

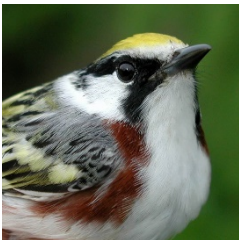


# Audubon | VERMONT

## Forest Bird Habitat Assessment

**Berlin Town Forest  
Berlin, VT**

**573 GIS acres**



**Assessment Date:**

**8/18/2021, 8/20/2021, and 8/24/2021**

**Report Date:**

**8/24/2021**

**Prepared by:**

Deron Rixon, Summer Intern  
Vermont Land Trust

*Priority Forest Birds (left to right): Chestnut-sided Warbler, Ovenbird, White-throated Sparrow, Black-throated Blue Warbler*

## Background

Breeding bird surveys have shown that the forests of Vermont and Northern New England are globally important for birds throughout the hemisphere. **Our forests are home to the highest concentration of bird species breeding in the continental United States;** they are a "veritable breeding factory" for hundreds of neo-tropical migratory birds.

Unfortunately – even though they are still common in our area - **many of these birds are experiencing long-term population declines.** Audubon Vermont's Healthy Forests Initiative focuses its conservation efforts on 40 of these forest bird species, known as *responsibility species*. These birds have a high proportion of their global populations breeding in our region, so we have the opportunity – and responsibility - to keep them common before they become rare, threatened, or endangered.

Even the smallest properties can be critical parts of large forest blocks that provide high-quality habitat for breeding birds. **Small actions by forest landowners can have a global impact.** Audubon Vermont is partnering with foresters and other stewardship and conservation organizations to provide **technical assistance to and educational opportunities for private landowners and municipalities** who want to make a difference for birds in their forests. Habitat assessments, management plan reviews, and implementation consultations are provided to qualifying landowners free of charge due to generous support from grant funding and individual donations.

## Purpose

This assessment was conducted by a Vermont Land Trust (VLT) Intern in order to:

- 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.
  - Terminology and descriptions can be found beginning on page 13.

## Key Recommendations-

- Increase diversity of forest habitat and structure through thinning/crop tree release/selection harvests in areas that are most suitable.
- Prioritize the development and implementation of a non-native invasive species management plan.
- Recruit coarse downed woody material (>10in dbh and >3ft long) throughout property.

## Birds and Habitat Types

We share our northern forests with as much as 90% of the global breeding populations of dozens of species of migratory birds, including the Bicknell's Thrush, Black-throated Blue Warbler, and Canada Warbler (Partners in Flight). The North American Bird Conservation Initiative refers to these birds as **responsibility species**; the responsibility of looking out for the future of these birds is in our hands because our forests are the core of their breeding range. 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 rare, threatened, or endangered. Knowing who is or may be nesting on your property is a great way to ensure that you're making a positive difference.

Young Hardwood/Mixed Forest	Confirmed	Potential	Boreal/High Elevation Forest	Confirmed	Potential
American Woodcock*		X	Bay-breasted Warbler		
Canada Warbler*		X	Bicknell's Thrush		
Chestnut-sided Warbler*		X	Black-backed Woodpecker		
Magnolia Warbler		X	Blackpoll Warbler		
Mourning Warbler		X	Boreal Chickadee		
Nashville Warbler		X	Cape May Warbler		
Northern Flicker		X	Gray Jay		
Ruffed Grouse	X		Palm Warbler		
White-throated Sparrow*		X	Spruce Grouse		
Mature Hardwood/Mixed Forest	Confirmed	Potential	Tennessee Warbler		
American Redstart		X	Yellow-bellied Flycatcher		
Blackburnian Warbler		X	Wetlands and Watercourses	Confirmed	Potential
Black-throated Blue Warbler*		X	Alder Flycatcher		X
Black-throated Green Warbler*		X	Lincoln's Sparrow		X
Blue-headed Vireo*	X		Louisiana Waterthrush		X
Chimney Swift		X	Olive-sided Flycatcher		X
Eastern Wood-pewee*	X		Rusty Blackbird		X
Northern Parula		X	Swamp Sparrow		X
Ovenbird	X		Other birds observed		
Purple Finch		X	Black and White Warbler, Red-Eyed Vireo, and Barred Owl.		
Scarlet Tanager*	X				
Veery*		X			
Wood Thrush*		X			
Yellow-bellied Sapsucker*	X				

\* *Birder's Dozen* species: Hundreds of species of birds breed in Vermont every year. Identifying all of them by sight and sound is a daunting task, even for expert birders. A simpler starting and focal point for those interested in managing forests with birds in mind is Audubon Vermont's *Birder's Dozen*, which are relatively easy to identify by sight and sound and use a variety of habitat types.

### Land Planning

Having a clear and informed plan for the future of your forest is one of the most important things you can do to protect habitat for birds and other wildlife in your woods.

	Yes	No	Interested	Comments
Forester	X			Robert Nelson, Washington County Forester
Enrolled in Current Use Program		X		
Management Plan	X			
Enrolled in NRCS		X		
Conservation Easement	X			Held by VLT
Tree Farm		X		

### 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	There is a diversity of natural communities and native plant species throughout the property.
Non-native plant infestation	None	Low	Moderate to severe	Overall, this large property has a low incidence of non-native plants but there are certain areas in the southwestern corner in particular where the infestation of invasives is moderate to high.
Soft mast native fruits and berries	Abundant	Some	Absent	Apple, blackberry, wild grape, pin cherry, and hobblebush.

### Mature Forest Structure – 567 acres – 98% of parcel

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	
<b>Understory</b>	High density	Moderate density	Little to none	The majority of surveyed plots had a low level of woody stems in the understory (1-25% cover or the low end of 25-50% cover).
<b>Midstory</b>	High density	Moderate density	Low density	The majority of surveyed plots had a moderate level of woody stems in the midstory (% cover in the range of 25-50% with several in the 51-75% cover range.)
<b>Canopy gaps</b>	Present		Absent	
<b>Leaf litter</b>	Present		Absent	
<b>Snags and cavity trees</b>	Many	Some	Few or none	The majority of snags observed were likely between 10 – 18 dbh with a few very large and old standing dead/cavity trees in the higher elevation portions of the property. Overall, the recruitment of future snags and cavity trees should be considered.
<b>Downed dead wood</b>	Many	Some	Few or none	Fine woody material was far more prevalent than coarse woody material throughout surveyed plots. For coarse woody material, there are approx. 10.7 pieces per acre and approximately 26 piles per acre of fine woody material.

### Young Forest Structure – 6 acres – 1% of parcel

Regenerating forests comprised of high-densities of seedling, saplings, and shrubs is an important habitat component of the landscape. These areas are often referred to as “early-successional” habitat.

Feature	Condition			Comments
	Good	Fair	Needs Work	
<b>Understory</b>	High density	Moderate density	Little to none	Much of the young forest on this property was in wet areas or on the edges of open-air spaces (i.e., small forest openings and a former home site turned into a meadow). For the most part, there was a moderate level of woody stems in the understory of these areas (the higher end of 26-50% cover to the lower end of the 51-75% cover.)
<b>Midstory</b>	High density	Moderate density	Little to none	The majority of the young forest areas had a moderate level of woody stems in the midstory (high end of 26-50% cover to the low end of the 51-75% cover.)
<b>Patch size(s)</b>	>1 acre		<1 acre	

Feature	Condition			Comments
	Good	Fair	Needs Work	
Snags and cavity trees	Many	Some	Few or none	
Downed dead wood	Many	Some	Few or none	There appeared to be more coarse than fine downed woody material however it was difficult to estimate in many areas due to dense herbaceous plant growth.
Overstory tree retention	Many	Some	Few or none	

### Other Habitats

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

Feature	Present	Absent	Comments
Streams	X		One stream observed runs west to east across the northern end of the property. There is also a stream in the south western corner of the property.
Forested Wetlands	X		The northern end of the property is much wetter than most of the rest of the property and there are at least 2 distinct wetlands present.
Other Wetlands		X	
Meadows	X		A few small openings in the forest where herbaceous plants are in high density. All but one of the openings observed were <1 acre in size.
Hayfields		X	

### Notes, Considerations, and Recommendations

Given the vegetative structure and bird species observed, the Berlin Town Forest provides a significant amount **mature forest habitat**. Many responsibility birds breed in mature forest habitat where they find nest sites, cover, and food. Typically, the quality of mature forest habitat increases for forest birds as the diversity of forest ages and structure increases. Pole stands, which are common on this property, are the youngest type of mature forest habitat, are typically structurally simple, and attract a smaller suite of forest birds. Older stands, which are also found in the town forest, exhibit more developed understory and midstory layers, canopy gaps, big trees, snags, logs on the ground, and attract a higher diversity of birds. In the Berlin

Town Forest, the habitat structural feature that could most benefit from enhancement is the understory layer. The main way to achieve this is through timber management that is integrated with songbird habitat management. A forest inventory will help identify opportunities for enhancing the understory layer as well as opportunities to release hardwood and softwood trees in the midstory and crop trees. To the extent possible, conduct any harvesting of trees outside of the bird breeding season which runs from May – mid-July. Late summer through winter management is preferable, as it will not result in direct impacts to nesting birds.

- There is a **significantly low** amount of **coarse woody material** throughout the entire property. Recruitment of downed wood material that is >10in dbh and >3ft long is recommended.
- **Non-native invasive plants** are a resource concern on any property. Currently, invasive plant species at the Berlin Town Forest seem to be mostly concentrated to the south western portion of the property. In this area, there are a number of **high-density patches** of buckthorn and barberry. Given this, it is highly recommended that a plan be developed to map and manage these areas. Rapid response is a critical component of invasive plant species management and it should be a priority at this property. An excellent online resource for learning more about the plants and control methods can be found at <https://vtinvasives.org>
- Encouraging deer hunting on this property as an effort to mitigate deer browse may improve regeneration and ultimately vertical forest structure.

### **Climate Change and Birds**

A newly released report by the National Audubon Society, "[Survival by Degrees: 389 Bird Species on the Brink](#)" has identified climate change as THE greatest challenges to bird conservation. Modeled climate change impacts to the forests of Vermont will alter nesting habitat conditions for priority bird species. This in turn is likely to result in changes to the bird species community, their nesting success, and overall incidence of birds that are currently characteristic of the region.

Of the 604 North American bird species Audubon assessed, nearly 2/3 (389 species) are vulnerable to extinction under 3°C of warming. In Vermont 94 of 168 bird species assessed are vulnerable in summer under the 3°C scenario. Reducing emissions to 1.5°C reduces the number of vulnerable species to 54. For a more detailed description of how climate change will impact birds in Washington Co., VT using Audubon's Birds and Climate Visualizer click [here](#).

Forest management activities that enhance songbird habitat also have the potential to provide climate-related co-benefits of mitigation (carbon storage) and adaptation (ecosystem resiliency). Co-benefits as they relate to management recommendations for the Berlin Town Forest property include:

<i>Attribute</i>	<i>Habitat Benefit</i>	<i>Mitigation Benefit</i>	<i>Adaptation Benefit</i>
Structural Retention	Structures such as large trees, down woody material, brush piles, and snags provide nest sites and foraging opportunities	Enhanced net carbon storage compared to silvicultural systems that do not emphasize structural retention	Superior wildlife habitat including refuges from extreme conditions and soil moisture retention which aids germination
Multi-aged, mixed-species forest with a shade-tolerant component	Layered canopy provides nesting and foraging sites for maximum number of species	Higher net carbon storage associated with multi-aged forests. High biomass enables higher sequestration rates.	Plant species diversity buffers against loss of species and impacts of pests and pathogens and creates redundancy in ecosystem functions.
Maintain a generally closed canopy	Mature forest birds such as Black-throated Green Warbler, Blue-headed Vireo, and Scarlet Tanager benefit	Cool temperatures on the forest floor moderate decomposition rates, slowing loss of carbon store compared to open-canopy sites where decomposition is more rapid	Cooler, shady forest offers refuge for invertebrates in warmer temperatures
Maintain moist leaf litter layer	Litter nesting (Ovenbird) and foraging (Wood Thrush) birds benefit	Leaf litter can contribute to soil organic carbon storage	Moist leaf litter offers refuge for invertebrates in warmer temperatures
Control invasive species	Remove low-value food source and potential “sink” habitat nesting site		When forest understory is dominated by non-native plants native trees and shrubs have a more difficult time becoming established and overall forest complexity is diminished
Protect and promote intact, connected forest landscapes	Higher reproductive success rates for interior forest birds	Carbon is stored in forests more so than other land uses	Landscape permeability allows for species movement and gene flow as conditions change



**Representative Photos from the Berlin Town Forest**



**Photo 1:** Dense midstory growth.



**Photo 2:** "Stem exclusion" forest.



**Photo 3:** Meadow.

**Photo 4:** Large old maple snag.



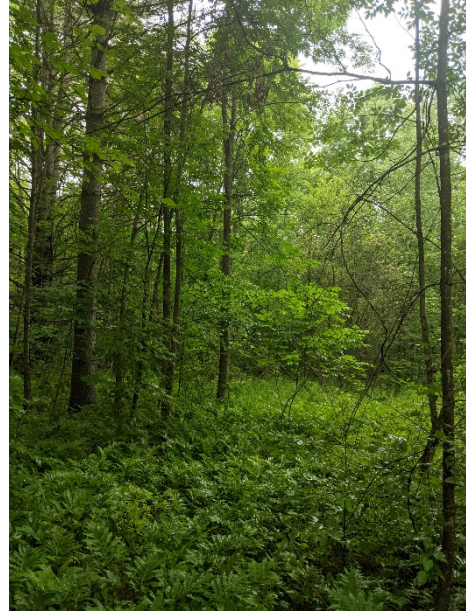
**Photo 5:** Very large old snag.





**Photo 6:** Small opening in mature forest.

**Photo 7:** Small forest opening in wet area.



**Photo 9:** Dense mid/understory with ferns.



**Photo 8:** Almost no understory or midstory coverage.

**Photo 10:** Pine forest with low understory coverage.



## Terms and Explanations

**Big Trees:** Live trees great than 19 – 24 inches diameter at breast height (DBH).

*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 also provide cavity nest sites for large woodland birds including owls and pileated woodpeckers.

**Canopy Gap:** A small opening in the upper canopy of a mature forest typically the size of one tree crown up to 1/4 acre.

*Importance for Forest Birds:* Birds such as the eastern wood-peewee 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 or blow over or are cut down are a normal and important part of a healthy forest and high-quality mature forest habitat.

**Downed Deadwood:** Coarse woody material (CWM) is downed logs and branches >4 inches diameter. Fine woody material (FWM) is limbs and branches <4 inches 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 white-throated sparrows and veeries. Scattered individual pieces have minimal habitat value.

**Forest Block:** A large area of contiguous forest cover

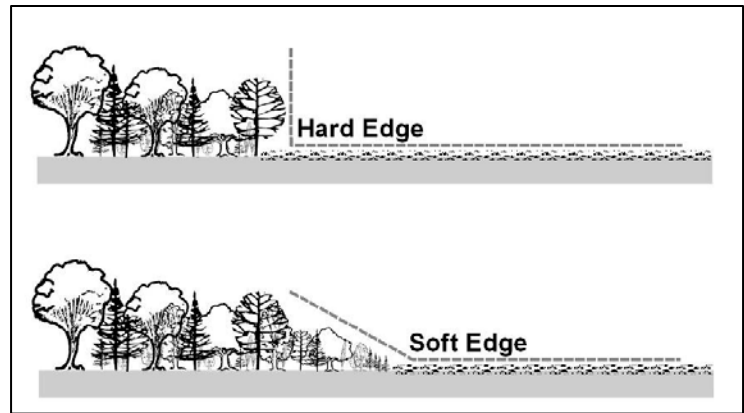
*Importance for Forest Birds:* Very large (>2500 acres) blocks of contiguous forest provide the highest quality habitat for interior-nesting birds like wood thrush that reproduce more successfully away from edges and development. Large blocks also likely contain the full range of habitat types and conditions required to support most or the entire suite of responsibility 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 area important habitat during the migration season.

**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 responsibility birds compared to fragmented and/or developed landscapes with lower 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 white-throated sparrow.

**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:* A fragmented forested landscape is more likely to support “generalist” wildlife species, such as raccoons and skunks, which can decrease nesting success of interior-nesting forest birds.

**Hardwood Forest:** A forest dominated by broad-leaved 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 and parasitism generally no longer occur. Interior-nesting species, such as scarlet tanager, wood thrush, ovenbird, black-throated blue warbler, and blue-headed vireo, have greater reproductive success when they nest away from forest edges.

**Invasive (non-native) 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, buckthorn, and Japanese barberry, present a variety of threats to forest health in Vermont 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. 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.

**Mature Forest Habitat:** Forest with a canopy greater than 20 feet tall.

*Importance for Forest Birds:* Many responsibility 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 responsibility bird species nest and/or forage within the first 30 feet of the forest. Nests of wood thrush, American redstart, black-throated green warbler, and blue-headed 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, Canada warbler, and white-throated sparrow.

**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 chimney swifts. Aspen and birch species are frequently chosen as trees to excavate. Cavities are often made in trees with the heartwood and sapwood decay fungi. Suggested targets for snags and cavity trees combined in are  $\geq 6$  per acre, with one tree  $>18$  inches DBH and 3  $>12$  inches DBH. Branches on snags may be used as foraging perches and nest sites.

**Soft Mast:** Soft fruits and berries.

*Importance for Forest Birds:* Fruits including cherry, apple, *rubus* species (e.g. blackberry and raspberry), dogwood, 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 exclusions in hardwood stands. For this reason, maintaining or increasing the softwood component of hardwood stands increases their overall habitat value. Several responsibility species are associated with softwood forests that are dominated by spruce and fir. Bicknell’s thrush is associated with these forests found at high-elevations in the mountains, and species including boreal chickadee, spruce grouse, and black-backed woodpecker, are associated with lowland spruce-fir forests in the northern parts of our region that are characterized by a short growing season and cold climate.

**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, red spruce, *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 mourning 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 as well.

**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 responsibility birds and many other wildlife species use young forests during all or part of their life cycle. Chestnut-sided warbler, American woodcock, and magnolia 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 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 scarlet tanager and wood thrush. Young forest provides dense, protective cover for juveniles, as well as 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 clearcut 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.