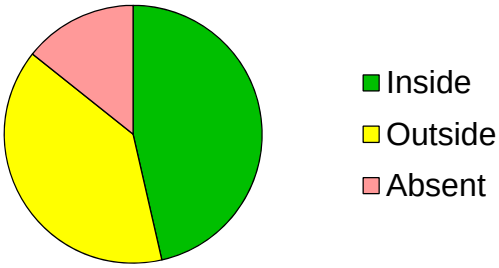
	Inside	Outside	Absent
Brush piles or tops	0%	18%	82%
Cavities	46%	39%	14%
Snags	79%	21%	0%

Brush piles or tops



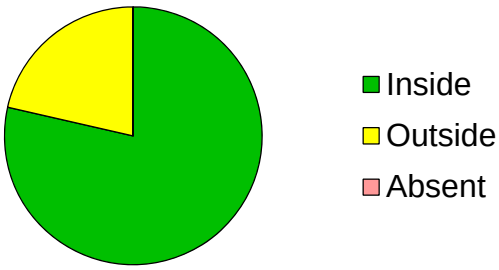
Brush piles or tops are either a large pile of woody material or a large section of a broken-off tree top with intact branches and twigs. It provides understory structure for nesting as well as habitat for insects and other small prey that provide food for birds.

Cavities



Cavities and larger hollows in tree trunks or branches provide good locations for nests because they provide some protection from weather and predators. Owls, Pileated Woodpeckers, and Nuthatches are among several species that utilize cavity trees.

Snags



Snags refer to a standing dead tree, often missing a top, and most of the smaller branches. Snags provide opportunities for excavating nests, perch sites, and possible mating rituals. The insect larvae in the decaying wood of snags provide an excellent food source for woodpeckers.

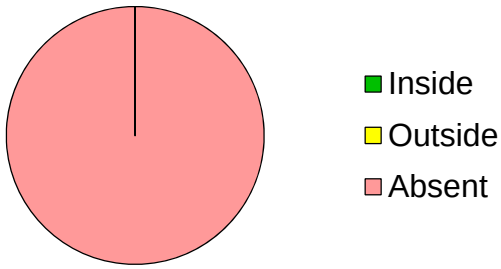
Sun, Wind, & Woodland, Canton LCT

Property summary (153.35 acres, 28 sample points)

Wetland features

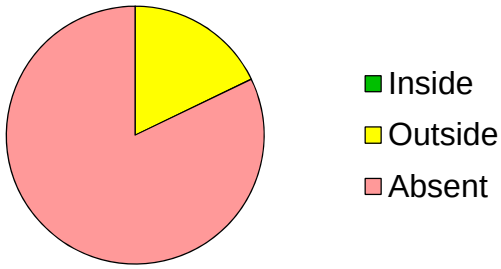
	Inside	Outside	Absent
Rocky stream	0%	0%	100%
Wetland	0%	18%	82%

Rocky stream



Rocky streams or streams with gravel bottoms within a forest provide an important water source for many wildlife species and potential nesting areas for bird species such as the Louisiana waterthrush. Tip-up mounds and root plates from fallen trees in close proximity to streams improve the quality of these areas for many species.

Wetland



Wetlands are defined as areas with water saturated soils. Forested and shrubby wetlands provide structure and frequently contain coarse and fine woody debris. They tend to have shorter trees with low canopy heights and dense shrubs and herbaceous plant communities. Wetlands add to the complexity of the landscape and diversity of the forest stands.

Sun, Wind, & Woodland, Canton LCT

(Stand-1, 153 acres, Mixedwood)

Groundlayer vegetation cover (0-5 feet tall)

	Absent	Low	Medium	High
Native herbaceous	54%	21%	14%	11%
Native shrubs	21%	54%	18%	7%
Non-native species	93%	7%	0%	0%

	Hardwood	Mixed	Conifer
Species mix	25%	57%	18%

Midcanopy vegetation (5-30 feet tall)

	Absent	Low	Medium	High
Midcanopy cover	0%	29%	32%	39%

	Hardwood	Mixed	Conifer
Species mix	7%	89%	4%

Upper canopy vegetation (>30 feet tall)

	Absent	Low	Medium	High
Upper canopy cover	0%	7%	21%	71%

	Short	Medium	Tall
Canopy height	0%	11%	89%

	Hardwood	Mixed	Conifer
Species mix	68%	32%	0%

Forest composition - basal area (feet^2/acre)

	Hard mast		Dry seeds				
	Oak	Beech	Maple	Other	Soft	Conifer	Total
Pole (5-11" diameter)	14	1	7	8	0	9	38
Saw (>11" diameter)	35	0	4	14	0	21	75
Total	49	1	11	22	0	30	113

Sun, Wind, & Woodland, Canton LCT

(Stand-1, 153 acres, Mixedwood)

Habitat features

	Absent	Low	Medium	High
Coarse woody material	25%	64%	11%	0%
Leaf litter	4%	32%	57%	7%
Soft mast	68%	25%	7%	0%

Nesting features

	Inside	Outside	Absent
Brush piles or tops	0%	18%	82%
Cavities	46%	39%	14%
Snags	79%	21%	0%

Wetland features

	Inside	Outside	Absent
Rocky stream	0%	0%	100%
Wetland	0%	18%	82%

Category criteria for 1/20 acre plots (26.33 ft or 8.03 m radius)

Vegetation cover, canopy closure, soft mast

Absent - covered <5% of plot

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Canopy height

Short - trees <20 ft tall

Medium - trees 20-60 ft tall

Tall - trees >60 ft tall

Nesting and wetland features

Absent - not found within plot

Inside - observed within plot

Outside - observed outside of plot

Habitat features

Absent - not found within plot

Low - few leaves / one or two pieces of coarse woody debris

Medium - average leaf litter/several pieces of coarse woody debris

High - thick leaf litter / many pieces of coarse woody debris