Forest Bird Habitat Assessment

Town of East Lyme – Oswegachie Hills
Alice Newton Street Memorial Park

411.97 Mapped Acres




Assessment Date: July 13, 2015

Report Date: February 15, 2016

Prepared for: Town of East Lyme

Prepared by:
Audubon Connecticut
Ferrucci & Walicki, LLC
Connecticut Agricultural Experiment Station

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. With your permission, we may also conduct more thorough bird surveys on your property in 2016 which will supplement this report and increase our collective knowledge of forest bird species distribution in CT.

Connecticut Priority Birds					
Mature Hardwoods/Mixed Forest	Confirmed	Potential	Young Hardwoods /Mixed Forest	Confirmed	Potential
American Redstart			Canada Warbler		
Black-and-white Warbler	X		Chestnut-sided Warbler		
Blackburnian Warbler			Eastern Whip-poor-will		
Black-throated Blue Warbler			Northern Flicker		X
Blue-gray Gnatcatcher	X		Ruffed Grouse *		
Blue-headed Vireo			Forest Edges/Dense Shrubs		
Broad-winged Hawk		X	Baltimore Oriole		X
Brown Creeper			Black-billed Cuckoo		
Cerulean Warbler		X	Blue-winged Warbler		
Eastern Wood Pewee	X		Brown Thrasher		
Hairy Woodpecker *		X	Eastern Towhee	X	
Hermit Thrush			Gray Catbird	X	
Hooded Warbler		X	Indigo Bunting		
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			Great-crested Flycatcher	X	
Veery	X		Least Flycatcher		
Winter Wren			Louisiana Waterthrush		X
Wood Thrush	X		Willow Flycatcher		
Worm-eating Warbler	X		Mature Softwood Forest		
Yellow-throated Vireo		X	Pine Warbler		X
			Black-throated Green Warbler		

* denotes year-round residents.

How the Assessment Was Done

For the purposes of this report, this property was broken into five areas with distinct 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 8 forested acres. A total of 52 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 a variety of habitats for birds. Several species of interior forest breeding birds were noted during our visit to the property. The mixture of upland and wetland hardwood dominated forest, along with ephemeral drainages, Clark Pond and proximity to the Niantic River all provide important potential food and nesting resources for many species. There is a small amount of softwood (mostly pitch pine in the openings and near ridgelines) which helps provide additional diversity. There are also scattered large diameter trees in the upland hardwood stand. Dense pockets of mountain laurel and overstory oak provide much of the beneficial habitat features here.

Right: Portions of Area 1 such as this taken in the eastern half of the area contain dense mountain laurel pockets. Some of the laurel is very tall and is missing foliage in the understory due to shade from overstory trees.

Invasive plants are an issue in places on the property and could be addressed in a phased approach. Because invasives can provide habitat structure that is beneficial to some nesting and migrant birds, some areas could be allowed to grow back up before all areas are cleared.

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 meets the criteria in 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**	Significant amounts of development and water surround the property
Forest Block Size	>2500 acres	**500-2500 acres**	<500 acres	Development, parcelization and fragmentation are common, but due to the size of this property, the forest block is over 500 acres

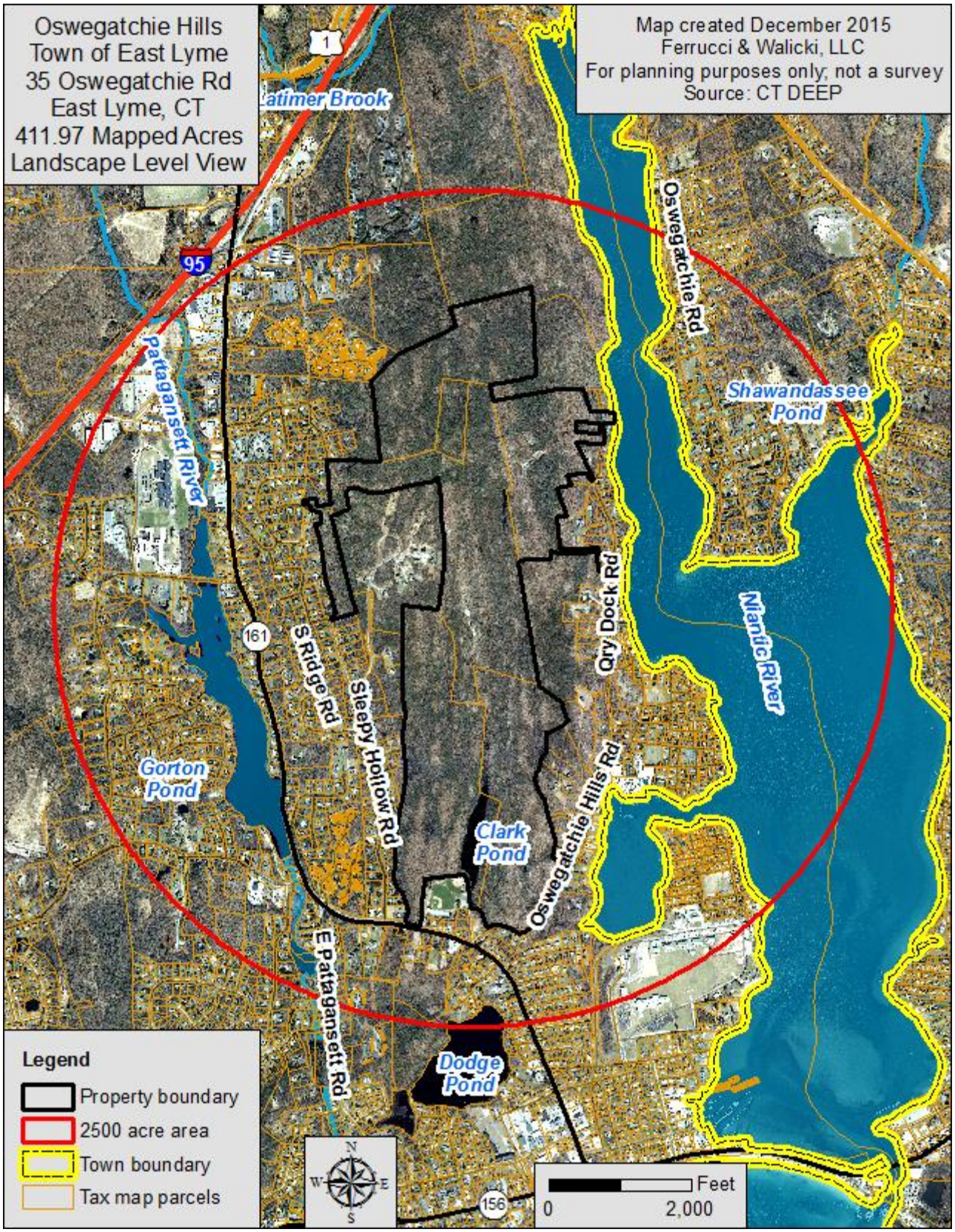
Feature	Value for forest birds			Comments
	Good	Fair	Low	
% Established Forest >20 years (with some old forest >100 years)	**>80% of forest**	70-80% forest	<70% forest	Based on the aerial photo it appears as though most of the forest in this area is established forest, and trees are on this property or in people's yards
% 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

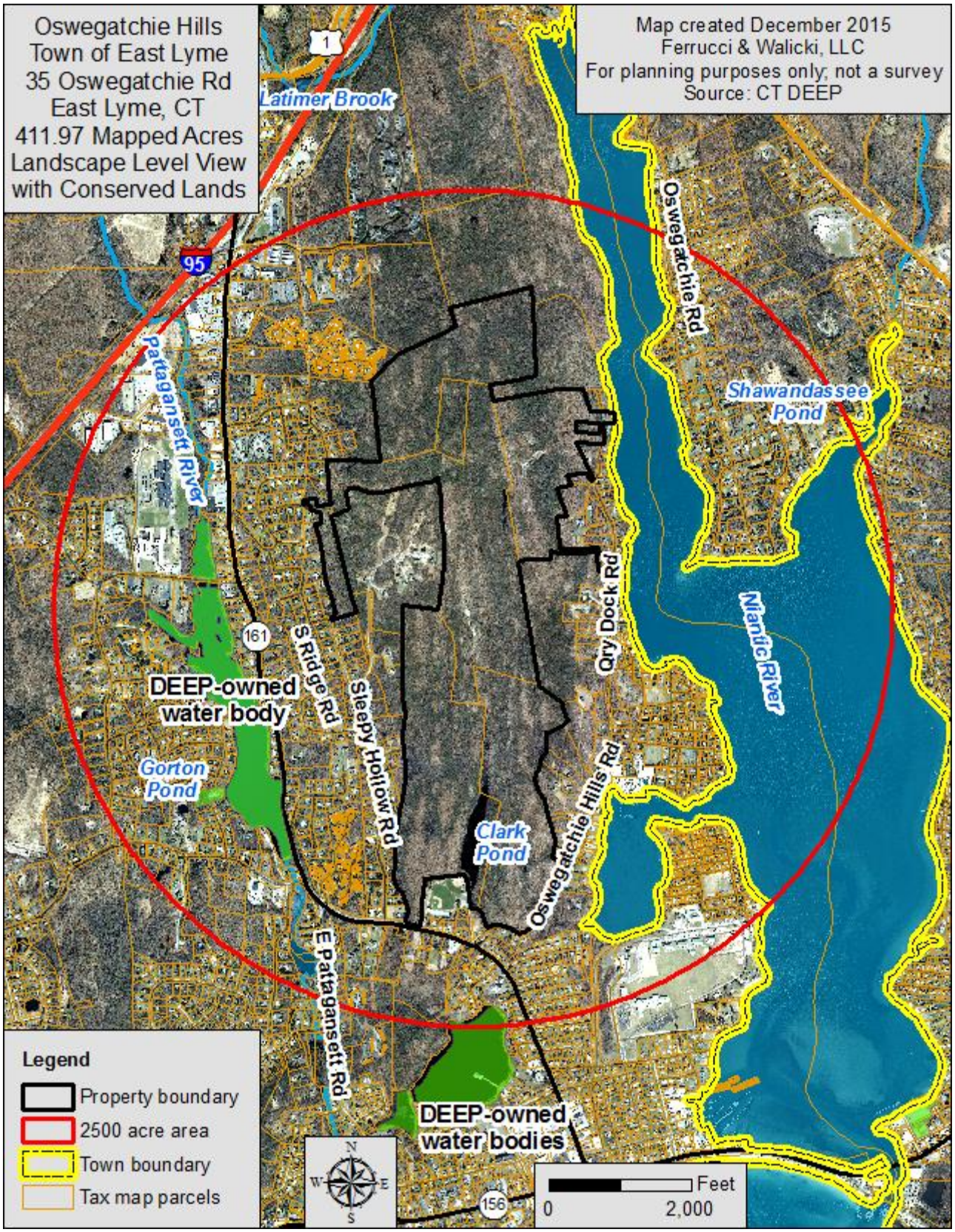
As seen on the maps on pages 7 and 8, this property plays an important role on a landscape level. It is by far the largest contiguous area of forest within a heavily developed landscape. Most of the development is residential with very small lots. The size of the property in the context of its surroundings is one of its most important features, especially in light of its coastal location. It is a relatively large "green" space within development, 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 size of the property, the dense laurel, small open areas, occasional softwood and semi-open areas provide additional habitat opportunities and are all valuable on a micro and macro landscape level. 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.

Above: This blueberry patch is likely highly productive in terms of fruit due to the amount of direct sunlight it receives. Photo courtesy of CAES.

Landscape Context Maps



Nearby Conserved Properties



Property Narrative

General Description

This +/- 412 acre property is located just north and east of Route 161 in the southeastern portion of East Lyme, Connecticut. As evidenced by stone walls, this property exhibits a history of use by people. The land's history of agricultural use has helped to shape this property into what we see today.

This property has a mix of habitats with several features that are beneficial for a variety of birds. Our visit took place at the beginning of July, near the end of breeding season. Many of the birds noted during our visit to Oswegachie Hills are likely breeding on the property as opposed to utilizing the habitats during migration while heading further north to breed and many of the local residents may have quieted down by this time of year especially considering that our visit occurred on one of the hottest days of the year. The mixture of upland hardwood forests, forested wetlands, small open areas with some softwood, open water and some drainages all help to provide a diversity of cover, nesting sites, and foraging areas for breeding birds. The property's location on the coast may make it extremely high quality stopover habitat for migratory birds.

Snags (standing dead trees) and cavity trees were found in fair numbers throughout the property. Coarse and fine woody material were also present, but were less prevalent. Continuing to recruit all these features by leaving snags and cavity trees where safety is not a concern, by periodically cutting some trees (especially hardwoods) and leaving their tops whole or mostly whole will help provide additional habitat diversity.

The quality of the vertical and horizontal structure on this property varies, but overall provides fair habitat with some areas of good to patches of very good habitat places.

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.



Above: Excavations in trees in the eastern (above left), and southwestern (above middle) portions of Area 2 were found throughout the property. Snags and potential cavity trees are important to retain where possible. Other features such as this oak top (above right) in the southeastern portion of Area 1 can serve as cover may provide an area for nesting.

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	Some great plants near the baseball fields. Removing invasive plants by hand and replacing with additional native sources of nectar can continue to improve habitat conditions in this area
Forest roads and trails	**All <20' wide**	Most < 20' wide	Many >20' wide	Nice trail system for people
Forest edges	All soft edges	Some soft edges	**No soft edges**	Currently there are no soft edges, but there may be potential to create some, especially near open areas in the western portion of the property

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 fair diversity of native species
Invasive plant infestation	None	**Low**	Moderate to severe	Invasive plants aren't everywhere, but where they occur, populations can be dense, especially near the trail entrance
Soft mast native fruits and berries	Abundant	**Some**	Absent	Black cherry, spicebush, **lowbush blueberry**, huckleberry and shadbush are found in places on the property, but are not uniformly distributed.
Softwood pockets in hardwood stands	**Present**		Absent	Small scattered amounts of white pine, & pitch pine (in some openings), but the vast majority of the property contains a limited to non-existent softwood component

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 frequently present. Maintain understory vigor by periodically increasing sunlight that can reach the forest floor by creating canopy gaps
Midstory in mature forests	Dense	**Moderate density**	Sparse	The midstory is moderately dense in places mostly due to tall laurel
Canopy gaps in mature forests	**Present**		Absent	Minimal gaps exist, but where present, there are mostly native plants including blueberry
Leaf litter	**Present**		Absent	
Snags and cavity trees	Many	**Some**	Few or none	Present in varying levels throughout the property
Downed dead wood	Many	**Some**	Few or none	Some coarse woody material is present, but it is not uniformly distributed. Fine woody material is largely absent.
Big trees	**Present**		Absent	Nothing very large; may result in a lack of Pileated Woodpecker habitat, or it is possible that we missed this species, which can be very quiet at this time of year.

Other Habitats

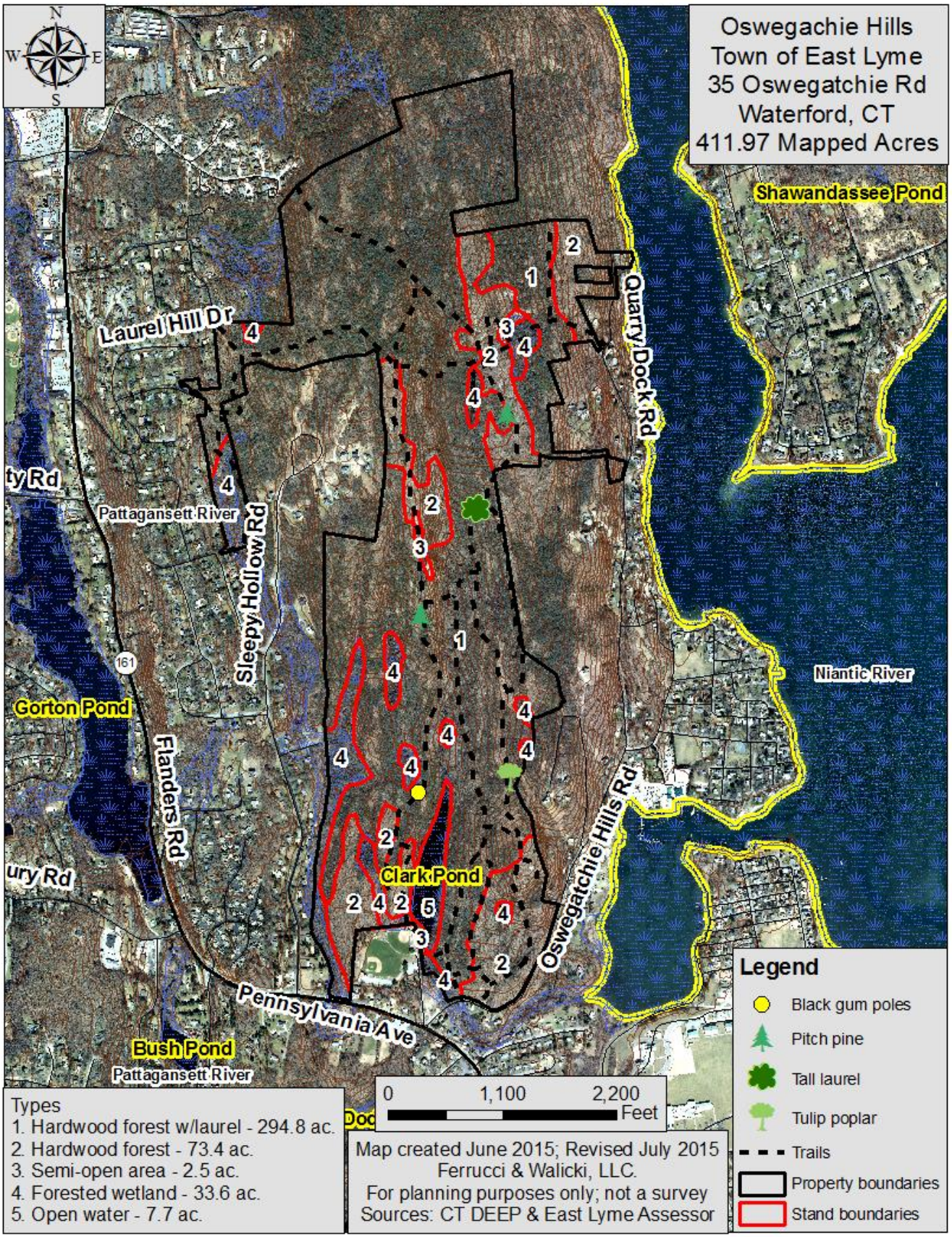
These habitats add diversity and habitat value for birds within forested landscapes.

Feature	Condition			Comments
	Good	Fair	Needs Work	
Waterways and riparian areas	**Good condition**	Fair condition	Poor condition	Generally good, though there are some invasive plants along the edges of the water features in places
Wetlands	**Good condition**	Fair condition	Poor condition	Good amounts of snags in places
Meadows	> 1 acre AND mowed every 2-3 years	> 1 acre OR mowed every 2-3 years	< 1 acre AND mowed every year	N/A

Feature	Condition			Comments
	Good	Fair	Needs Work	
Hayfields	Grassland bird-friendly		NOT Grassland bird-friendly	N/A

Above: The trail makes its way through several different habitat types throughout the property. Here, a portion of the trail goes through Area 3 and we see a pocket of softwood trees (pitch pine) which is relatively rare on this property.

Property Features Map



Stand Descriptions and Recommendations

For the purposes of providing recommendations, the property was broken into five distinct land cover types. These include two forested stands, a mostly forested riparian area, and two small developed areas. The Property Features Map on page 12 shows the locations of the areas as well as some interesting features 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. 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.

Areas 1-2: Hardwood forest with laurel (Area 1) and hardwood forest (Area 2) (368.2 ac.) – Area 1 is the largest stand and combined with Area 2 makes up all of the upland hardwood forest on the property. It[1] is found throughout the property separated in places by narrow bands of mostly forested wetland and some small semi-open areas. Generally the topography is flat to gently sloping and the soils are well-drained, but there are some moderately steep areas with rocky outcrops. There are also some small ephemeral drainages found in portions of the area.

This is an even-aged to two-aged stand which has a well-developed, moderately tall, mostly closed canopy as well as occasional sapling and small pole-sized trees. Native understory vegetation (i.e. vegetation from 0-5 feet tall) is present throughout the stand, mostly in the form of mountain laurel in Area 1. The most commonly found overstory species include a mix of oaks, with some red maple, black birch, and occasional aspen, hickory, black cherry and tulip. Some yellow birch were found in pockets of wetter soils. There were also occasional white pine and pitch pine found widely scattered. Hard and soft mast producing species throughout this area include oak (hard mast) and the occasional black cherry (soft mast). Some of the hilltop areas that have shallower soils contain shorter trees and understories more laden with blueberry.

Above: The eastern portion of Area 2 contains some areas like this which are shallow to ledge, and have canopy gaps in which blueberry is thriving. Continuing to increase canopy gaps where appropriate can help to diversify species, size, and age class of vegetation which attracts different suites of birds and other wildlife species.

[1] This area will be mostly referred to in the singular form for the purposes of this report. Where necessary, distinctions between Areas 1 and 2 will be made in the text.

Very small populations of white ash are also present. Ash trees in the northeastern United States are in decline from "ash yellows" and "ash decline" and are expected to be further impacted by the non-native invasive emerald ash borer beetle. No sign of the beetle was detected on our visit, though it is known to be in the area. There were a fair amount of snags, and some potential cavity trees found in this area.

Right: The neatly drilled sap wells of a Yellow-bellied Sapsucker in this pitch pine in the eastern portion of Area 2 indicates the presence of this species. Frequently Ruby-throated Hummingbirds will associate with sapsuckers as hummingbirds can feed on the sap after the wells are created.

Midstory tree species include 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 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.

A functional[2] understory is frequently present in this area. Where understory vegetation is present, mountain laurel dominates, particularly in Area 1. Other species present include a mix hardwood seedlings, sweet pepperbush (in the wetter areas, witch hazel, lowbush blueberry, and huckleberry. Non-native invasive plant species are located in portions of this area (especially in Area 2), but populations are still relatively small. Invasive plants present here include Japanese barberry and multiflora rose, with smaller amounts of mugwort and Asiatic bittersweet. Populations of invasive plants tended to be worse along the edges and in the wetter areas.

Above: Densely growing mountain laurel with foliage low to the ground provides quality cover and nesting opportunities for a variety of species. Here the trail runs through a patch laurel in the eastern portion of Area 1.

Forest birds that were present in this stand include Osprey, woodpeckers, Blue-gray Gnatcatcher, Eastern Wood-Pewee, Red-eyed Vireo, Great-crested Flycatcher, Wood Thrush, Veery, Ovenbird, Worm-eating Warbler, Black-

[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.

and-White Warbler, Eastern Towhee, and Scarlet Tanager among others. This property can likely provide quality habitat for other species that were note noted due to the heat of the day the relative lateness in the season. Wood Thrush likely use this property and several were noted during our visit. A link to what habitats Wood Thrush require can be found here: http://www.birds.cornell.edu/bbimages/clo/pdf/thrushguide.pdf

Recommendations for Areas 1-2:

Treat invasive plant species where noted.

Additionally, if appropriate locations can be found, a crop/mast tree release in this area would allow more growing space for desirable species including oak, cherry, hickory, yellow poplar, sugar maple, pine, and yellow birch (the latter of which is found in the wetter areas). 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/or 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.

Though the ingredients exist for good understory and overstory characteristics in these stands, much of the area is fairly uniform, both in terms of species mix and in terms of structure. In many places the mountain laurel is growing relatively tall which means that it is shaded by the nearly completely closed canopies on the property. Species diversity in the overstory and understory is fairly limited.

That said, if appropriate locations can be found, considering creating canopy gaps or expanding existing gaps to increase the structural diversity, to release desirable native understory vegetation (i.e. seedlings, saplings, and/or blueberry/ huckleberry), and/or to improve clearings around vistas. Canopy gaps in these circumstances can increase the productivity of these areas and also be very important foraging areas for nesting birds and provide high quality stopover habitat for migrating birds. If this is to be done, attempt to avoid areas with infestations of invasive plants and/or treat invasive plants prior to cutting trees in the overstory. Canopy gaps 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.

Above left: Small pockets of oak regeneration were noted in portions of Areas 1 and 2. Though these seedlings were successfully able to germinate, without an increased amount of direct sunlight, they will likely not become established. The canopy closure above is relatively complete (above right).

In addition, some of the tall, leggy laurel, could be cut in order to stimulate its sprouting response. If this is to be done, simultaneously create a gap in the canopy above the cut laurel. This can increase the effectiveness of this treatment. These activities can help to diversify the size and age classes of understory vegetation and can also help ensure continued vigor of these areas. Retaining much of the cut wood on site and considering the creation of brush piles can also improve habitat conditions as fine woody material was mostly lacking, and coarse woody material was found sparingly.

Release vigorous looking pine 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 Pine Warbler.

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

In the portion of Areas 1 & 2 that are adjacent to the semi-open areas (Area 3), consider treating any invasive species then softening the edges along the forest/semi-open area boundary by cutting groups of trees along the edge and allowing the cut area to regenerate. If feasible, consider planting some native shrubs in cut areas.

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.

Area 3: Semi-open area (2.5 ac.) – This area is found in a few small locations along or near the existing trail system. Soils are well-drained to excessively-drained and the areas are relatively flat with some exposed bedrock. Some of the areas contain pitch pine, a softwood species which adds value to the overall property because there is not much softwood elsewhere. Softwood pockets attract some bird and other wildlife species for which hardwood stands alone cannot always provide suitable habitat.

Left: The trail runs along the top of some exposed ledge in portions of Area 3.

Other plants noted here include some wildflowers, lowbush blueberry and huckleberry, and low-growing oak species.

Bird species noted in this stand include fairly common species such as Eastern Bluebird, Carolina Wren, Eastern Wood-Pewee, Downy Woodpecker, and Eastern Towhee among others.

Recommendations for Area 3:

Keep these areas semi-open. Retain pitch pine.

If feasible, install paired bluebird nest box and continue maintaining the existing box.

Consider planting native flowers and shrubs that can provide additional nectar, structure, and mast including species like milkweed, blueberry, and dogwood. The addition of more native nectar sources could be beneficial for pollinators and birds. Various native species of milkweed are important nectar sources for hairstreak

butterflies and would be especially beneficial when planted in openings in proximity to existing stands of bear oak, which is a host plant for some uncommon species of hairstreak butterflies.

Right: Continuing to maintain nest boxes is important to maintaining their function for desired species. In addition to regular maintenance, if feasible, installing paired boxes can increase the chances of successful bluebird nesting.

If conditions warrant, consider cutting a group or groups of trees along the edge of the semi-open area and allowing the cut area to regenerate. This will help soften the edges of the open/forest boundary and can provide quality habitat for some edge nesters. If feasible, consider connecting nearby semi-open areas by creating a canopy gap to promote dense regeneration between them.

In the small semi-open area at the southern end of the property near the baseball field, consider working with the Town of East Lyme to eliminate invasive plants and create a small meadow near the field. This should only be done if it is not going to be in the way of maintenance, walking paths or other necessary upkeep or infrastructure. If this is to be done consider installing educational signage. Plantings of native shrubs, wildflowers and small trees selected for their value to wildlife and host plant functionality for butterflies would be very beneficial to nesting and migratory birds and insects including butterflies. A great guide that lists many good options can be found online here: http://ctenvirothon.org/wp-content/uploads/2014/08/Picone-BackyardHabitat.pdf

Above left: The area adjacent to the outbuilding near the baseball fields could become an education tool as a planted meadow if it works with the purposes of the Town. A nearby section of the hill near the backstop (above right) contains a quality example of flowers producing nectar.

Area 4: Forested wetland and riparian areas (33.6 ac.) – These areas are found in pockets throughout the property. Soils are mostly poorly-drained and relatively flat. This area contains patches with good structural diversity in terms of dense, native understory as patches of spicebush, winterberry and especially sweet pepperbush were growing well there. Many of the trees in this area are red maple, but a variety of other hardwoods are found here as well. The midstory is moderately dense, and overstory densities vary, but are generally closed.

Bird species noted in in these areas include Eastern Wood-Pewee, Common Grackle, Veery, and Wood Thrush among others.

Above: This portion of Area 4 (in the eastern part of the property) is wetter than some of the other wetlands and contains standing water. If an appropriate location can be found, considering enhancing the edge effect along this wetland by cutting a group or groups of trees can increase the amount of cover, nesting and potential forage the area provides.

Recommendations for Area 4:

Allow these areas to continue to develop. If feasible and desirable, and appropriate locations can be found, consider softening areas in places around these features by cutting small groups of trees and allowing the cut areas to regenerate.

Area 5: Open water (7.7 acres) – This area is made up of Clark Pond along the southern edge of the property. This is a long and narrow pond that contains mostly native vegetation in it and along its shores. Some portions adjacent to the southern end of the property contain invasive plants.

Bird species noted in this area include Cedar Waxwing and Double-crested Cormorant. This area is likely used by many species of birds and other wildlife throughout the year and may provide high quality foraging habitat for many species of migratory birds in the migration season.

Recommendations for Area 5:

Continue to remove invasive plants by hand near the southern end of the pond. If feasible replace invasives with native flowers and shrubs to increase the production of nectar and mast and to improve structure.

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. If any of these recommendations are attempted, consider incorporating the treatment as an educational/demonstration site with signage and descriptions of what is being done, why and what the desired outcomes are. Whenever possible, attempt to limit tree cutting during times of the year when birds may be nesting (i.e. April 15-August 15).

Areas 1-2: Attempt to treat invasives; crop and/or mast tree release; create canopy gaps to improve structural diversity and release desirable understory vegetation (seedlings, saplings, blueberry, huckleberry, and laurel in places); retain and release healthy softwoods; retain snags, cavity trees and some large diameter trees; consider softening the edge near the semi-open areas; consider creating brush piles.

Area 3: Keep areas semi-open; retain softwoods; if feasible, install paired bluebird nest boxes and continue maintaining them; consider plantings for nectar, structure and mast; consider softening the edge and if possible connecting open areas with pockets of regenerating forest and/or blueberry; consider working with the Town to develop a small meadow type habitat and add selected plantings to benefit birds and butterflies near baseball field. This area has much potential to serve as a public demonstration area for such wildlife friendly landscaping techniques.

Area 4: Continue to allow to develop; if feasible and desirable, consider softening some edges.

Area 5: Continue to remove invasive plants; if feasible, plant native flowers and shrubs to increase nectar, structure and mast potential.

Additional Property Recommendations:

- ☒ Call a Forester to arrange a visit and discuss implementing some of the recommendations. Cost-share funds may be available through the USDA Natural Resources Conservation Service (NRCS) to help offset the costs of implementation. 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: The pond as seen from the southern end looking north. This is an excellent freshwater resource given the area’s proximity to the ocean and salt marshes just south along the coast.

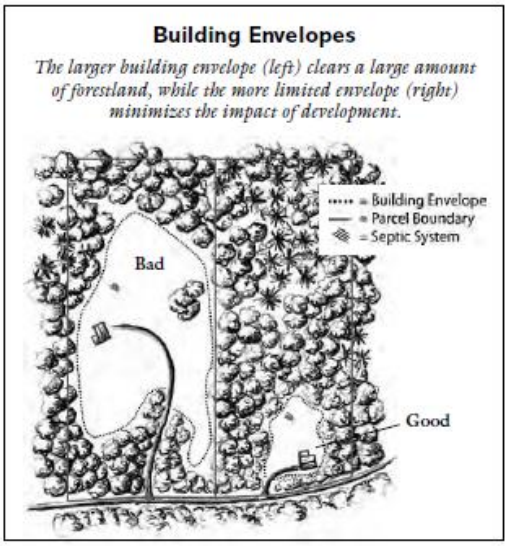
Terms and Explanations

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.

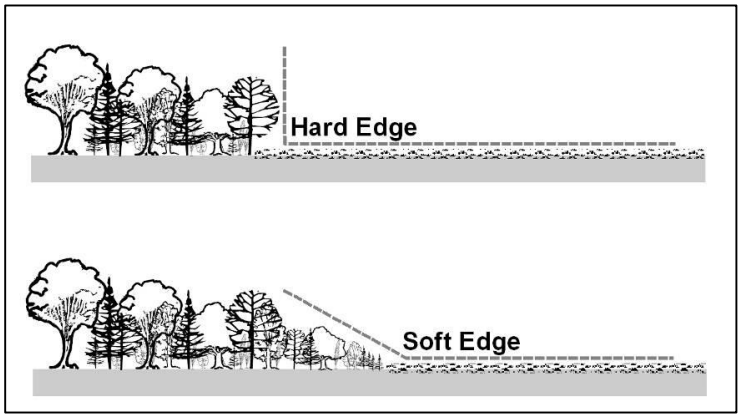
Importance for Forest Birds: Very large (>2500 acres) blocks of contiguous forest provide the highest quality habitat for interior-nesting birds like Wood Thrush that reproduce more successfully away from edges and development. Large blocks also likely contain the full range of habitat types and conditions 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: 07/13/2015 Property: Oswegachie hills		**1**	**2**	**3**	**4**	**5**	**total**	**NOTES**
Canada Goose	*Branta canadensis*						**0**	**May nest on pond**
Mute Swan	*Cygnus olor*						**0**	
Wood Duck	*Aix sponsa*						**0**	**May or could nest on pond**
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**	
Wild Turkey	*Meleagris gallopavo*						**0**	**likely occurs**
Great Blue Heron	*Ardea herodias*						**0**	**likely occurs**
Green Heron	*Butorides virescens*						**0**	**likely occurs**
Turkey Vulture	*Cathartes aura*						**0**	**likely occurs**
Black Vulture	*Coragyps atratus*						**0**	**May ocucr**
Osprey	*Pandion haliaetus*	**1**					**1**	
Bald Eagle	*Haliaeetus leucocephalus*						**0**	**may occur**
Sharp-shinned Hawk	*Accipiter striatus*						**0**	
Cooper's Hawk	*Accipiter cooperii*						**0**	**may nest**
Northern Goshawk	*Accipiter gentilis*						**0**	
Red-shouldered Hawk	*Buteo lineatus*						**0**	**may nest**
Broad-winged Hawk	*Buteo platypterus*						**0**	
Red-tailed Hawk	*Buteo jamaicensis*						**0**	**likely occurs**
American Kestrel	*Falco sparverius*						**0**	
Peregrine Falcon	*Falco peregrinus*						**0**	
Killdeer	*Charadrius vociferus*						**0**	**likely occurs**
Spotted Sandpiper	*Actitis macularius*						**0**	**likely occurs**
American Woodcock	*Scolopax minor*						**0**	
Rock Pigeon (i)	*Columba livia feral*						**0**	
Mourning Dove	*Zenaida macroura*			**1**			**1**	
Black-billed Cuckoo	*Coccyzus erythropthalmus*						**0**	
Yellow-billed Cuckoo	*Coccyzus americanus*						**0**	**likely occurs**
Eastern Screech Owl	*Megascops asio*						**0**	**may nest**
Great Horned Owl	*Bubo virginianus*						**0**	**may nest**
Barred Owl	*Strix varia*						**0**	**may nest**

		1	2	3	4	5	total	NOTES
Eastern Whip-Poor-Will	*Caprimulgus vociferus*						0	
Chimney Swift	*Chaetura pelagica*						0	likely occurs
Ruby-throated Hummingbird	*Archilochus colubris*		2				2	
Belted Kingfisher	*Megaceryle alcyon*						0	likely occurs
Red-bellied Woodpecker	*Melanerpes carolinus*	1					1	
Yellow-bellied Sapsucker	*Sphyrapicus varius*						0	
Downy Woodpecker	*Picoides pubescens*	5	4	2			11	
Hairy Woodpecker	*Picoides villosus*						0	may nest
Northern Flicker	*Colaptes auratus*						0	may nest
Pileated Woodpecker	*Dryocopus pileatus*						0	may nest
Eastern Wood-Pewee	*Contopus virens*	1	2	1	3		7	
Acadian Flycatcher	*Empidonax virescens*						0	
Alder Flycatcher	*Empidonax alnorum*						0	
Willow Flycatcher	*Empidonax traillii*						0	
Least Flycatcher	*Empidonax minimus*						0	
Eastern Phoebe	*Sayornis phoebe*						0	may nest
Great Crested Flycatcher	*Myiarcuscrinitus*	1	4				5	
Eastern Kingbird	*Tyrannus tyrannus*						0	may nest
White-eyed Vireo	*Vireo griseus*						0	
Yellow-throated Vireo	*Vireo flavifrons*						0	may nest
Blue-headed Vireo	*Vireo solitarius*						0	
Warbling Vireo	*Vireo gilvus*						0	may nest
Red-eyed Vireo	*Vireo olivaceus*	5	7				12	
Blue Jay	*Cyanocitta cristata*	3	1				4	
American Crow	*Corvus brachyrhynchos*		2		2		4	
Fish Crow	*Corvus ossifragus*						0	may nest
Common Raven	*Corvus corax*						0	likely occurs
Purple Martin	*Progne subis*						0	
Tree Swallow	*Tachycineta bicolor*						0	likely occurs
N. Rough-winged Swallow	*Stelgidopteryx serripennis*						0	likely occurs
Bank Swallow	*Riparia riparia*						0	
Cliff Swallow	*Petrochelidon pyrrhonota*						0	
Barn Swallow	*Hirundo rustica*						0	likely occurs
Black-capped Chickadee	*Poecile atricapillus*		5	1			6	
Tufted Titmouse	*Baeolophus bicolor*	11	6	7	1		25	
Red-breasted Nuthatch	*Sitta canadensis*						0	
White-breasted Nuthatch	*Sitta carolinensis*	4	3	1	2		10	
Brown Creeper	*Certhia americana*						0	
Carolina Wren	*Thryothorus ludovicianus*			3			3	
Winter Wren	*Troglodytes hiemalis*						0	

		1	2	3	4	5	total	NOTES
House Wren	*Troglodytes aedon*	1		2			3	
Blue-grey Gnatcatcher	*Polioptila caerulea*	3					3	
Golden-crowned Kinglet	*Regulus satrapa*						0	
Eastern Bluebird	*Sialia sialis*			2			2	
Hermit Thrush	*Catharus guttatus*						0	
Wood Thrush	*Hylocichla mustelina*	7	6		1		14	
Veery	*Catharus fuscescens*	4	1		1		6	
American Robin	*Turdus migratorius*		2				2	
Grey Catbird	*Dumetella carolinensis*		1				1	
Northern Mockingbird	*Mimus polyglottos*						0	likely occurs
Brown Thrasher	*Toxostoma rufum*						0	
Europen Starling (i)	*Sturnus vulgaris*						0	likely occurs
Cedar Waxwing	*Bombycilla cedrorum*					1	1	
Ovenbird	*Seiurus aurocapilla*	1					1	
Worm-eating Warbler	*Helmitheros vermivorum*	2	1				3	
Louisiana Waterthrush	*Parkesia motacilla*						0	
Northern Waterthrush	*Parkesia noveboracensis*						0	
Golden-winged Warbler	*Vermivora chrysoptera*						0	
Blue-winged Warbler	*Vermivora cyanoptera*						0	
Black-and-white Warbler	*Mniotilta varia*	1					1	
Nashville Warbler	*Leiothlypis ruficapilla*						0	
Connecticut Warbler	*Oporornis agilis*						0	
Mourning Warbler	*Geothlypis philadelphia*						0	
Common Yellowthroat	*Geothlypis trichas*						0	likely occurs
Hooded Warbler	*Setophaga citrina*						0	
American Redstart	*Setophaga ruticilla*						0	
Cerulean Warbler	*Setophaga cerulea*						0	
Northern Parula	*Setophaga americana*						0	
Magnolia Warbler	*Setophaga magnolia*						0	
Blackburnian Warbler	*Setophaga fusca*						0	
Yellow Warbler	*dendroica petechia*						0	likely occurs
Chestnut-sided Warbler	*Setophaga pensylvanica*						0	
Black-throated Blue Warbler	*Setophaga caerulescens*						0	
Pine Warbler	*Setophaga pinus*						0	
Yellow-rumped Warbler	*Setophaga coronata*						0	
Prairie Warbler	*Setophaga discolor*						0	
Black-throated Green Warbler	*Setophaga virens*						0	
Canada Warbler	*Cardellina canadensis*						0	
Eastern Towhee	*Pipilo erythrophthalmus*	2	2	1			5	
Chipping Sparrow	*Spizella passerina*	1		3			4	

		1	2	3	4	5	total	NOTES
Field Sparrow	*Spizella pusilla*						0	
Savannah Sparrow	*Passerculus sandwichensis*						0	
Song Sparrow	*Melospiza melodia*						0	likely occurs
Swamp Sparrow	*Melospiza georgiana*						0	
White-throated Sparrow	*Zonotrichia albicollis*						0	
Dark-eyed Junco	*Junco hyemalis*						0	
Scarlet Tanager	*Piranga olivacea*						0	may nest
Northern Cardinal	*Cardinalis cardinalis*	2	2	2	2		8	
Rose-breasted Grosbeak	*Pheucticus ludovicianus*						0	may nest
Indigo Bunting	*Passerina cyanea*						0	likely occurs
Bobolink	*Dolichonyx oryzivorus*						0	
Red-winged Blackbird	*Agelaius phoeniceus*				1		1	
Eastern Meadowlark	*Sturnella magna*						0	
Common Grackle	*Quiscalus quiscula*				2		2	
Brown-headed Cowbird	*Molothrus ater*						0	likely occurs
Orchard Oriole	*Icterus spurius*						0	
Baltimore Oriole	*Icterus galbula*						0	likely occurs
Purple Finch	*Haemorhous purpureus*						0	
House Finch	*Haemorhous mexicanus*			1			1	
American Goldfinch	*Spinus tristis*	2	6	2			10	
House Sparrow (i)	*Passer domesticus*			1			1	
Total		20	18	15	9	1	33	

NOTES

Double-crested Cormorant on pond

Very hot day, late in season. Birds quiet.

"May nest" are birds that may nest on the property, but were not recorded.

"Likely occurs" refers to birds that may occur from time to time on property and/or nest in area in the nesting season

Appendix B – *CAES Data*

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

East Lyme, Oswegachie Hills

401.8 acres of assessed forest land
52 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 do 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. Final pages include summaries at the stand level.

2015 habitat assessment crew (l to r): Sarah Kucharski, Amanda Massa, Jamie Cantoni, Jacob Bongiovanni

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

East Lyme, Oswegachie Hills

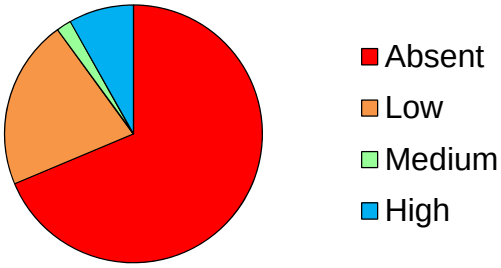
Property summary (401.8 acres, 52 sample points)

Groundlayer vegetation cover (0-5 feet tall)

	Absent	Low	Medium	High
Native herbaceous	69%	21%	2%	8%
Native shrubs	4%	52%	31%	13%
Non-native species	98%	0%	2%	0%

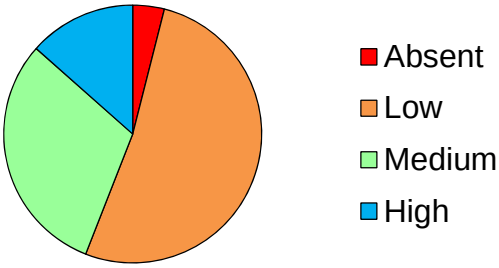
	Hardwood	Mixed	Conifer
Species mix	100%	0%	0%

Native herbaceous



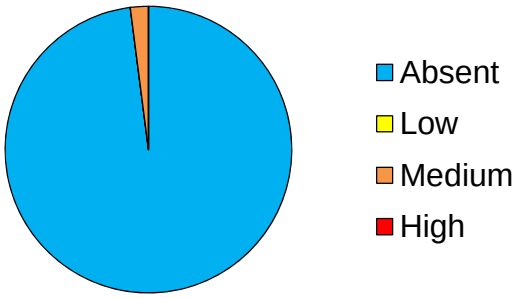
Native herbaceous plants are ideal for foraging and provide cover for species such as the Veery. Typical examples include: asters, mayflowers, goldenrods, skunk cabbage, sarsaparilla, and jewelweed. These plants should be encouraged as they serve as a food source for invertebrates that are consumed by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

East Lyme, Oswegachie Hills

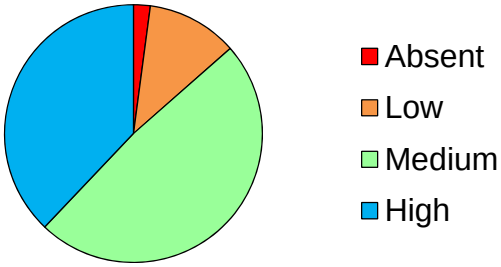
Property summary (401.8 acres, 52 sample points)

Midcanopy vegetation (5-30 feet tall)

	Absent	Low	Medium	High
Midcanopy cover	2%	11%	49%	38%

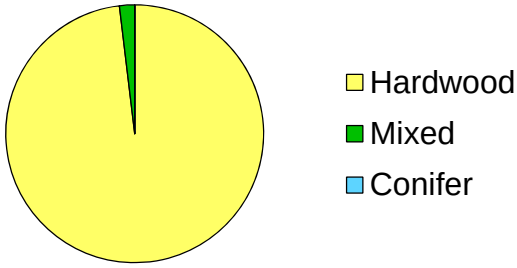
	Hardwood	Mixed	Conifer
Species mix	98%	2%	0%

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.

East Lyme, Oswegachie Hills

Property summary (401.8 acres, 52 sample points)

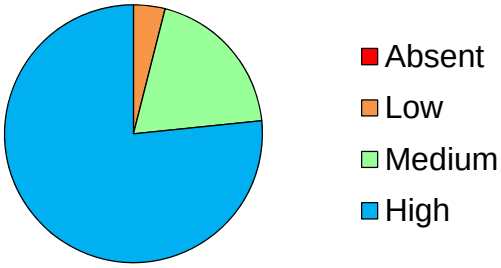
Upper canopy vegetation (>30 feet tall)

	Absent	Low	Medium	High
Upper canopy cover	0%	4%	19%	77%

	Short	Medium	Tall
Canopy height	0%	18%	82%

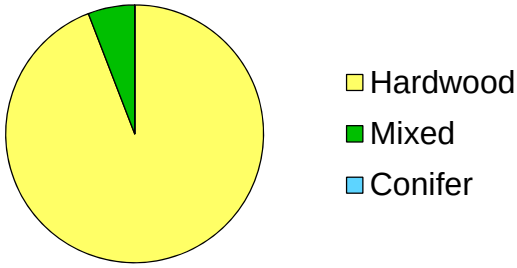
	Hardwood	Mixed	Conifer
Species mix	94%	6%	0%

Upper canopy cover



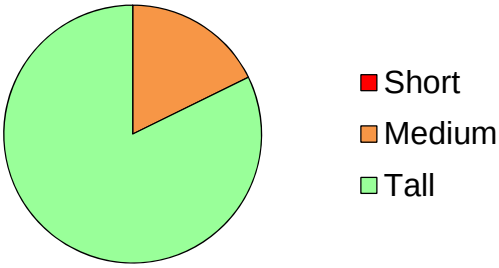
Upper canopy cover is an estimate of horizontal area covered by tree crowns, i.e., the shade cast by trees at high noon. Low cover allows abundant sunlight to reach the forest floor and often has dense herbaceous and shrub layers. Medium cover provides conditions for the maintenance of a midstory. Stands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

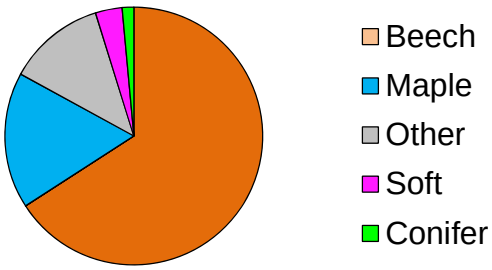
East Lyme, Oswegachie Hills

Property summary (401.8 acres, 52 sample points)

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

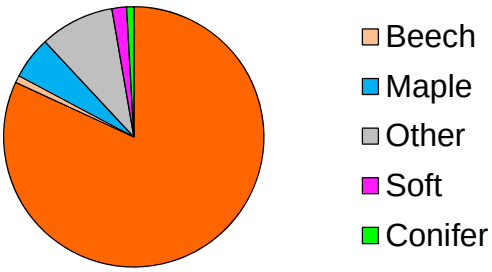
	Hard mast		Dry seeds				
	Oak	Beech	Maple	Other	Soft	Conifer	Total
Pole (5-11" diameter)	27	0	7	5	1	1	40
Saw (>11" diameter)	36	0	2	4	1	0	44
Total	62	0	9	9	2	1	84

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.

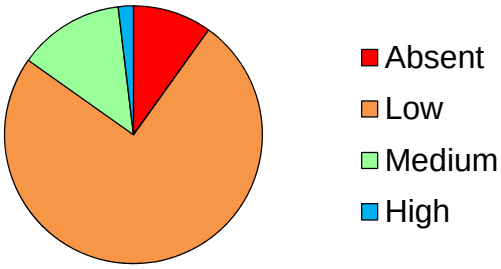
East Lyme, Oswegachie Hills

Property summary (401.8 acres, 52 sample points)

Habitat features

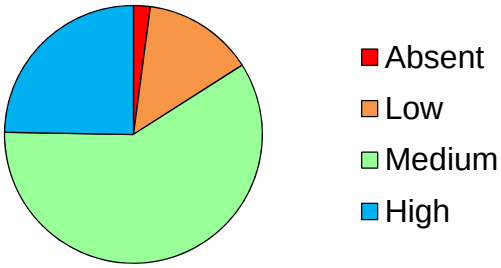
	Absent	Low	Medium	High
Coarse woody material	10%	75%	13%	2%
Leaf litter	2%	14%	59%	25%
Soft mast	42%	37%	8%	13%

Coarse woody material



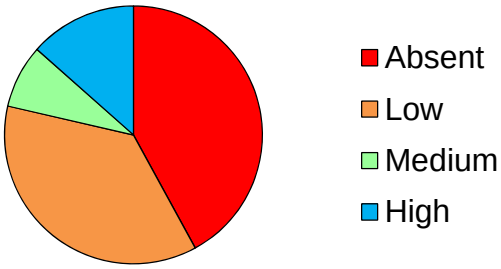
Coarse woody material (CWM) is comprised of downed trees and branches with diameters of 4 inches or greater. CWM may function as a perch site for singing birds, a substrate for wood-rotting fungi, and a habitat for insects and other invertebrates that provide a protein-rich diet for birds during the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

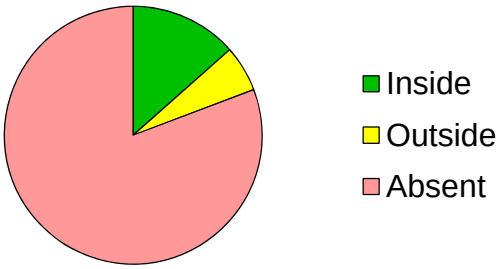
East Lyme, Oswegachie Hills

Property summary (401.8 acres, 52 sample points)

Nesting features

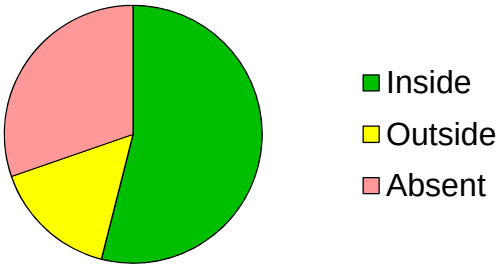
	Inside	Outside	Absent
Brush piles or tops	13%	6%	81%
Cavities	54%	16%	30%
Snags	63%	23%	13%

Brush piles or tops



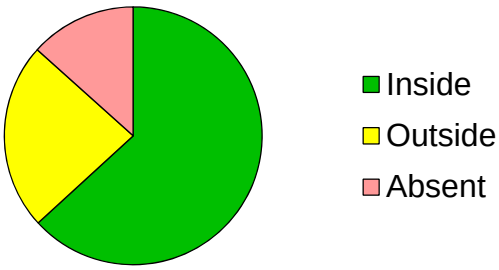
Brush piles or tops are either a large pile of woody material or a large section of a broken-off tree top with intact branches and twigs. It provides understory structure for nesting as well as habitat for insects and other small prey that provide food for birds.

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.

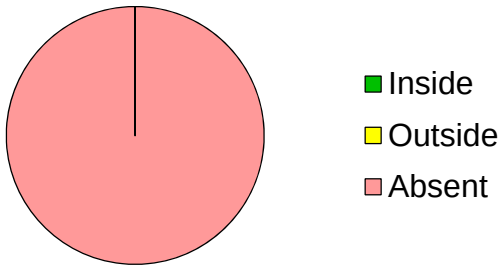
East Lyme, Oswegachie Hills

Property summary (401.8 acres, 52 sample points)

Wetland features

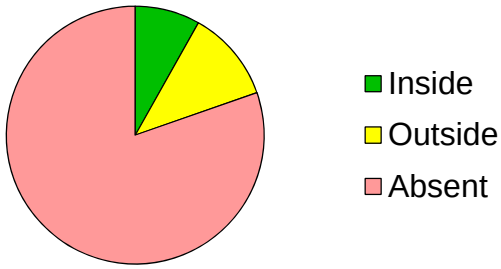
	Inside	Outside	Absent
Rocky stream	0%	0%	100%
Wetland	8%	11%	80%

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.

East Lyme, Oswegachie Hills

(Stand-1, 295 acres, Hardwood, laurel)

Groundlayer vegetation cover (0-5 feet tall)

	Absent	Low	Medium	High
Native herbaceous	77%	18%	3%	3%
Native shrubs	3%	51%	33%	13%
Non-native species	100%	0%	0%	0%

	Hardwood	Mixed	Conifer
Species mix	100%	0%	0%

Midcanopy vegetation (5-30 feet tall)

	Absent	Low	Medium	High
Midcanopy cover	0%	13%	41%	46%

	Hardwood	Mixed	Conifer
Species mix	97%	3%	0%

Upper canopy vegetation (>30 feet tall)

	Absent	Low	Medium	High
Upper canopy cover	0%	3%	15%	82%

	Short	Medium	Tall
Canopy height	0%	10%	90%

	Hardwood	Mixed	Conifer
Species mix	95%	5%	0%

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

	Hard mast		Dry seeds				
	Oak	Beech	Maple	Other	Soft	Conifer	Total
Pole (5-11" diameter)	28	0	7	6	1	1	43
Saw (>11" diameter)	36	0	3	4	1	1	44
Total	64	0	10	10	2	1	87

East Lyme, Oswegachie Hills

(Stand-1, 295 acres, Hardwood, laurel)

Habitat features

	Absent	Low	Medium	High
Coarse woody material	5%	77%	15%	3%
Leaf litter	0%	8%	64%	28%
Soft mast	46%	36%	5%	13%

Nesting features

	Inside	Outside	Absent
Brush piles or tops	13%	5%	82%
Cavities	51%	10%	38%
Snags	67%	18%	15%

Wetland features

	Inside	Outside	Absent
Rocky stream	0%	0%	100%
Wetland	3%	13%	85%

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

East Lyme, Oswegachie Hills
(Stand-2, 73 acres, Hardwood)

Groundlayer vegetation cover (0-5 feet tall)

	Absent	Low	Medium	High
Native herbaceous	56%	44%	0%	0%
Native shrubs	0%	56%	22%	22%
Non-native species	89%	0%	11%	0%

	Hardwood	Mixed	Conifer
Species mix	100%	0%	0%

Midcanopy vegetation (5-30 feet tall)

	Absent	Low	Medium	High
Midcanopy cover	0%	11%	67%	22%

	Hardwood	Mixed	Conifer
Species mix	100%	0%	0%

Upper canopy vegetation (>30 feet tall)

	Absent	Low	Medium	High
Upper canopy cover	0%	0%	44%	56%

	Short	Medium	Tall
Canopy height	0%	44%	56%

	Hardwood	Mixed	Conifer
Species mix	100%	0%	0%

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

	Hard mast		Dry seeds				
	Oak	Beech	Maple	Other	Soft	Conifer	Total
Pole (5-11" diameter)	27	0	1	2	0	0	30
Saw (>11" diameter)	47	1	0	0	0	0	48
Total	73	1	1	2	0	0	78

East Lyme, Oswegachie Hills

(Stand-2, 73 acres, Hardwood)

Habitat features

	Absent	Low	Medium	High
Coarse woody material	22%	67%	11%	0%
Leaf litter	0%	22%	56%	22%
Soft mast	33%	44%	0%	22%

Nesting features

	Inside	Outside	Absent
Brush piles or tops	22%	11%	67%
Cavities	67%	33%	0%
Snags	67%	33%	0%

Wetland features

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

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

East Lyme, Oswegachie Hills
(Stand-3, 34 acres, Wetland)

Groundlayer vegetation cover (0-5 feet tall)

	Absent	Low	Medium	High
Native herbaceous	25%	0%	0%	75%
Native shrubs	25%	50%	25%	0%
Non-native species	100%	0%	0%	0%

	Hardwood	Mixed	Conifer
Species mix	100%	0%	0%

Midcanopy vegetation (5-30 feet tall)

	Absent	Low	Medium	High
Midcanopy cover	25%	0%	75%	0%

	Hardwood	Mixed	Conifer
Species mix	100%	0%	0%

Upper canopy vegetation (>30 feet tall)

	Absent	Low	Medium	High
Upper canopy cover	0%	25%	0%	75%

	Short	Medium	Tall
Canopy height	0%	25%	75%

	Hardwood	Mixed	Conifer
Species mix	75%	25%	0%

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

	Hard mast		Dry seeds				
	Oak	Beech	Maple	Other	Soft	Conifer	Total
Pole (5-11" diameter)	15	0	15	3	5	3	40
Saw (>11" diameter)	8	0	5	10	5	0	28
Total	23	0	20	13	10	3	68

East Lyme, Oswegachie Hills

(Stand-3, 34 acres, Wetland)

Habitat features

	Absent	Low	Medium	High
Coarse woody material	25%	75%	0%	0%
Leaf litter	25%	50%	25%	0%
Soft mast	25%	25%	50%	0%

Nesting features

	Inside	Outside	Absent
Brush piles or tops	0%	0%	100%
Cavities	50%	25%	25%
Snags	25%	50%	25%

Wetland features

	Inside	Outside	Absent
Rocky stream	0%	0%	100%
Wetland	75%	25%	0%

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