

# Managing Your Woods with Birds in Mind



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A Vermont Landowner's Guide

**Audubon Vermont and the Vermont Department of Forests,  
Parks, and Recreation**



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## About this guide

Human fascination with and compassion for birds are ancient. So is our relationship with forests. However, in our modern world, the natural links between forest stewardship and bird conservation are not always apparent. Forest management has traditionally centered on maximizing timber production, and protecting bird habitat has focused on the specific needs of game birds, such as ruffed grouse and waterfowl, and species that are rare or endangered. But the reality is that our management choices in the woods have direct and real impacts on hundreds of lesser known bird species, many of which are common and concentrated in our region, but whose global populations are in decline. *Managing Your Woods with Birds in Mind* gives landowners and managers a new way to look at the woods. Our approach brings these birds to the forefront while promoting an ecological and sustainable approach to timber management.

This integrated and innovative approach to forest stewardship and bird conservation has evolved over the past several years out of a partnership between Audubon Vermont and the Vermont Department of Forests, Parks, and Recreation. County Foresters have been helping private landowners steward their forests since the 1940s. Audubon Vermont began providing technical assistance and educational opportunities for forest landowners interested in bird-friendly management through the *Forest Bird Initiative* in 2006. Recognizing the potential to make a bigger positive difference for forests, birds, and landowners by working together, our two organizations launched the *Foresters for the Birds* project in 2009. This project has provided technical tools and trainings for over 100 foresters in our region, who are now using their knowledge and skills to help landowners – like you - manage their forests with birds in mind.



County Foresters and Audubon Vermont conservation biologists continue to reach out directly to landowners, spending time walking and talking with them in their woods and leading workshops and trainings. However, there are a handful of us and many, many of you. As of 2001, there were 80,000+ private forest landowners in Vermont. Nearly half of those landowners own forested properties that are less than 100 acres in size. Collectively, small woodland owners like these own a third of the private forest land in Vermont – about 1 million acres.

So what you do in your woods matters. But we know that making good management choices isn't easy; it takes expertise, thought, and care. This guide is designed to help you make good decisions by giving you information, some basic skills, and guidance on managing your woods with birds in mind. We hope that you'll use it as a reference and resource for getting to know your woods and its avian inhabitants and for planning for your forest's future. It is not prescriptive and cannot tell you which specific management activities will make the most sense on your property. Even if you have the time and skills to write your own forest management plan and do your own work in the woods, we always recommend that you consult with a professional forester. S/he will have the technical

expertise to help you apply the information and recommendations in this guide in a way that make the best sense for your individual property and management goals.

Happy birding and woods-walking,

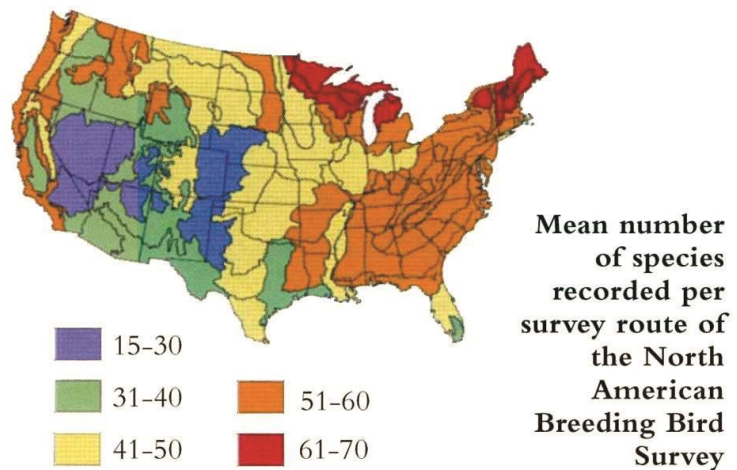
The staff of Audubon Vermont and Vermont FP&R

### Why forest birds?

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.** We now have the responsibility – and opportunity - to keep them common before they become 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 individual forest landowners can have a global impact.**



Map courtesy of the Nature Conservancy, Vermont

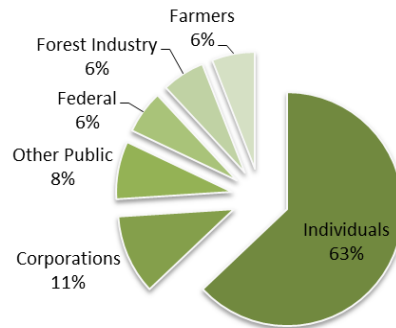
***Our northern forests are home to the highest concentration of bird species breeding in the continental United States.***



### Does private forestland matter to birds in Vermont?

Roughly 80% of our region's forests are privately-owned. When considered within the broader landscape, even the smallest properties can be critical parts of the large blocks of forest in our region that support breeding birds. As a result, small actions by individual forest landowners can have a global impact.

Distribution of Timberland Area by Ownership Type



More than 80% of Vermont's forests are privately owned (Source: VT Monitoring Cooperative 2009 Report)

### Can working forests work for forest birds?

Absolutely, with careful planning and thoughtful implementation. Forest products from timber to maple syrup can generate income that helps landowners to offset the costs of land ownership. In this way, income from forest products helps to protect forest bird habitat by minimizing subdivision and conversion to non-forested uses. In addition, forest management activities have the potential to enhance habitat for some forest birds. For example, growing and cutting firewood can improve future timber potential in a forest stand while also enhancing understory nesting habitats for black-throated blue warblers.



## What are the benefits of managing your woods with birds in mind?

- ✓ **More birds and other wildlife** to watch, photograph, hunt, and enjoy.
- ✓ **Helping to keep common birds common** and protect habitats for rare, threatened, or endangered species.
- ✓ **Healthier, more resilient, and more productive woodlands** since management with birds in mind focuses on enhanced forest structure, promoting native species diversity and composition, and working with natural forest dynamics.
- ✓ **Birds can be good indicators of forest health and biodiversity** since they are sensitive to changes in habitat and climate. They are relatively easy to identify and measure.
- ✓ **Better forest insect damage control** (e.g. tent caterpillars and gypsy moths). Birds eat tons of insects every year. Habitat features, such as snags and wetlands, also attract other natural predators like bats and dragonflies, which leads to reduced reliance on insecticides and bug zappers around your home.
- ✓ **Enhanced natural beauty and aesthetics.**
- ✓ **Higher property values** that result from attractive, well-managed, productive land. Maintains value for next generation and heirs.
- ✓ **Lower energy costs** through landscape design that reduces home heating and cooling and yard maintenance costs. For example, planting/maintaining trees and shrubs that attract birds and other wildlife around your home reduces the time and cost of maintaining lawn and non-native plantings.
- ✓ **Added income** by enrolling land in federally-funded conservation programs such as the Natural Resource Conservation Service (NRCS).



*Northern Flicker ©Jerry Acton*





- ✓ **Increased forest-based revenue** over the long-term including:
  - Sustainably cutting trees for timber income and/or firewood.
  - Collecting mushrooms, berries, and other non-timber forest products.

## Vermont Forest Birds

### Responsibility Species

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 threatened or endangered.

### Audubon Vermont's 40 Forest Responsibility Species



*Left to right:  
Blackburnian warbler,  
magnolia warbler,  
Nashville warbler.  
Courtesy of Charley  
Eisman and  
Powdermill Avian  
Research Center.*

Alder Flycatcher  
American Redstart  
American Woodcock\*  
Bay-breasted Warbler  
Bicknell's Thrush  
Black-backed Woodpecker  
Blackburnian Warbler  
Blackpoll Warbler  
Black-throated Blue Warbler\*  
Black-throated Green Warbler\*  
Blue-headed Vireo\*  
Boreal Chickadee  
Canada Warbler\*  
Cape May Warbler  
Chestnut-sided Warbler  
Chimney Swift  
Eastern Wood-Pewee\*  
Gray Jay  
Lincoln's Sparrow  
Louisiana Waterthrush  
Magnolia Warbler

Mourning Warbler  
Nashville Warbler  
Northern Flicker  
Northern Parula  
Olive-sided Flycatcher  
Ovenbird  
Palm Warbler  
Purple Finch  
Ruffed Grouse  
Rusty Blackbird  
Scarlet Tanager\*  
Spruce Grouse  
Swamp Sparrow  
Tennessee Warbler  
Veery\*  
White-throated Sparrow\*  
Wood Thrush\*  
Yellow-bellied Flycatcher  
Yellow-bellied Sapsucker\*  
\* = Birder's Dozen species

## **Birder's Dozen**

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*. The *Birder's Dozen* is twelve of the 40 responsibility species that have been identified by Audubon Vermont as being high priorities for protection in Vermont and the northeast. The *Birder's Dozen* were selected because they:

- Are simple to identify by sight and/or sound.
- Collectively use a wide range of forest types and conditions for feeding and for breeding.
- Are showing a decline in their global breeding populations or are at risk for decline.
- Have a significant proportion of their global breeding population in the Northern Atlantic Forest.

*American Woodcock*

*Black-throated Blue Warbler*

*Black-throated Green Warbler*

*Blue-headed Vireo*

*Canada Warbler*

*Chestnut-sided Warbler*

*Eastern Wood-Pewee*

*Scarlet Tanager*

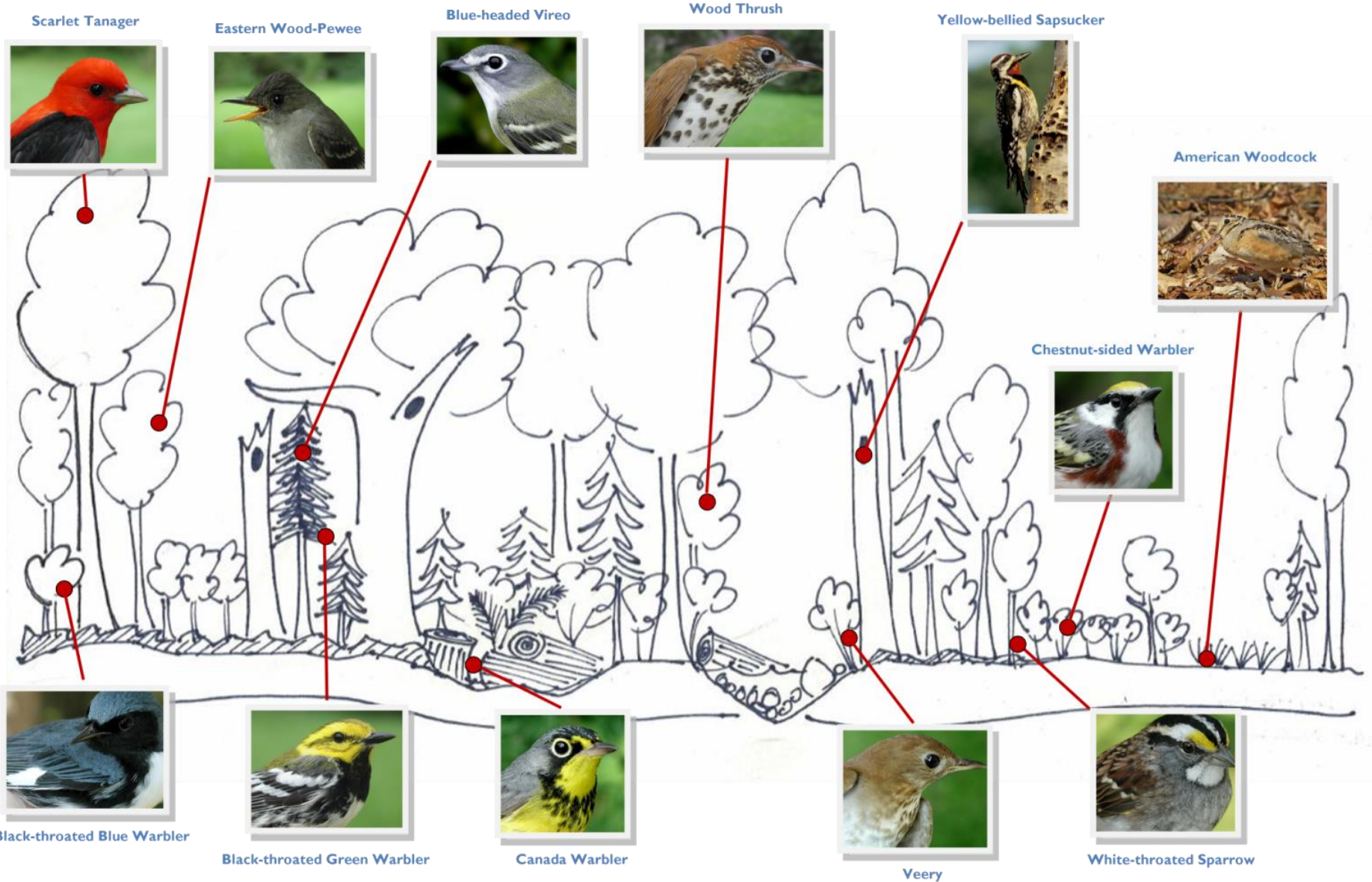
*Veery*

*White-throated Sparrow*

*Wood Thrush*

*Yellow-bellied Sapsucker*

Where in the woods are the *Birder's Dozen*?



## What do forest birds need to survive?

Like all living things, birds need a few basic components of habitat for survival: food, water, shelter, and space. A bird's specific habitat needs change with the seasons depending on whether they are breeding, migrating, or over-wintering. Vermont forests are especially important breeding habitats for a large diversity of neotropical migrant songbirds that spend their winters in Central or South America and make the long journey north each spring to mate and raise their young. Vermont also provides stop-over habitats along the Atlantic Flyway for species that breed further north and wintering grounds for some hearty year-round residents and northern species, such as American tree sparrows and redpolls, that travel south looking for food.

### Food

During the breeding season, insects make up the bulk of forest birds' diets in Vermont. The great abundance and diversity of insects in our forests – which we've all experienced when walking or working in the woods during the summer – is one of the primary factors that makes our region so attractive to so many breeding birds. Birds literally consume tons of insects in our forests every season, and play an important role in controlling forest pests such as tent caterpillar and spruce budworm.



*Black-throated green warbler*

### **What you can do**

- ✓ Retain and regenerate soft mast species such as black cherry, serviceberry, and elderberry in your woods.
- ✓ Release apple trees.
- ✓ Plant native, fruiting shrubs around your house and in your yard.
- ✓ Allow portions of lawn or mowed field or meadow to naturally grow up into shrubby habitats that include fruiting species such as blackberry, raspberry, chokecherry, and dogwood.

Different birds have different foraging habits and strategies. For example, the eastern wood-pewee is a flycatcher and catches insects on the wing by “sallying forth” from a perch next to a forest opening or edge. Many wood warblers glean butterfly and moth (*Lepidoptera*) larvae off of tree leaves and branches. Wood thrush forages for soil invertebrates, such as beetles, snails, and millipedes, in the leaf litter on the forest floor.

Forest birds also consume nectar, leaves, buds, earthworms, spiders, and seeds. Fruits and berries – referred to as soft mast - including cherry, apple, blackberry and raspberry, dogwood, and others are important food sources for forest birds in the late summer and early fall after leaving the nest and before migrating. During this time, many birds feed on soft mast and the insects that are attracted to them in order

to build up critical fat reserves needed to endure long fall migrations.



*Black-throated blue warbler male with nest and nestlings*

### **Nest Sites**

Nests provide a safe place for birds to keep their eggs and nestlings. Bird nest design is as varied as the birds themselves. Birds use a wide diversity of materials including leaves, mud, grass, plant down, animal hair and fur, feathers, rootlets, and spider silk in nest construction. Birds nest in every layer of the forest from the ground up to the tops of the trees. Some species, such as the yellow-bellied sapsucker, nest in cavities in snags or living trees. Others including the ovenbird, ruffed grouse, and American

woodcock construct camouflaged nests right on the forest floor. Most forest birds nest in the lower layers of the forest. Birds are very faithful to their nest sites and individuals often return to the same spot year after year.

### **Cover**

Forest birds face constant threats from potential predators including owls and other raptors, weasels, snakes, and raccoons. Often fewer than half of a nesting pair's young survive their first summer. Dense cover is important in every life stage, but especially so for fledglings. Many of these new birds, even species that breed in interior forest away from edges such as scarlet tanager, are attracted to dense, shrubby growth in forest openings where protective cover and food are abundant.



*White-throated sparrow fledgling ©Jerry Acton*

### **Territories**

A territory is the area a male defends – usually by singing - during the breeding season. Territory size is often dependent on the quality of the habitat with smaller territories being possible in higher quality habitat. During the breeding season, some species may restrict their movements to staying entirely within their territories. However, most species require an area larger than their territory for foraging. Although potentially very useful for making management decisions, these area requirements



*Ovenbird ©Jerry Acton*

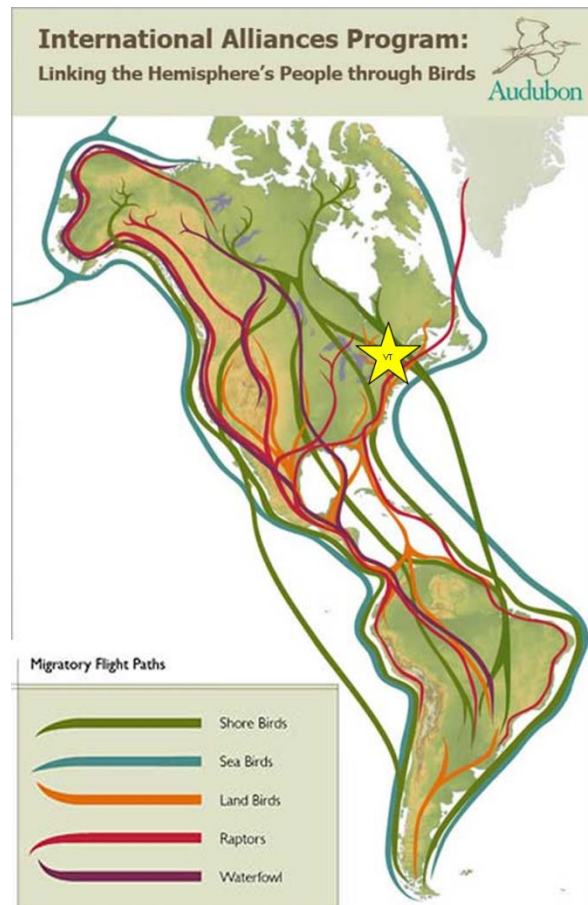
are often difficult to calculate since they are dependent on a large number of factors.

## The Atlantic Flyway

Vermont is located along a super highway in the sky: the Atlantic Flyway. From South America to Canada, the Atlantic Flyway handles hundreds of species of birds and millions of individuals each spring and fall. The heaviest traffic is at night when most songbirds travel and rush hour can last for weeks.

Vermont is both an exit and a rest stop along the Atlantic Flyway. 73 species return to New England to breed in our forests, many of them making Vermont their final spring destination. Millions more birds stop in to rest and refuel – often in wetlands – before continuing on to breeding habitat further north. In the fall, the same process is completed, but in reverse, as the same birds and their young travel from and through Vermont to return to wintering grounds further south.

In the United States on the eastern seaboard, human populations are dense. We compete with birds for space in almost every possible type of habitat required by a startling diversity of bird species. Audubon and its partners are facing and solving the threats and challenges of habitat destruction, pollution, climate change, and population growth along the flyway. Audubon Vermont is working with other states along the Atlantic Flyway as part of a strategic conservation initiative; the Atlantic Flyway Initiative is using a variety of innovative strategies and tools, such as working with public and private landowners, in targeted critical bird habitats within our forests, salt marshes, barrier islands, and on coastal beaches. Local action in a flyway-scale context is needed to have the global impact that will create significant positive change for birds, habitats, and human communities along the flyway. Forest landowners in Vermont – like you – play a critical role in helping to offset threats birds face elsewhere by giving them the best breeding habitat possible in our woods.



### ***What you can do***

- ✓ Manage your woods with birds in mind. Giving them the best breeding habitat possible in Vermont will help offset other threats and stresses they face during migration and on their wintering grounds.
- ✓ Close your blinds at night and turn off lights you aren't using during bird migration season (April-June and August-October). Some birds use constellations to guide them on their annual migrations, and bright lights can disrupt them.



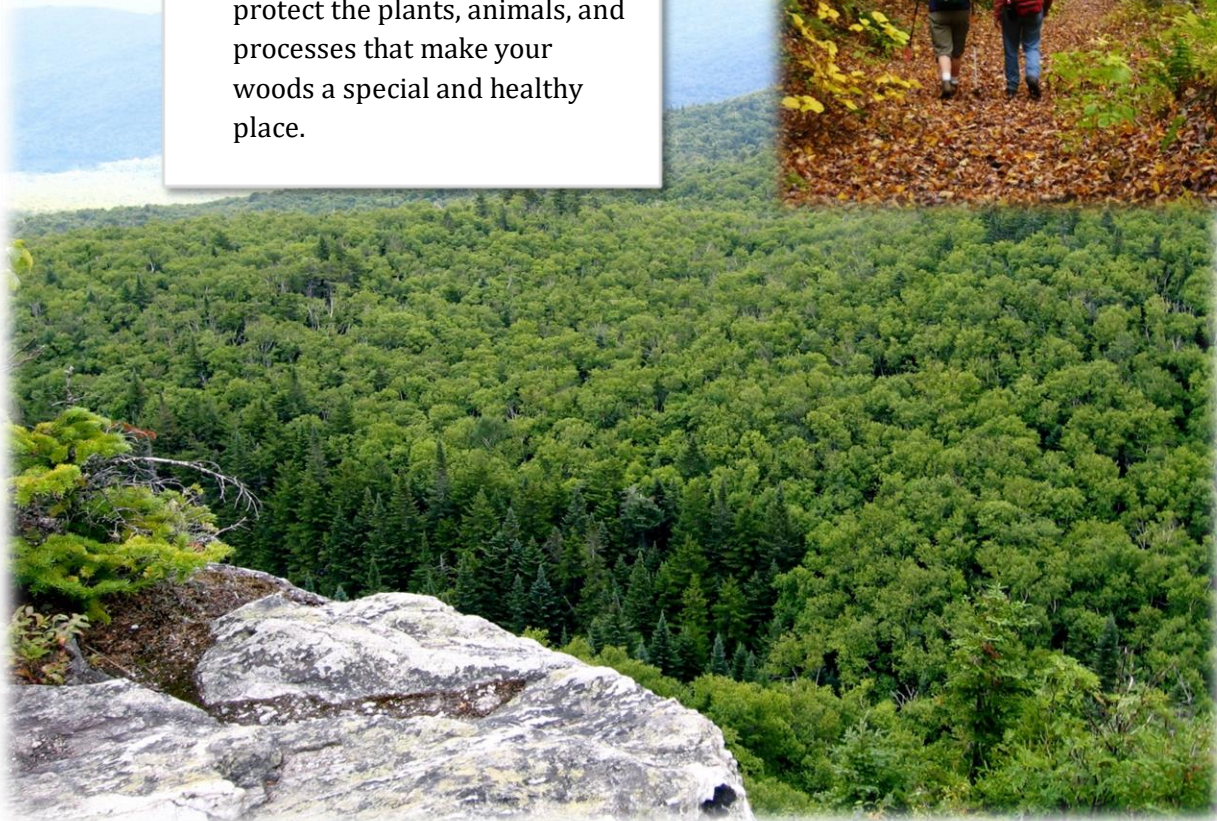
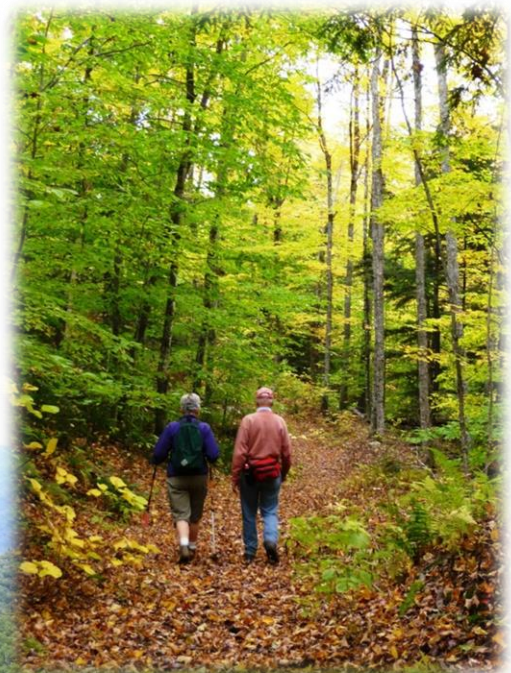
## Vermont Forests

### What is a Forest?

Forests cover nearly 80% of our state, so it's impossible to go far without seeing or being in one. But forests are not just the backdrop of our Vermont landscape, and the woods out your backdoor are more than a woodlot. Forests are dynamic and complex ecosystems dominated by trees that also include a wide array of other living and non-living things as well as all the processes that affect them. The rocks, soil, water, microbes, fungi, plants, birds, and other wildlife in a forest are all affected in some way by climate patterns, predator-prey relationships, competition for resources, nutrient and water cycling, changes caused by forest succession and disturbance as well as by our management and actions.

#### ***What you can do***







- ✓ Remember that your woods aren't just backdrop or a woodlot; they are a complex and dynamic forest. Consult a professional forester before building trails, cutting trees, or making other changes in your woods. Plan your actions carefully to make sure you protect the plants, animals, and processes that make your woods a special and healthy place.



## **Types of Forests in Vermont**

Forests are classified into different types based on the dominant tree species. Which suite of species thrives where is determined by site factors such as soil, climate, and topography, and is also often influenced by past land use and management.

In Vermont, we have a wide array of different forest types. We are at the southern extent of the northern boreal forest, at the northern edge of the range for forests dominated by southern species such as oak, and our climate and soils are well-suited to support the extensive northern hardwood forests that dominate most of our hillsides. Birds pay attention to differences in forest types, and most species have a preference for where to live and breed. Broadly, forest birds tend to be associated with hardwood, softwood, or mixedwood forests although some species have more specific preferences. For example, blue-headed vireos prefer to nest in softwood forests, such as those dominated by eastern hemlock; eastern wood-pewees are most often found in hardwood forests; and Bicknell's thrush is only found in high-elevation forests on Vermont's tallest mountain peaks. The wide variety of forest habitat types in Vermont is part of what allows our region to support the highest diversity of breeding birds in the continental United States.

Hardwood Forest	Mixedwood Forest	Softwood Forest
		
<p><i>≥75% hardwood species such as maple, birch, beech, and ash</i></p>	<p><i>25-75% softwood species with the rest being hardwoods</i></p>	<p><i>≥75% softwood species such as eastern hemlock, spruce, fir, or pine</i></p>
Swamp	Boreal Forest	Riparian Forest
		
<p><i>Forested wetland such as a hemlock, red maple, or cedar swamp.</i></p>	<p><i>Circumpolar band of forest characterized by species that are adapted to the extreme cold of this region.</i></p>	<p><i>Forest along a stream or river that may be regularly disturbed or affected by flooding.</i></p>

## **Natural Disturbance: Wind and Ice**

Forests do not stay the same over time; they grow and develop and are also altered by natural disturbances including those caused by wind, ice, and insect outbreaks such as the tent caterpillar. These disturbances are natural parts of healthy forest ecosystems in our region. In particular, wind events of varying size and intensity have shaped the northern forest for centuries. Large, intense disturbances that destroy large areas of forest, such as hurricanes, are rare in our region while wind and ice storms that knock down or damage individual or small groups of trees at a time are the norm.

Forest birds native to the northeast have evolved with these natural disturbance patterns. Some species, such as the Canada warbler and veery, make use of the regeneration that establishes in canopy gaps and openings created by a wind or ice storm. Others, such as the wood thrush and black-throated green warbler, shy away from these openings, but move back in to an area after the canopy closes. For example, after the 1998 ice storm, canopy cover in many affected Vermont forests was reduced to less than 70%. Research conducted by the Vermont Bird Forest Monitoring Cooperative found that birds quickly responded to this change in the forest; just one year after the storm birds that prefer a closed canopy (e.g. ovenbird and blackburnian warbler) were found to be less abundant in affected areas, and birds associated with forest gaps (e.g. Canada warbler) were more abundant. Five years after the storm, the canopy had increased to 80% cover creating conditions that again favored species associated with closed canopy forests.



*Tree-fall gap created by a wind storm*

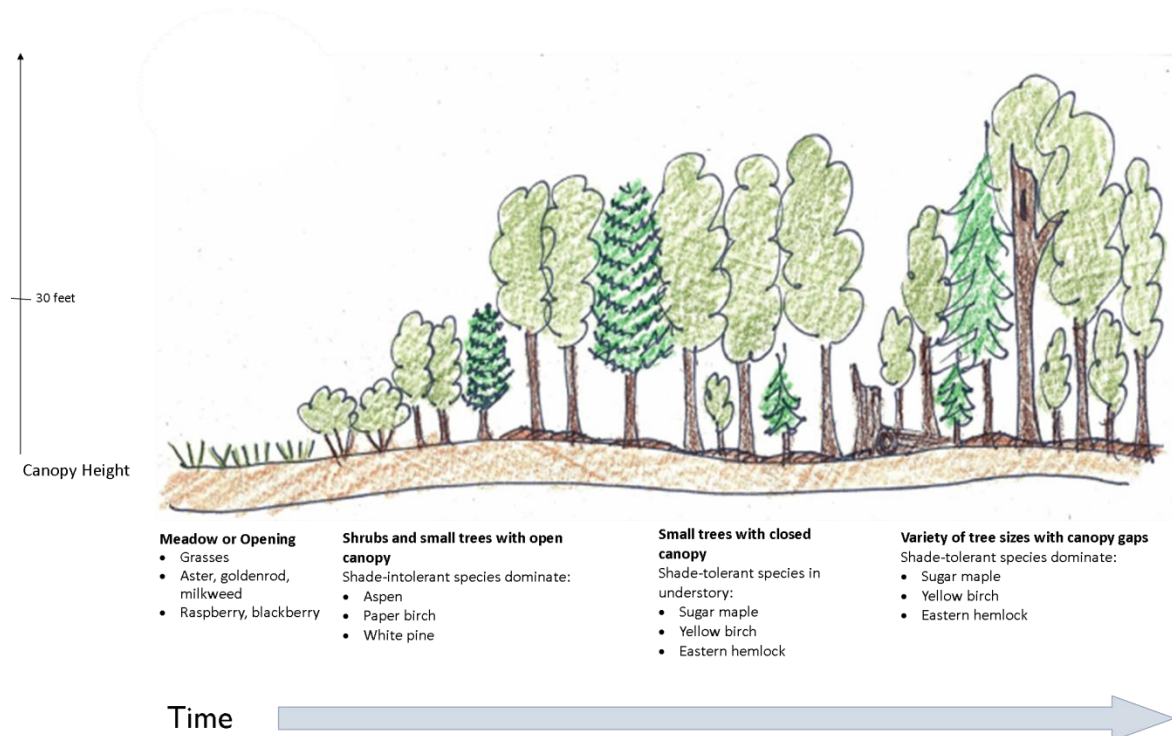
### ***What you can do***

- ✓ If a wind or ice storm damages your woods, you may think about conducting a salvage harvest. If you do decide to salvage some of the commercial value from downed and damaged trees, consider leaving patches of standing as well as downed trees. These areas will add to the habitat value and diversity of your woods over time.
- ✓ Monitor disturbed openings for invasive plants; non-native species like bush honeysuckle and glossy buckthorn may quickly establish and spread in openings and along edges.

### Forest Succession: Change Over Time

Forests grow, develop, and change over time. In the absence of human or natural disturbance, this change usually follows a predictable pattern in which one plant community gradually establishes and is then eventually replaced by another community. You have probably experienced forest succession in action, even if you were not aware of it. After a field or pasture is abandoned or a portion of forest is cleared, trees and shrubs start to grow. Species that grow quickly and need a lot of light, such as aspen, paper birch, and white pine, often establish first. Five-15 years later, what was open land has probably developed into a young forest of small trees or saplings growing tightly together. Several responsibility birds are associated with patches of young forest including chestnut-sided warbler, ruffed grouse, and Nashville warbler. However, once the trees grow greater than 20 feet in height and a closed overstory forms, these species move out and another group of wildlife species associated with mature forests begin to move in.

Tree species composition also changes after the canopy closes. More shade tolerant species, such as maple, birch, and beech, begin to take over. As the forest continues to age and mature, it also becomes more complex. As some trees die, snags are created. Fallen trees add logs and branches to the forest floor. Gaps in the canopy are formed where these trees fall over. Seedlings and saplings grow up in response to the increased light creating a forest of trees of a variety of sizes and heights.



### What about Early-Successional Habitat?

The earliest successional stage of a forest is, not surprisingly, often referred to as early-successional habitat (ESH). ESH is characterized by an open overstory canopy (<30% cover) and a high abundance of seedlings, saplings, and shrubs over an area of at least 1 acre. This dense woody vegetation provides excellent cover for many species of nesting and foraging songbirds. There are a number of responsibility bird species that require ESH conditions during the breeding season including chestnut-sided warbler, mourning warbler, and white-throated sparrow. Birds that nest

in forests of later successional stages, such as wood thrush and scarlet tanager, may also use ESH during the post-breeding period to take advantage of the often abundant fruit resources such as raspberry and blackberry as well as the dense cover. ESH conditions are temporary, often only lasting for the first 15-20 years after a disturbance or harvest.

There is no question that ESH is a valuable part of forested landscapes. What is often up for debate is how much ESH is the right amount. In order to support breeding populations of the full suite of responsibility species, Audubon Vermont advocates for maintaining large tracts of mature, healthy forests that contain small amounts of ESH where appropriate. Based on our understanding of forest history, regional disturbance patterns, and other considerations such the risk of invasive species colonizing openings, **Audubon Vermont suggests a target of 3-5% of a 2,500 acre landscape in an ESH condition at any given time.** This target includes not only young forest resulting from a timber harvest or natural disturbance but also old, brushy fields, the margins of beaver complexes, and power-line corridors. Further research is required to fully understand if this amount of ESH is sufficient to maintain viable breeding populations of associated bird species. In the meantime, creating ESH should be done

#### What you can do

- ✓ If there is a lack of ESH on and around your property, look for opportunities to create patches of ESH 1-5 acres in size. Silvicultural treatments such as clearcutting or shelterwoods will create temporary patches of ESH. Larger clearcuts (>5 acres) are not required but may be appropriate in some situations. When treatments would be non-commercial, NRCS funds may be available for creating and maintaining ESH as an alternative.
- ✓ Look for opportunities to develop ESH conditions in areas close to already disturbed areas such as roads, fields, or buildings. Creating larger patches of ESH in interior forest is discouraged.
- ✓ Take invasive plants into consideration; open-canopy conditions may favor invasives.
- ✓ Retain some overstory trees in ESH patches to provide singing and hunting perches.
- ✓ Leave some coarse and fine



Early-successional habitat

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st can be quickly created in the future if needed, but it will take 100 years to grow a complex 100 year old forest.

### **Climate Change: Impacts on Vermont Birds and Forests**

Global climate change is having regional impacts on Vermont forests and birds. Though implications for individual species can appear benign, potential disruptions of complex ecosystem connections and process are far-reaching and serious for forests, birds, other wildlife, and people. Forest landowners should keep the following trends in mind as they plan for the future of their forests:

<b><i>Climate changes in Vermont</i></b>	<b><i>Impacts on Birds</i></b>	<b><i>Impacts on Forests</i></b>
<p>Longer growing seasons.</p> <p>More frequent winter thaws and earlier springs.</p> <p>Less winter precipitation falling as snow and more as rain.</p> <p>Increased heavy downpours.</p> <p>Earlier spring snowmelt resulting in earlier peak river flows.</p> <p>More frequent short-term droughts in late summer and fall.</p> <p>More frequent hot (over 90° F), humid days.</p>	<p><b>Shifts in bird ranges.</b> Nearly 60% of bird species that winter in North America have moved their ranges northward or inland over the past 40 years with shifts that can exceed hundreds of miles.</p> <p><b>Changes in the timing of bird migration and life cycle events.</b> Many birds are arriving on their breeding grounds and are laying their eggs earlier. Birds that arrive too early are at risk for exposure to late spring storms.</p> <p><b>Bird stress and mortality are anticipated to increase</b> in association with increased exposure to extreme weather events, more frequent mismatches in time and space between birds and their food, exposure to new pests and pathogens, and lack of suitable habitat in new ranges.</p>	<p><b>Changes in forest types and plant species distribution.</b> Spruce-fir forests are being replaced by hardwoods at high elevations. At lower elevations, oak-pine forests will likely replace forests dominated by sugar maple and other northern hardwoods.</p> <p><b>Increased spread of forest pests,</b> such as hemlock woolly adelgid, that can survive milder winters and take advantage of stressed trees. Non-native, invasive plants may also spread.</p> <p><b>Forest-based economy will be impacted</b> by changes in timing and extent of peak fall foliage, shortened winter logging season, stresses on maples in sugarbushes, and reduced snow fall for winter recreation.</p>

### ***What you can do***

- ✓ Increase the chances that your forest and its inhabitants can successfully adapt to climate change by creating a diverse forest that includes a variety of species, stand structures, and age classes.
- ✓ Maximize the resiliency of your forest to climate change by reducing other stresses on your forest through invasive plant management, reducing frequency of harvests, and other strategies.
- ✓ Help scientists learn more about how birds are responding to climate change by entering when and where you observe birds – whether in the woods or your backyard – into the online citizen science database eBird: [www.ebird.org](http://www.ebird.org). Add to 10 years' worth of



## Non-native Invasive Species

Non-native, invasive plants, such as bush honeysuckles, buckthorn, autumn olive, and Japanese barberry present a variety of threats to forest health in Vermont and the northeast. They crowd out native plants, reduce habitat quality and biodiversity in forest ecosystems, are expensive and difficult to control, and can have other negative economic impacts. 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.

Non-native invasive insects are also on the move into Vermont forests. A few insects that are being watched for are Asian longhorn beetle, emerald ash borer, and hemlock wooly adelgid, which has already been detected in southern Vermont. These species have the potential to cause extensive mortality of some native tree species, which has wide-ranging negative implications for Vermont wildlife and forest health. On a hopeful note, according to the US Forest Service, native woodpeckers have been shown to be some of the best natural predators of emerald ash borer in areas of the Midwest where this invasive insect is already wide-spread. As insect-eaters, forest birds already play an important role in controlling native insect outbreaks, such as those caused by tent caterpillars, and may be able to do the same for non-



*Catbird eating honeysuckle berries ©Jerry Acton*

### **What you can do**

- ✓ Learn how to recognize and manage invasives in your woods. Visit [vtinvasives.org](http://vtinvasives.org) for more information.
- ✓ Ask your forester to include consideration for invasives monitoring and control in your forest management plan. Even if invasives aren't yet present on your property, they are likely on the way. Early detection and removal are key to avoiding overwhelming and expensive infestations.
- ✓ Plant native trees and shrubs around your home and camp. Remove non-native, invasive species so they don't spread into forests and wetlands. Remember – birds spread honeysuckle, barberry, and

## Forest Fragmentation

Habitat loss and degradation caused by forest fragmentation and conversion are some of the leading threats to Vermont's wildlife, including forest birds. Forest becomes fragmented when it is broken into small, unconnected patches by human residential and commercial development that includes roads, houses, and lawns. This development drastically changes habitat for specialized forest species, not just in or immediately around clearings and openings, but well into the surrounding forest as well. Research by the Wildlife Conservation Society in the Adirondacks has shown in the *Science from the Field 2000-2010 Report* that at least the 17 acres of forest surrounding a house and clearing become noisier, less sheltered, and vulnerable to invasion by domestic animals and nest predators and parasites. Interior forest conditions that are not impacted by fragmenting features do not occur until more than 200-300 feet away from the forest edge. The impacted area favors a new group of relatively tough, generalist omnivores, such as raccoons, jays, crows, that outcompete and may prey on more specialized mature forest responsibility species, such as wood thrush and black-throated blue warbler. Although development may increase the total number of birds and species in an area, it causes specialized forest and rare birds to be replaced by a homogenous group of generalists and common species.

Large blocks of unfragmented forest



Forest specialists, insect-eaters, and rare species



Forest fragmented by development



Generalists, omnivores, and common species



## Forest Edges

Edges between forests and openings can be hard or soft. A hard edge is an abrupt, linear change. A soft edge is a gradual change in vegetation height moving into the forest where the transition zone forms an irregular boundary between forest and non-forest. This gradual transition is important for buffering interior-nesting specialists such as the wood thrush from nest predators, including raccoons and skunks, and nest parasites such as the brown-headed cowbird that are frequently found in and around 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-



*Dark-eyed junco feeding brown-headed cowbird young ©Jerry Acton*

sided warbler and white-throated sparrow.

### ***What you can do***

- ✓ If you are planning additional buildings and development on your property, do so in a way that minimizes the creation of new clearings- particularly those far from an existing road – and construction of new roads greater than 20 feet wide.
- ✓ Plan ahead for your forest's future. Estate and conservation planning now can ensure that your forest stays intact for the next generation and for the benefit of your forests' health and that of its inhabitants.
- ✓ Create and maintain soft edges between the woods and openings, such as fields, woods

## **Forest Management in Vermont**

The forests of Vermont serve many purposes and provide much for our society including timber products (flooring, furniture, millwork, lumber, paper, and fuel), non-timber products (Christmas trees, maple syrup and other foods, medicine, and art), as well as clean air, water, and wildlife habitat. Our forests also provide us with abundant recreational opportunities, including bird watching. All of these products and activities come primarily from “working forests”, and contribute over 1.5 billion annually to the Vermont economy. The “working forest” is a forest that is actively managed where periodic harvests and tending practices are implemented.

Today, forests dominate our landscape, covering almost 80% of Vermont. In the mid-1800s, the trend was reversed; 80% of Vermont’s landscape had been cleared for farming. As many farms were abandoned in the late 1800s and early 1900s, trees naturally regenerated or were planted. As forests regrew, timber harvesting again became a larger part of Vermont’s economy. Since that time, forest management as an art and science has evolved. Today, common goals of forest management, in addition to generating forest products and revenue, are to conserve biological diversity across the landscape, promote ecosystem health, and maintain and enhance an ethic of respect for the land. Today, some of the biggest threats to our forests include parcelization and fragmentation; conversion to other uses; and loss of biodiversity and ecosystem functions. These threats to our forests are also threats to the birds and other species that are part of the forest ecosystem. The stresses on the forest today are far different than 150 years ago. Conversion is no longer for farming but more often for development. We also face the threats of invasive species and climate change. Keeping our forest and all its parts healthy means maintaining biological integrity and a diversity of structures and functions.

The financial costs of owning forestland in Vermont are high. Rising property taxes and high real estate values combined with other factors can put a lot of pressure on landowners to sell or subdivide their forestland. Vermont’s Use Value Appraisal (Current Use) taxation program is a voluntary program that taxes enrolled land at a real use-value based on active farm and/or forestry uses rather than speculative market-value rate. This fair tax program plays an important role in enabling individual forestland owners to hold on to their properties, which keeps forest as forest and reduces the risk of future forest fragmentation. It also plays a key role in supporting the long-term stability of our state’s

### ***What you can do***

- ✓ If your land is not enrolled in the Current Use Program, call your County Forester to learn more about if it would qualify for the use-value tax rate and how to apply. S/he can answer your questions and walk your land with you. In order to enroll, you will need to have or create a forest management plan and be willing to actively manage your woods. This guide can help you think about how to manage for timber and forest products as well as bird habitat and general forest health, but be sure to consult with or hire a professional forester to write your management plan.

working landscape, which relies on vital and growing farm- and forest-based economies. The *Forest Bird Initiative* and its materials have been recognized by the state of Vermont as compatible with the Current Use program

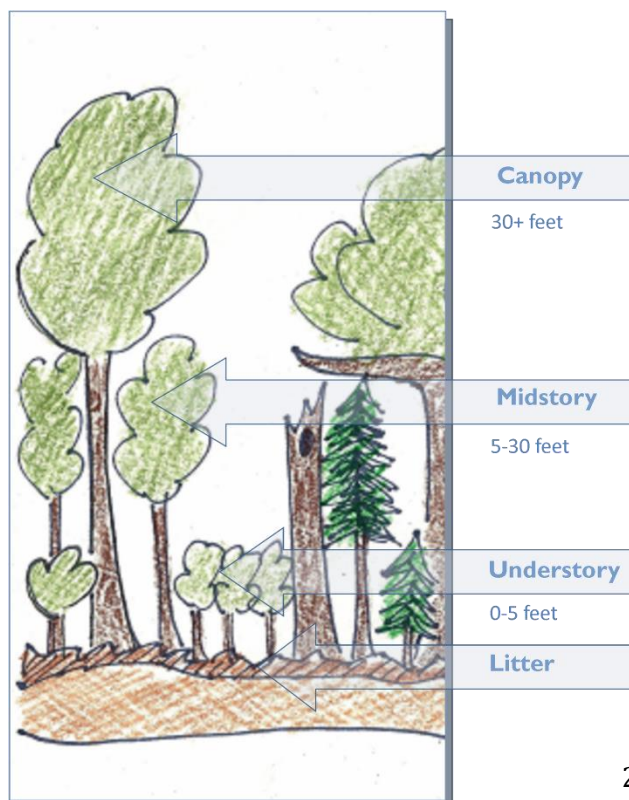
## What is Forest Structure?

Forest structure is all the living and non-living components of a forest and landscape that take up or create space. **Horizontal structure** is the arrangement of different habitat types and conditions across an area. A landscape with mature and young forest habitats, open fields, and wetlands is rich in horizontal diversity. Landscapes with greater horizontal diversity support a greater diversity of breeding forest birds and other wildlife.



Horizontal structure across a landscape

**Vertical structure** is the complexity of vegetation and other structures as they are vertically arranged in the forest. A forest with well-developed layers of vegetation at multiple heights (e.g. 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.



Vertical structure within a forest

Enhanced vertical structure often looks messy to us. But messy structure is often exactly what birds need. Sometimes we're tempted to treat our woods like a garden or our yards by tidying up downed branches, raking up leaves, or cutting down small trees. But forests aren't gardens. They're complex ecosystems and all that mess isn't really a mess. It's structure! A complex, messy forest structure can be a signature of a healthy forest and key to supporting a wide diversity

### What you can do

- ✓ Leave the rake and the clippers at home the next time you head out in the woods. Try looking at that "mess" in a different way; from a bird's perspective, all that "messy" structure is home.

of living things in your woods.

## What does a bird-friendly forest look like?

We envision healthy forests that provide suitable breeding and post-breeding habitat conditions for a suite of Vermont birds and sustained yields of timber and other forest products and services.

**Generally Closed Canopy** (in older stands): A forest with a closed canopy (>70-80% cover) works for interior-nesting birds like wood thrush and black-throated blue warbler, but also includes patches of understory regenerating in small canopy gaps.

**Big Trees:** Big (24+” DBH) trees provide nest sites for woodland raptors, owls, and pileated woodpeckers.

**Timber value:** A well-managed forest has a high concentration of canopy trees with well-formed stems of commercially valuable species.

**Snags and Cavity Trees:** Snags and cavity trees—especially large sizes—are present for nesting and foraging.

**Native Species Diversity:** A diversity of native tree species are present and non-native, invasive species are absent. Native species diversity is important for forest health and resilience. Different birds prefer different types of trees and shrubs for nesting and foraging.

**Complex Horizontal Structure:** A variety of forest habitats and ages should support all twelve *Birder's Dozen* species if the landscape includes wetlands and riparian areas.



**Leaf Litter:** A thick, moist, deciduous litter layer provides nesting habitat for oven bird and abundant soil macroinvertebrates for species like wood thrush that forage on the forest floor.

**Complex Vertical Structure** (in older stands): Dense understory, midstory, and canopy layers provide the greatest number of birds with the greatest number of nesting and foraging opportunities.

**Softwood Pockets:** In northern hardwood forests, patches of softwood trees add to the diversity of habitat conditions and attract species like black-throated green warbler and blackburnian warbler.

**Wetlands:** Swamps, seeps, and beaver complexes are appropriately protected and provide habitat for species like Canada warbler, veery, and white-throated sparrow.

**Downed Dead Wood:** Logs of all sizes and stages of decay, branches, and brush piles are present. Downed dead wood is used by birds for drumming, perching, cover, and foraging.

**Streams and Riparian Areas:** Riparian areas along streams are appropriately protected and provide habitat for species like American redstart and Louisiana waterthrush.

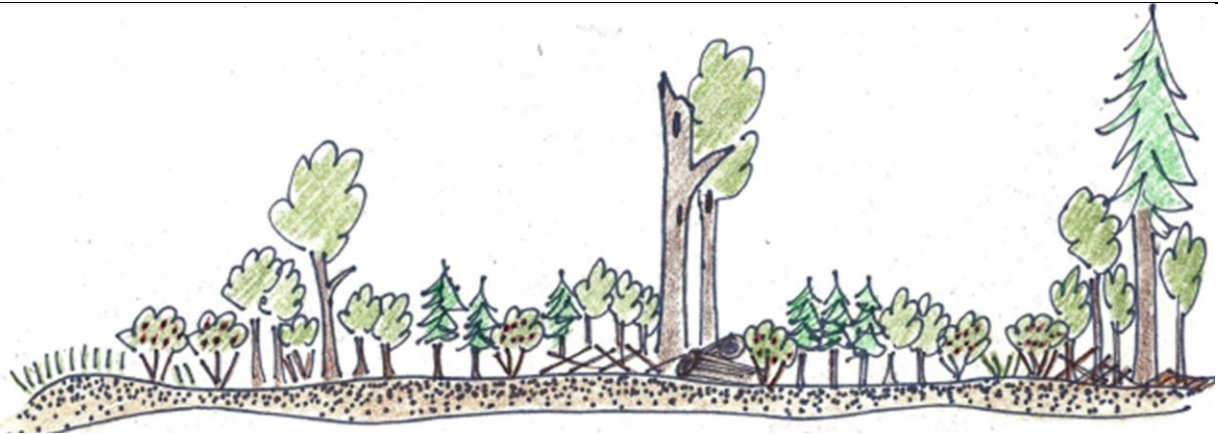
**Birds and Wildlife:** A healthy forest has a wide array of birds and other wildlife that are successfully reproducing.



## Responsibility Bird Habitat Associations

### *Young Hardwood and Mixedwood Forest*

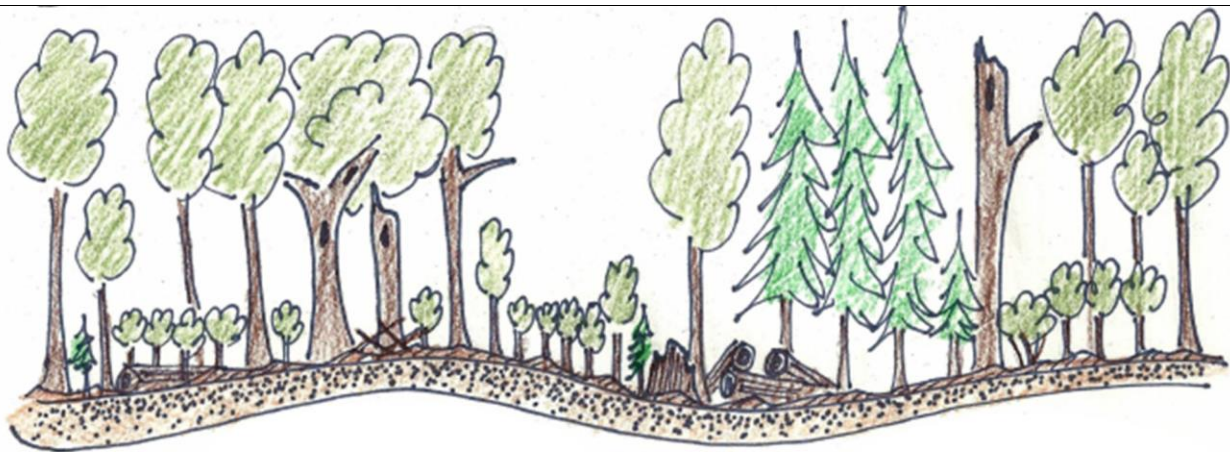
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- American Woodcock
- Canada Warbler
- Chestnut-sided Warbler
- Magnolia Warbler
- Mourning Warbler
- Nashville Warbler
- Northern Flicker
- Ruffed Grouse
- White-throated Sparrow

### *Mature Hardwood and Mixedwood Forest*

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- American Redstart
- Blackburnian Warbler
- Black-throated Blue Warbler
- Black-throated Green Warbler
- Blue-headed Vireo
- Chimney Swift
- Eastern Wood-pewee
- Northern Parula
- Ovenbird
- Purple Finch
- Scarlet Tanager
- Veery
- Wood Thrush
- Yellow-bellied Sapsucker

### **Boreal/High Elevation Forest**

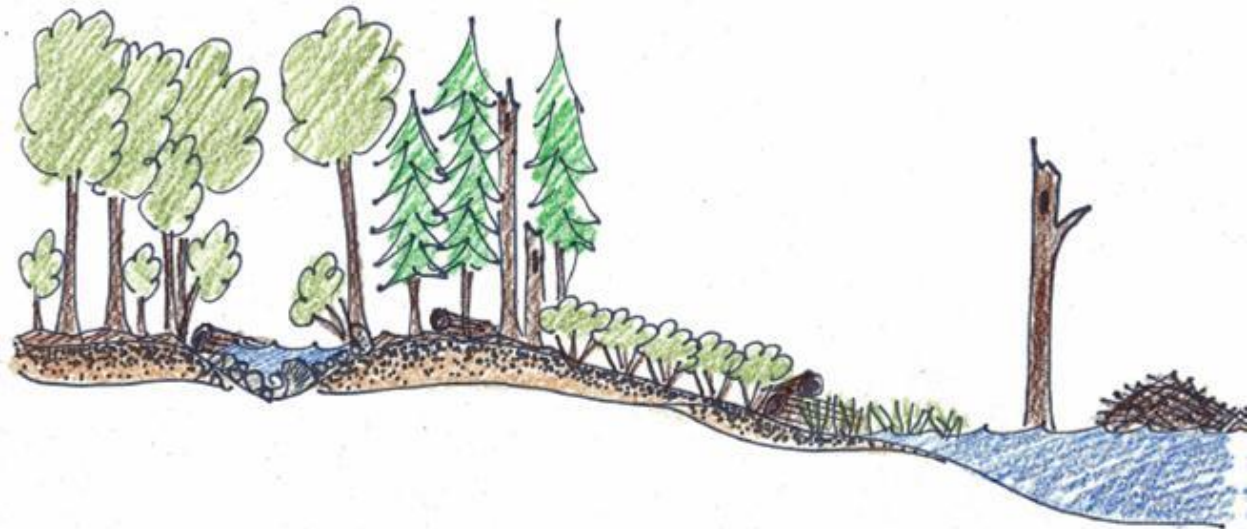
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- Bay-breasted Warbler
- Bicknell's Thrush
- Black-backed Woodpecker
- Blackpoll Warbler
- Boreal Chickadee
- Cape May Warbler
- Gray Jay
- Palm Warbler
- Spruce Grouse
- Tennessee Warbler
- Yellow-bellied Flycatcher

### **Wetlands and Watercourses**

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- Alder Flycatcher
- Lincoln's Sparrow
- Louisiana Waterthrush
- Olive-sided Flycatcher
- Rusty Blackbird
- Swamp Sparrow

## Assessing Bird Habitat on Your Property

Vermont's forests are among the world's most diverse and productive for breeding birds, and high-quality habitat is abundant. A high-quality breeding habitat for any given species is one in which they survive and reproduce successfully. For forest birds, the ability to survive and breed is often related to the presence of specific forest structures and features, such as those that provide nest sites; food and foraging substrates; singing perches; and cover from predators. Many forest birds can be found inhabiting a wide range of conditions during the breeding season. Nonetheless, not all forest habitats are created equal.

Before deciding on which silvicultural options or other management activities you will implement on your property, it is important to know of what types and quality of habitat your forest offers. Such information can be collected through a habitat assessment. A habitat assessment is similar to and can be incorporated into a forest inventory conducted by your forester. Or you can conduct a basic assessment on your own and share your observations with your forester. Either way, the results of a habitat assessment can help you identify the forest bird species that your property is best suited to support and opportunities for protecting and enhancing their habitat.

To fully understand the forest bird habitat your property provides you will want to conduct the assessment at multiple scales: landscape-level, property-level, and stand-level, which is illustrated in the example below.

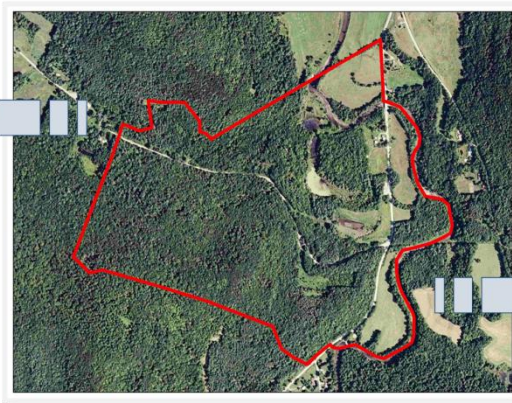


### Landscape

How does my property fit into the surrounding landscape?

- Located in the foothills of the Green Mountains; connects the Champlain Valley and mountain ridge.
- Surrounding landscape is ~75% forested. 3-5+% landscape is in a young, forest condition.
- Rural residential and agricultural development along roads fragments landscape, but property is part of two larger forested blocks.
- Fields, wetlands, river, and stream are all present in the landscape.

Zoom Out



### Property

What habitat types and features are on my property?

- Mature hardwood, softwood, and mixedwood forests
- Young, regenerating forest in patches
- Beaver wetlands pond, streams, river, hayfields, forested swamp

### Forest Stand

What is the condition of each forest habitat type?

- Pine plantation on hardwood site.
- Closed canopy, little understory or midstory; lacks vertical structure.
- Adjacent to young, regenerating forest and meadow.
- Some invasives plants present.



Zoom In

## Landscape-level

Landscape composition and configuration around a property may affect property and stand-level habitat quality. For example, birds nesting in forest stands adjacent to open areas may be subject to nest parasitism by brown-headed cowbirds. Although most landscape level influences are difficult to address through stand level forest management, they deserve attention. Look at an area of approximately 2,500 acres surrounding your property (Google Maps and Google Earth are two great, free tools for this exercise), and use the following questions to focus a simple, landscape-scale assessment of your property:

- ✓ Identify general habitat types within the landscape including forest, open land, wetlands, streams, etc. Approximately what percent does each general habitat type comprise of the whole area?
- ✓ Is the forestland fragmented by roads, agriculture, and/or development? Larger, roadless blocks of forest have greater value for interior-nesting birds and other reclusive wildlife.
- ✓ Is there any young forest on the landscape? Audubon Vermont recommends a target of 3-5% of the landscape be a forest of 0-15 years of age to support successfully breeding populations of birds associated with young forest habitats (e.g. chestnut-sided warbler).
- ✓ Is there a forest condition or forest type missing or underrepresented on the landscape? Is there anything that your property offers that is unique in the surrounding landscape?
- ✓ How will your management activities affect the larger landscape?

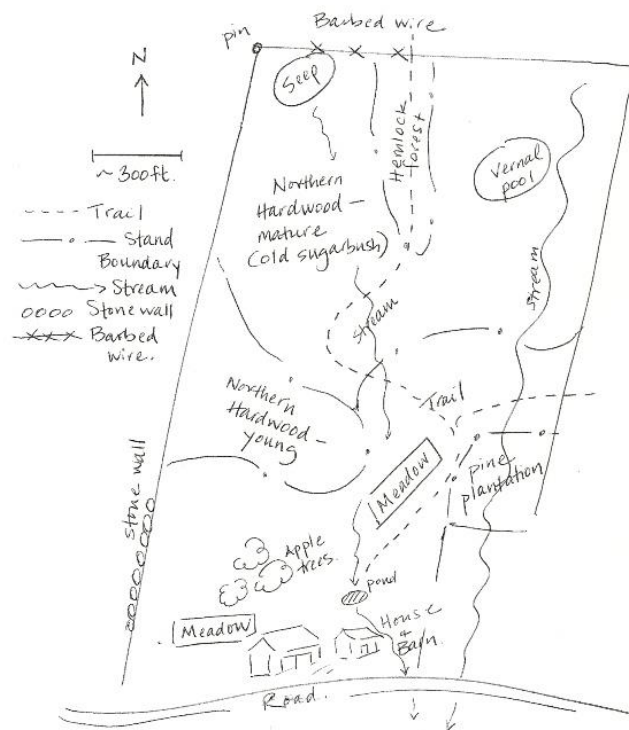


*Look at your property within the context of the surrounding landscape.*

## Property-level

Whether you're aware of it or not, when you walk your property you are most likely conducting some form of habitat assessment. You may come to expect that you'll hear a barred owl down in the hemlock stand or that the old overgrown field is full of bird song in the spring. Assessing forest bird habitat at the property level is essentially the same as looking at the landscape level but on a smaller scale. Taking note of the "lay of the land" will help give an idea of the groups of birds that may find suitable nesting habitat there. Some bird species, such as blackburnian warbler, black-throated green warbler, and blue-headed vireo, show a preference for softwoods while wood thrush, black-throated blue warbler, and scarlet tanager are more likely to use hardwoods. The banks of the stream that offers relief from hot summer days may also be a nest site for the Louisiana waterthrush. The property-level assessment gives a broad view of the general habitat types your property has to offer.

- ✓ Get to know your land. Sketch a map of your property showing different features and forest types. It doesn't need to be to scale or fancy. The goal is to have a visual and spatial reference to the main habitats and features your property offers.
- ✓ What forest types (hardwood, softwood, mixedwood) are on your property? How are they arranged? How much is there of each type?
- ✓ Is the forest all the same age or are there areas where the forest seems younger? Older? Just as there are groups of birds associated with different forest types there are also groups associated with different ages of forests.
- ✓ What is the land use history of your property? Can you find evidence, such as old skid trails, stone walls or cellar holes, of past logging or agricultural use? Each of these historic uses can influence the bird habitat available today.
- ✓ Are there some areas of the property that just feel different or special? A complex forested wetland or an area with of very large trees may provide special habitat conditions for birds and other wildlife.



An example of a hand-drawn property map showing different habitat types and features.

## Stand-level

Silviculture happens at the stand-level and, therefore, this is where the real opportunities to enhance forest bird habitat occur. Assessment at the stand-level is focused on looking at the condition of forest features that are important to bird habitat, such as shrubs and saplings, cavity trees, and down woody material in a specific area. By gaining an understanding of the function of these features, their presence or absence, and relative abundance you and your forester will have the information needed to think about what can be enhanced, protected, and/or created through active management.

- ✓ Try assessing habitat at a stand level on your own. Take the illustration “*What does a bird-friendly forest look like*” (page 24) out into your woods. Compare the idealized forest to your own woods. Which features are present? Which are lacking? Use the following pages to guide you through a more specific rapid habitat assessment. Descriptions of key habitat features and guidance on how to judge their function for forest birds are provided.

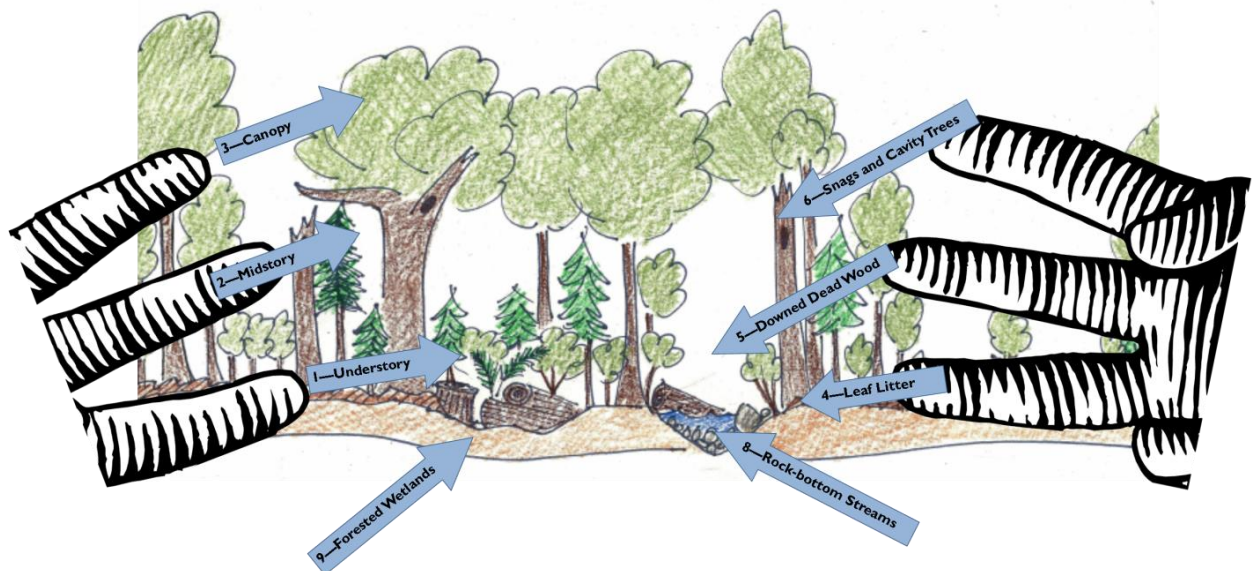


*Assessing habitat at the stand-level can help determine habitat quality forest birds and inform future management.*

### A Rapid Stand-Level Habitat Assessment

This is a little trick to help you remember the key habitat features that are important to forest birds. You can use it to assess habitat quality wherever you are. See the following pages for more specific information on each feature and its function for birds.

- ✓ With each hand hold up three fingers, like the forward-facing toes of a perching songbird.
- ✓ Point your fingers away from you and orient your fingers so they line up vertically. If it helps, pretend you are holding on to the trunk of a standing tree.
- ✓ Each of the fingers on each hand represents a component of forest habitat to be inventoried. The finger closest to the ground represents the structure closest to the forest floor, the middle finger is the structure a bit higher, and the finger furthest from the ground helps to remind you of the structure found furthest from the forest floor.



#### Living Plants (Left Hand)

1. Ring Finger: The digit closest to the ground reminds you to look at the understory vegetation.
2. Middle Finger: The middle digit reminds you to look at the midstory vegetation.
3. Index Finger: This digit, closest to the sky, reminds you to look at canopy closure and height.

#### Dead and dying plant material (Right Hand)

4. Ring Finger: The digit closest to the ground is for leaf litter.
5. Middle Finger: The middle digit is for downed dead wood.
6. Index Finger: The digit closest to the sky reminds you of snags and cavity trees.

The advanced level of this inventory uses the thumbs or to stick with the analogy, the rear facing toes of our perching songbirds. Each thumb is for a water feature

7. Left thumb: rocky bottom streams
8. Right thumb: forested wetlands



## Bird Habitat Features

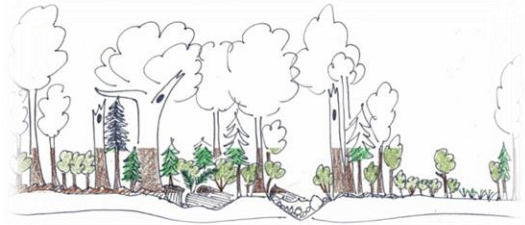
### 1. Understory

#### Definition




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 trees and shrubs 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 – such as ferns - may also be used by songbirds for foraging and nesting, but generally less so than woody plants. Plant species in this layer frequently used by birds include sugar maple, American beech, hobblebush, red spruce, *rubus* species (e.g. blackberry and raspberry), 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).



*Black-throated blue warbler*

<p><b>Habitat Quality</b></p>	<p><b>High</b></p> 	
<p><b>What it looks like</b></p>	 <ul style="list-style-type: none"> <li>• Very dense cover throughout area.</li> <li>• No invasive plants.</li> </ul>	 <ul style="list-style-type: none"> <li>• Moderate or scattered cover.</li> <li>• No invasive individual plants.</li> </ul>
<p><b>Recommendations</b></p>	<ul style="list-style-type: none"> <li>• Monitor for invasive plants regularly.</li> </ul>	<ul style="list-style-type: none"> <li>• Look for existing...</li> <li>• Remove...</li> </ul>

## 2. Midstory

### Definition

Live trees and shrubs in the 6-30 foot height range.

### Importance for Forest Birds

High stem and foliage densities of trees and shrubs 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








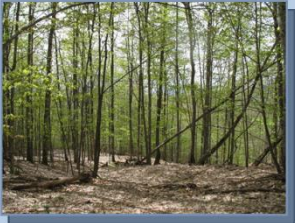
Wood thrush

of the forest. Wood thrush, American redstart, black-throated green warbler, and blue-headed vireo nests are most commonly found in the midstory level.

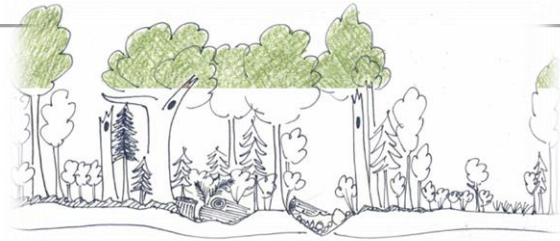


American redstart



Habitat Quality	High 	Medium 	Low 
What it looks like			
Recommendations	<ul style="list-style-type: none"> <li>• Very dense cover throughout area.</li> </ul>	<ul style="list-style-type: none"> <li>• Moderate cover throughout area or scattered patches of dense cover.</li> <li>• Look for opportunities to release existing seedlings and saplings in understory that will grow up into midstory.</li> </ul>	<ul style="list-style-type: none"> <li>• Little or no midstory.</li> <li>• Look for opportunities to release existing seedlings and saplings in understory that will grow up into midstory.</li> <li>• Recognize that structure is naturally simple in young forests with a dense growth of small trees.</li> </ul>

### 3. Canopy



#### Definition




The combined cover of individual tree crowns.

#### Importance for Forest Birds

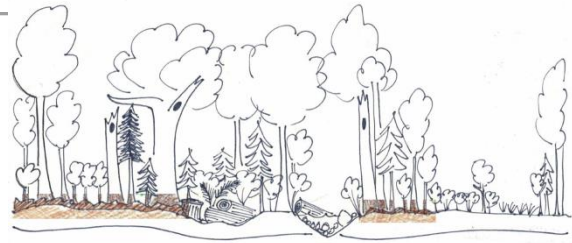
The height of the forest canopy affects nesting habitat quality for birds. For birds that nest in young forest habitats – such as chestnut-sided and mourning warbler – once trees reach a height of approximately 20-30 feet, overall conditions are no longer suitable as nesting habitat. For mature forest nesting birds, including wood thrush and Blackburnian warbler, nest site selection is strongly associated with increasing canopy height and a closed canopy (>80%). Forest stands  $\geq 1$  acre in size with an open canopy (<30% closure) are likely to provide young forest habitat conditions. An intermediate canopy (30-80% closure) often promotes a dense understory and midstory-used by many nesting birds. Canopy closure tends to be inversely proportional to understory development.



Blackburnian warbler

Condition	Closed $\geq 80\%$	Intermediate 30-80%	Open $\leq 30\%$
What it looks like			
	<ul style="list-style-type: none"> <li>No sky—or only a little bit—is visible through the trees' canopies.</li> </ul>	<ul style="list-style-type: none"> <li>Cover may be patchy with canopy gaps and openings or evenly dispersed.</li> </ul>	<ul style="list-style-type: none"> <li>Canopy is generally lacking with only a few scattered trees taller than 30 feet.</li> </ul>
Associated Birds	<ul style="list-style-type: none"> <li>Black-throated green warbler</li> <li>Scarlet tanager</li> <li>Blue-headed vireo</li> <li>Blackburnian warbler</li> </ul>	<ul style="list-style-type: none"> <li>Black-throated blue warbler</li> <li>Veery</li> <li>Canada warbler</li> <li>American redstart</li> </ul>	<ul style="list-style-type: none"> <li>Nashville warbler</li> <li>White-throated sparrow</li> <li>Chestnut-sided warbler</li> <li>American woodcock</li> <li>Mourning warbler</li> </ul>

## 4. Leaf Litter



### Definition

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





Ovenbird



*Ovenbirds build their nests on the ground out of leaf litter. Look for the side entrance - like a pizza oven!*

feature.

Habitat Quality	High 😊	Low 😞
What it looks like		
Recommendations	<ul style="list-style-type: none"> <li>At least 1.5 inch of leaf litter during spring and summer</li> <li>Be aware that earthworms can be invasive species in northern forest ecosystems; they can consume all your leaf litter—along with seeds and young plants—once established. Do your best to keep earthworms out of your woods.</li> <li>Maintain canopy cover to prevent desiccation.</li> </ul>	<ul style="list-style-type: none"> <li>Bare ground or little leaf litter (&lt;1.5 inch thick)</li> <li>Keep in mind that some forest types—like pine plantations—naturally have little leaf litter.</li> <li>Let leaves lie; don't rake up leaves in your woods.</li> </ul>

## 5. Coarse and Fine Woody Material



### Definition







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.



Ruffed grouse

Habitat Quality	High 	Medium 	Low 
What it looks like	 <ul style="list-style-type: none"> <li>• Many downed trees, logs, and big branches in the area.</li> <li>• Quite a few tree tops and/or brush piles in the area.</li> <li>• Difficult or impossible to walk through in places.</li> </ul>	 <ul style="list-style-type: none"> <li>• Scattered logs and big branches or groups where a few trees have fallen over together.</li> <li>• Some tree tops and/or brush piles in the area.</li> <li>• Occasionally need to step over or walk around logs or fallen trees.</li> </ul>	 <ul style="list-style-type: none"> <li>• No—or very few—downed trees, logs, big branches, tree tops or brush piles in the area.</li> <li>• Downed wood that is present is small diameter and scattered.</li> <li>• Easy to walk through—like a park.</li> </ul>
Recommendations	<ul style="list-style-type: none"> <li>• Don't disturb downed logs, trees, and stumps during harvesting.</li> <li>• High-density patches of downed woody material are sufficient; does not need to cover the whole area.</li> </ul>	<ul style="list-style-type: none"> <li>• Don't disturb downed logs, trees, and stumps during harvesting.</li> <li>• Add to woody material when harvesting by leaving as much on site as possible.</li> </ul>	<ul style="list-style-type: none"> <li>• Add to woody material when harvesting by leaving as much on site as possible.</li> <li>• Avoid whole-tree harvesting when feasible.</li> </ul>



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## 6. Snags and cavity trees

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### **Definitions**

Snags are standing dead trees that are relatively stable. Cavity trees have excavated holes created by birds or other wildlife and may be alive or dead.

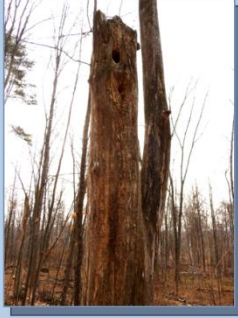


### **Importance for Forest Birds**

Snags provide opportunities for nesting cavity excavation by yellow-bellied sapsuckers, northern flickers, and other woodpeckers, 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 2  $>16$  inches DBH. Branches on snags may be used as foraging perches and nest sites.



*Northern flicker* ©Jerry Acton



Feature	Snag	Cavity Tree	Girdled Tree
<p><b>What it looks like</b></p>	 <ul style="list-style-type: none"> <li>• A standing dead tree.</li> <li>• May have cavities.</li> </ul>	 <ul style="list-style-type: none"> <li>• Tree with holes excavated by birds or other wildlife.</li> <li>• May be living or dead.</li> </ul>	 <ul style="list-style-type: none"> <li>• Girdling is cutting through the living tissue around the entire circumference of a tree trunk, which results in the death of the tree.</li> <li>• A method used to thin a forest and/or to create snags.</li> </ul>
<p><b>Notes and Recommendations</b></p>	<ul style="list-style-type: none"> <li>• To the extent possible retain a minimum of six snags and/or cavity trees per acre, with one exceeding 18 in. dbh and two additional exceeding 16 in. dbh. (Bigger-diameter trees have greater wildlife value).</li> <li>• Note that aspen and birch with heartrot are preferred cavity nesting sites for yellow-bellied sapsuckers. Retain these species when present.</li> </ul>		<ul style="list-style-type: none"> <li>• Only girdle trees away from trails since dead wood is unstable and dangerous.</li> <li>• Consult with a professional forester to decide which trees to girdle.</li> </ul>

## 7. Rocky Bottom Streams

Rocky or gravelly bottomed streams within a forest matrix may support nesting Louisiana waterthrush. This warbler nests in cavities under steep streamside banks or in upturned roots of a fallen tree over or near water.



*Louisiana waterthrush*

## 8. Wetlands

Forested wetland communities such as red maple - northern white cedar and spruce-fir-tamarack swamps provide breeding habitat attributes important to Canada warbler and yellow-bellied flycatcher. Among these attributes are low average canopy height and abundance of ground cover, primarily ferns and shrubs. Structurally complex forest floors with hummocks, rootballs, and downed woody debris provide concealment for nests and young. Shrub-dominated wetlands provide habitat for American woodcock and alder flycatcher.



*Canada warbler*

## Managing Your Woods with Birds in Mind

Forest management is not just about harvesting and generating wood products. Any activity that changes the forest toward the purpose of meeting a particular goal - whether related to wildlife, forest health, recreation, growing timber, sugaring, or some combination of these - is part of managing your woods. Some examples of management activities that have the potential to enhance forest bird habitat, but are not necessarily related to managing for forest products are:

- ✓ Releasing and pruning apple trees.
- ✓ Clearing and maintaining 1+ acre patches of early-successional habitat by cutting every 7-10 years.
- ✓ Retaining and releasing trees in the forest that have high wildlife value, but low economic value (e.g. large-diameter cavity trees, bear-scared beech trees, and declining aspen and birch trees).

Any management activity worth doing requires some combination of time, energy, and/or money. Cutting back two acres of saplings is labor-intensive or - if you pay to have someone else do it - expensive. Fortunately, cost-share and grant programs, such as those provided through the Natural Resource Conservation Service (see Appendix B for more information), recognize the value of these wildlife-focused management practices and can provide financial assistance for qualifying landowners who want to implement them. Participating in one of these programs can be a great way to get some non-commercial activities done that work on your property toward a goal of managing your woods with bird in mind.

However, most forests contain valuable economic - as well as ecological and social - resources, and managing for forest products and bird habitat do not need to be mutually exclusive. In fact, **very often it is the act of growing and harvesting wood products that creates the opportunity for landowners to meet non-timber objectives like enhancing wildlife habitat.** If carefully planned and implemented, a commercial harvest can improve the future timber resource in a forest stand, cover the costs of manipulating



vegetation in a way that benefits birds and other wildlife, may even generate enough income to pay for other non-commercial activities, like those listed above. If you want to manage your woods with birds in mind, you'll also likely need to keep timber, forest products, and economics in mind as well. For this reason, we've devoted the rest of this section to an introduction to and explanation of some common silvicultural practices used in Vermont to manage for forest products that have the

potential to benefit birds. Choosing among and successfully implementing any of these strategies in your own woods will require input and help from a professional forester; remember that forests are complex systems and there are many factors to consider if you want to protect the economic and ecological value of your woods.

## An Introduction to Silviculture

Silviculture - the basis of forestry - is the art and science of tending forest trees. Effectively applied, silviculture plays a role in directing forest establishment, composition, and growth to help create and maintain a forest that meet a landowner's objectives.

Much of the science of silviculture was originally developed to maximize the production and harvest of firewood and sawtimber. As the awareness of the values we derive from the forest evolves to include an expanding set of ecological functions and other benefits, the application of our common silvicultural treatments should adapt to meet these additional objectives.

In the practice of silviculture, harvesting trees is one of the primary strategies. Because trees compete for resources (light, space, water, nutrients) the cutting of a tree can increase the availability of resources and reduce competition between trees. These changes can create favorable conditions for the growth of neighboring trees, undergrowth development, or seed germination. Variations in the timing of cutting and distribution of trees that are harvested or left to grow have significant impacts on resulting species composition, age classes and growth rates. These effects can be directed to enhance habitat for birds and other wildlife.

An activity that manages vegetation in the forest using silvicultural principles is called a silvicultural treatment. Multiple treatments may be applied over time as part of a bigger-picture silvicultural system designed to achieve long-term goals.

### A Few Common Treatments Explained

The following are common silvicultural treatments used by foresters throughout Vermont in order to help landowners meet objectives for their forests. While many of the following treatments were designed with production of forest products in mind, they can and should be adapted to meet a wide variety of objectives including bird habitat enhancement. When a treatment is prescribed or laid out in a management plan a set of parameters are put on the treatment. These parameters are critical details that guide the application of a treatment and are necessary to effectively direct management of the stand towards a desirable condition. These parameters can describe any aspect

### Common Silvicultural Terms

- ✓ **Silviculture:** The art and science of tending forest trees.
- ✓ **Forestry:** The practice of using silvicultural principals to grow and manage forests for the continuing use of their resources.
- ✓ **Treatment:** An activity that manages vegetation using silvicultural principals such as a harvest or thinning.
- ✓ **Commercial Maturity:** Occurs when a tree has reached the point where it has maximized value growth from the perspective of the market place. Financial maturity is reached long before biological maturity.
- ✓ **Harvest:** A silvicultural treatment that is intended to establish regeneration. A harvest is generally a higher level of cutting intensity than a thinning.
- ✓ **Regeneration:** Renewal of a tree

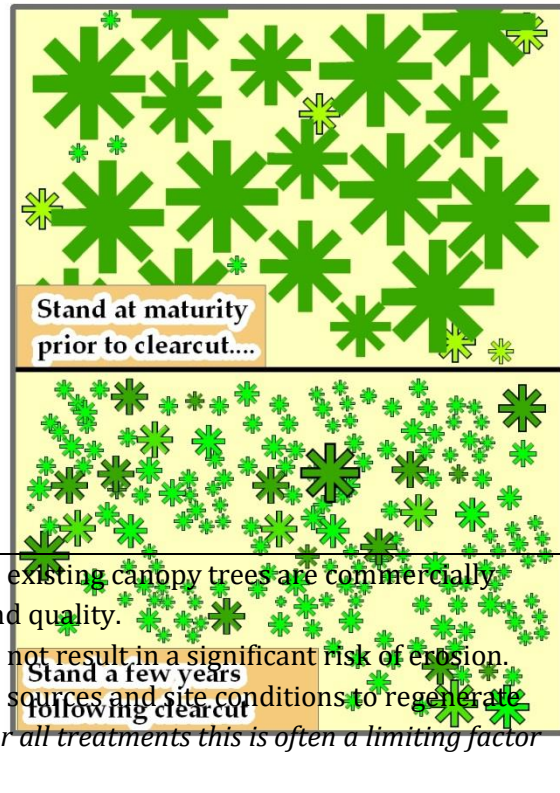
of the treatment: the trees to be left, their spatial arrangement, how many, what kind and size and under what conditions harvesting should occur, etc. Often, these parameters vary from site to site. Therefore, be sure to discuss your objectives and management options with a forester to help in the process of selecting and designing an appropriate treatment.

**Clearcutting**

A silvicultural method which removes all trees from a designated area at one time for the purpose of creating a new, young stand of trees that are all the same age. This management system is usually used to regenerate shade-intolerant tree species including paper birch, aspen, and black cherry. Variations include patch and strip clearcutting, and clearcutting with reserves.

**Goals**

- Harvest commercially-mature trees all at once.
- Establish a new, young stand, usually of shade-



<p><b>When and where is it used?</b></p>	<ul style="list-style-type: none"> <li>• Often applied in stands where existing canopy trees are commercially mature and/or of low vigor and quality.</li> <li>• Where removal of canopy will not result in a significant risk of erosion.</li> <li>• Where there are suitable seed sources and site conditions to regenerate desired species. (<i>While true for all treatments this is often a limiting factor in clearcuts.</i>)</li> </ul>
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intolerant species.

- Create young forest habitat for species such as chestnut-sided warbler.

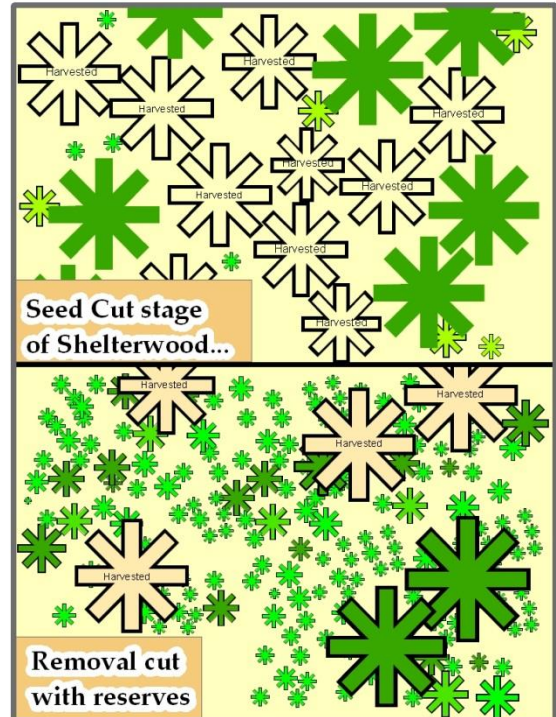
<p><b>How is it done?</b></p>	<ul style="list-style-type: none"> <li>• All or almost all trees &gt;1-2" dbh in a stand are cut.</li> <li>• Scattered patches of canopy trees or individuals may be left if reserves are retained.</li> <li>• Area harvested is usually 2+ acres in size.</li> </ul>
<p><b>Why does it work?</b></p>	<ul style="list-style-type: none"> <li>• Creates sunny, open conditions needed to regenerate shade-intolerant species.</li> </ul>
<p><b>Bird habitat tips</b></p>	<ul style="list-style-type: none"> <li>• Create soft and irregular edges between the clearcut and forest interior where possible.</li> <li>• Retain some perch trees and snags in the clearcut.</li> <li>• If retaining reserves, leave patches or strips of the overstory in place.</li> <li>• Leave behind as much woody material on site as possible; avoid whole tree harvesting.</li> </ul>
<p><b>Responsibility birds that may benefit</b></p>	<ul style="list-style-type: none"> <li>• American Woodcock</li> <li>• Canada Warbler</li> <li>• Chestnut-sided Warbler</li> <li>• Magnolia Warbler</li> <li>• Mourning Warbler</li> <li>• Nashville Warbler</li> <li>• Northern Flicker</li> <li>• Ruffed Grouse</li> <li>• White-throated Sparrow</li> </ul>

### Shelterwood

A silvicultural method in which all or most of the mature trees are removed in a series of partial cuts. The seed cut opens an area to be regenerated while retaining trees that serve as a seed source and provide shade and protection for the new seedlings. Once the seedlings are established, one or a series of removal cuts harvests the overstory trees and releases the new regeneration. May be applied in a variety of arrangements; uniformly throughout stand, or conducted in groups or strips.

#### Goals

- Harvest commercially-mature canopy trees through a series of partial cuts.
- Regenerate all or portions of a stand with intermediate to shade tolerant species.



<p><b>When and where is it used?</b></p>	<ul style="list-style-type: none"> <li>• When regeneration of the stand is desired, either at maturity or when the stand is degraded.</li> <li>• Where desired species can be most effectively regenerated under protection of partial canopy, particularly species of moderate to high shade tolerance. May include white ash, white pine, sugar maple, and many others.</li> <li>• A less-intense alternative to clearcutting.</li> </ul>
<p><b>How is it done?</b></p>	<ul style="list-style-type: none"> <li>• <b>Seed cut:</b> Maturing trees are retained as sources of seed, shelter, and shade. Overstory retained may be as little as 25% or as much as 75% of original stand.</li> <li>• Regeneration establishes and/or grows in the shelter of the partial canopy.</li> <li>• <b>Removal cut(s):</b> Overstory trees are harvested when they start to hinder growth of established regeneration.</li> </ul>
<p><b>Why does it work?</b></p>	<ul style="list-style-type: none"> <li>• The partial overstory provides shades and protects regenerating seedlings.</li> <li>• Shelterwoods can be effective for regenerating species of all shade tolerances, and can be very adaptable to different objectives and site conditions.</li> </ul>
<p><b>Bird habitat tips</b></p>	<ul style="list-style-type: none"> <li>• Reducing canopy cover to &lt;70% after the seed cut may create young forest conditions for species such as chestnut-sided warbler. Leaving more canopy cover (&gt;50%) favors other species such as black-throated blue warbler.</li> <li>• Retain 5 – 15% of the original overstory as reserves after removal cut to</li> </ul>



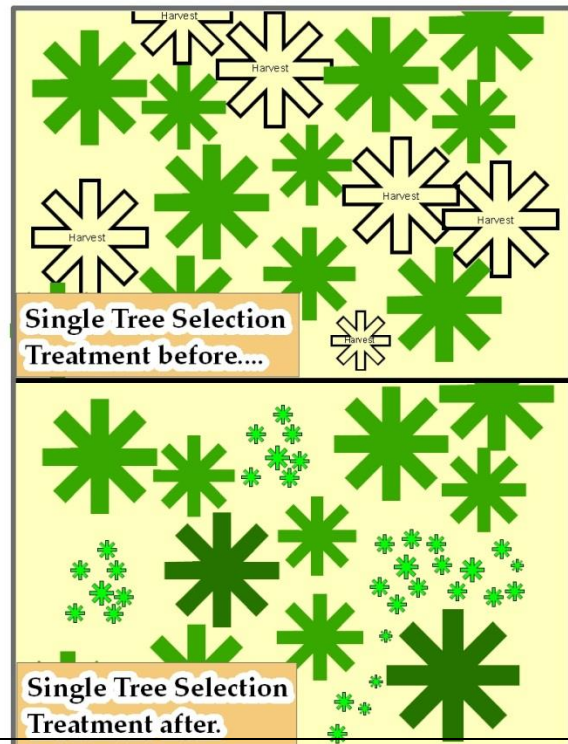
	enhance forest structure.
<b>Responsibility birds that may benefit</b>	<ul style="list-style-type: none"><li>• American redstart</li><li>• Black-throated blue warbler</li><li>• Canada warbler</li><li>• Veery</li></ul>

### Single Tree and Group Selection

This treatment is designed to promote the regeneration of a portion of a stand while improving growing conditions for the remainder of the stand. It involves the removal of individual trees or small groups distributed throughout the stand. If done right, this treatment creates forests with a variety of tree ages and diameters, yielding good structural diversity.

#### Goals

- Remove low quality and mature trees distributed throughout the stand in a way that promotes establishment of regeneration.
- Establish a wide variety of age classes so that trees are continually coming in to maturity.
- Increase the vigor of retained trees.
- Increase understory vegetation for the benefit



<p><b>When and where is it used?</b></p>	<ul style="list-style-type: none"> <li>• In stands which are being managed for a diversity of tree sizes and ages.</li> <li>• Is suitable on a wide variety of sites when preferred species regenerate and grow well in partial shade.</li> </ul>
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of species like black-throated blue warbler.

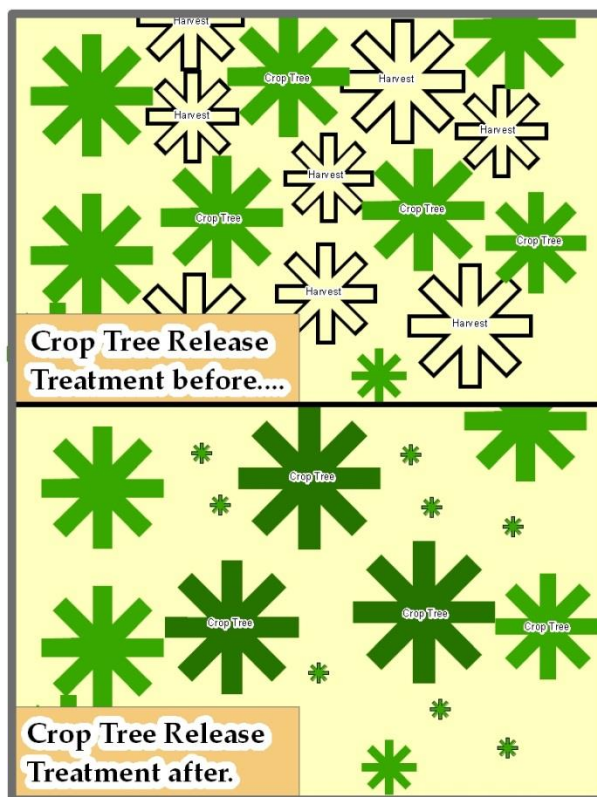
<p><b>How is it done?</b></p>	<ul style="list-style-type: none"> <li>• Individual trees and small patches (groups) of trees 1/20 to 2 acres in size are removed at 10 – 20 year intervals.</li> <li>• A fixed portion of the stand is regenerated at each harvest entry (e.g. no more than 1% per year or 15% per 15 years)</li> </ul>
<p><b>Why does it work?</b></p>	<ul style="list-style-type: none"> <li>• By regenerating a fixed portion of the stand at each entry, a manager can plan for a portion of the trees in a stand to reach maturity at specified times. This approach maintains the structural diversity of the forest at all times and allows for regular harvests.</li> </ul>
<p><b>Bird habitat tips</b></p>	<ul style="list-style-type: none"> <li>• Harvesting groups greater than 1 acre in size benefits chestnut-sided warbler and American woodcock. Smaller openings to provide important foraging opportunities for other species including the eastern wood-pewee.</li> <li>• Recruit and retain snags and cavity trees for nesting opportunities for species such as the yellow-bellied sapsucker.</li> </ul>
<p><b>Responsibility birds that may benefit</b></p>	<ul style="list-style-type: none"> <li>• Black-throated blue warbler</li> <li>• Eastern wood-pewee</li> <li>• Chestnut sided warbler</li> <li>• Wood thrush</li> <li>• White-throated sparrow</li> <li>• Canada warbler</li> <li>• Veery</li> <li>• American woodcock</li> </ul>

### Crop Tree Release

Crop tree management focuses growth on the best formed stems or most desirable trees by harvesting trees that are competing for resources. Crop trees are selected and then some of those trees competing with the crop tree for light and space are removed.

#### Goal

- Increase growth and vigor of select trees. *Design of treatment may be adapted to meet a wide variety of objectives.*



<p><b>When and where is it used?</b></p>	<ul style="list-style-type: none"> <li>• In stands where desirable trees may benefit from reduced competition; generally most beneficial in stands with immature trees.</li> </ul>
<p><b>How is it done?</b></p>	<ul style="list-style-type: none"> <li>• When a crop tree is selected as a preferred tree to grow, trees with crowns touching the crop tree may be selected for removal.</li> </ul>
<p><b>Why does it work?</b></p>	<ul style="list-style-type: none"> <li>• By removing trees competing for the same light and space as select “crop” trees, this treatment can be effective at promoting the growth of the most desirable trees, while retaining trees that are not limiting a crop tree’s growth.</li> </ul>
<p><b>Bird habitat tips</b></p>	<ul style="list-style-type: none"> <li>• Expand crop tree definition to include trees with particular value for forest birds such as yellow birch and black cherry, and softwoods in hardwood stands.</li> <li>• Expand crop tree management goals to include establishment of regeneration. Achieve this goal by fully releasing more crop trees. Opening up the canopy more promotes development of an understory which benefits species like veery.</li> </ul>
<p><b>Responsibility birds that may benefit</b></p>	<ul style="list-style-type: none"> <li>• Blackburnian warbler</li> <li>• Black-throated blue warbler</li> <li>• Blue-headed vireo</li> <li>• Canada warbler</li> <li>• Eastern wood-pewee</li> <li>• Scarlet tanager</li> <li>• Veery</li> </ul>

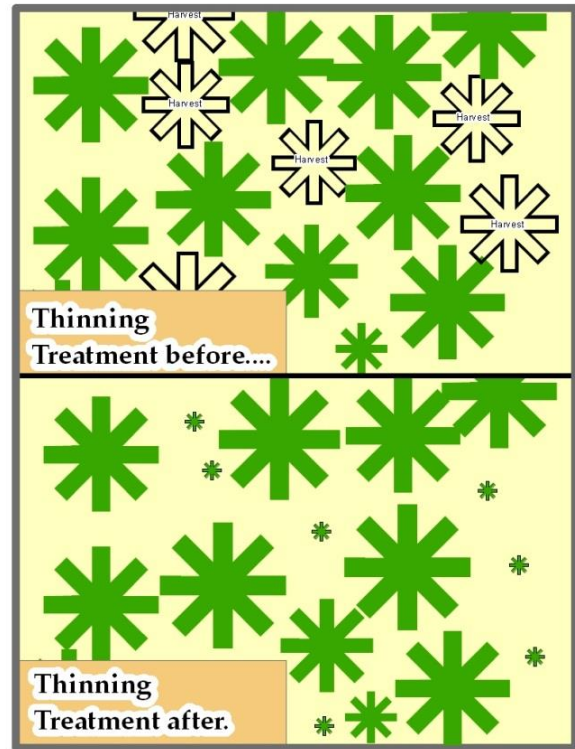
	<ul style="list-style-type: none"><li>• Wood thrush</li></ul>
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### Thinning

Thinning is a treatment that attempts to promote the growth of developing stems in a stand by reducing the density of trees. This is achieved by removing the least desirable trees in the stand, such as diseased or poorly formed stems, to give more growing space to healthy trees with good form. A thinning achieves desirable tree spacing through the removal of some of the lowest quality trees.

#### Goals

- Remove low quality trees distributed throughout the stand.
- Reduce tree density to improve growing conditions for retained trees.
- Enhance canopy vigor for species that may benefit including the scarlet tanager.



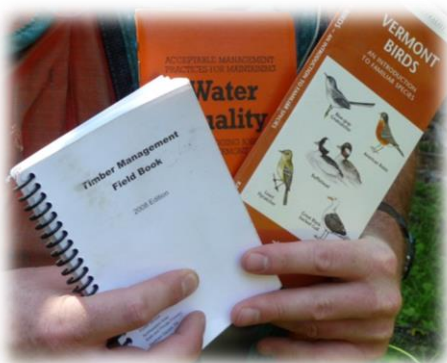
<b>When and where is it used?</b>	<ul style="list-style-type: none"> <li>• In stands where trees will grow more vigorously if stem density is reduced; generally most beneficial in stands with immature trees.</li> </ul>
<b>How is it done?</b>	<ul style="list-style-type: none"> <li>• Low quality or undesirable trees dispersed throughout the stand are harvested to reduce the density of trees in the treatment area.</li> </ul>
<b>Why does it work?</b>	<ul style="list-style-type: none"> <li>• By creating a stand with well-spaced trees, a landowner can increase the growth rate of a large number of established trees across a stand.</li> </ul>
<b>Bird habitat tips</b>	<ul style="list-style-type: none"> <li>• Use the thinning principals to enhance vigor in other forest layers (e.g. midstory).</li> <li>• Remove most overtopped trees in some areas to create open midstory conditions providing favorable foraging conditions for flycatchers such as the eastern wood-pewee.</li> <li>• Vary the spacing of retained trees, particularly by removing clusters of poor quality trees. This approach creates openings that will stimulate development of understory vegetation and benefit species such the black-throated blue warbler.</li> <li>• Retain and recruit potential cavity and snag trees.</li> </ul>
<b>Responsibility birds that may benefit</b>	<ul style="list-style-type: none"> <li>• Black-throated blue warbler</li> <li>• Canada warbler</li> <li>• Eastern wood-pewee</li> <li>• Scarlet tanager</li> <li>• Veery</li> </ul>

	<ul style="list-style-type: none"><li>• Wood thrush</li></ul>
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## Best Management Practices

### Inventory and Planning

- ✓ **Conduct a rapid habitat assessment of your property.** Use the inventory method in the previous section. Record results and identify features and habitats that should be protected and could be improved. Share your observations with your forester.
- ✓ **Learn more about birds and habitat on your property.** Whether you are a seasoned birder or only recognize a couple of songs, you can learn something new about how birds are using your woods. Learn to identify the Birder's Dozen if you don't know them already and note when and where you hear these birds.
- ✓ **Consult with a professional forester.** Ask your consulting forester to update your forest management plan to include goals and actions that help protect and enhance habitat for forest birds. Call your County Forester for general guidance on managing your forest; s/he can connect you with a consulting forester if you don't already have one and provide information on other programs that provide landowners with technical and financial assistance.
- ✓ **Make birds a priority in your management plan.** Consider making your interest in birds clear and stating it right up front. One way to do so is to list protection and enhancement of forest bird habitat as a management objective in your forest management plan. Example: Protect and enhance habitat for breeding birds of conservation concern.



- ✓ **Include the management practices in the following section in your forest management plan.** The Best Practices in this section can help clearly communicate how you want your woods to be managed.
- ✓ **Contact your county forester and/or Audubon Vermont with any questions or when you're planning management activities.** We'll be happy to follow up with you and provide additional assistance if and when you implement any of the recommendations in this guide.
- ✓ **Consider a conservation easement.** A conservation easement is a legal agreement that allows a landowner to limit the type or amount of development on their property while retaining private ownership of the land. If you want to permanently protect your land, contact the Vermont Land Trust or your local land trust to learn more.



- ✓ **Monitor forest birds on your property.** Note which birds you see and/or hear when you're walking or working in your woods. Enter your observations into e-Bird; it's easy and you don't need to be an expert birder to contribute.

#### In Your Woods

- ✓ **Maintain interior forest conditions where present.** Limit the creation of new permanent openings and roads >20 feet wide to avoid fragmenting existing forest.
- ✓ **Maintain or create enhanced horizontal structure across your property and landscape.** Protect and/or create a wide variety of habitat types across your property, especially those that may be lacking or under-represented on the surrounding landscape. If less than 3-5% of the forest in your landscape is in a young, regenerating condition, consider creating and/or maintaining 1-5 acre patches of young forest where appropriate. When possible, locate openings adjacent to roads, fields, and existing development to minimize negative impacts on surrounding interior forest. Take advantage of opportunities to create this habitat type on old landings, under power lines, and in old fields or meadows.



- ✓ **Enhance vertical structure in mature forest stands.** Enhance vertical structure where it is lacking by creating canopy gaps, establishing new regeneration, creating snags, cavity trees, and downed woody material, and allocating resources to the most vigorous canopy trees. Try to ensure all forest layers are present in moderate to high amounts across stands.
- ✓ **Promote a dense understory and midstory.** Encourage a dense growth of native seedlings, saplings, and shrubs in the understory (0-5 feet) and midstory (6-30 feet) layers of the forest. Don't cut down small trees; they are not competing with canopy trees, but are providing important habitat and are your future forest. Most birds nest and forage in these lower forest layers. If there is no understory in an area, look for signs of excessive deer browse (browse on seedling, scat, trails, scrapes); if deer browse is inhibiting new tree growth consider opening your land for hunting by permission if it is posted and talk with your forester about forest management options that could encourage regeneration.



*Yellow birch*

- ✓ **Promote native species composition.** Strive to have the species composition of your forests reflect the full range of species – commercial and non-commercial – that are part of the natural community type. Native species diversity is important for

regeneration, forest health, and for forest birds that rely on the specific structures certain species provide for foraging and nesting.

- ✓ **Retain large aspen and birch trees.** Yellow-bellied sapsuckers and northern flickers frequently excavate nest cavities in trees in sawtimber-sized ( $\geq 13$  in. dbh) aspen and birch trees. Cavities are often made in trees with the heartrot. Retain as many of these trees as possible when present. Since most birds are territorial, leave scattered clusters of these trees across an area – rather than one cluster – in order to accommodate more breeding pairs.
- ✓ **Retain yellow birch.** The branches and foliage of yellow birch are preferentially chosen for foraging by insect-eating responsibility bird species including blackburnian warbler, black-throated green warbler, and scarlet tanager. This preference may be due to the very high diversity and density of native insects on this tree and the ability of these bird species to forage efficiently among the branches and leaves. Retain as many trees of this species – across a variety of sizes – as possible.

- ✓ **Retain and release pockets of softwoods in hardwood stands.** In a northern hardwood forest, softwoods diversify habitat conditions available to birds and other wildlife species and are particularly beneficial for species such as the black-throated green warbler, blackburnian warbler, and blue-headed vireo. Retain softwoods – across a variety of tree sizes – where present in hardwood stands. Release and regenerate softwoods when the opportunity exists.



*Softwood pocket in the understory*

- ✓ **Retrain and grow some large-diameter**



*Large, yellow birch snag*

**trees.** Grow and retain some trees that grow to be 24+ inches dbh. Some of these trees may be commercially mature and others may be declining legacy trees that will never be harvested or cut down. Structurally-sound, large-diameter trees are important stick nest sites for woodland raptors; cavity nest sites for larger birds including owls and pileated woodpeckers; den trees for mammals including bear and porcupine; and seed sources.

- ✓ **Retain standing snags.** Standing dead trees are of significant value to a number of responsibility bird species including northern flicker, chimney swift, and olive-sided flycatcher as well as many other species of wildlife. To the extent possible retain a minimum of six

snags and/or cavity trees per acre, with one exceeding 18 in. dbh and two additional exceeding 16 in. dbh. Priority should be given to hardwood snags as they remain intact longer. Also, retain some live trees of poor form and quality during harvests to serve as the next cohort of snags. If target number of snags does not exist, consider girdling poor quality trees.

- ✓ **Retain coarse and fine woody material.** Small limbs and branches, including the tops of harvested trees, on the forest floor provide cover and feeding sites for ground and understory foraging bird species such as veery and white-throated sparrow. Larger diameter logs serve as drumming sites for male ruffed grouse and singing perches for songbirds including ovenbird. Strive to maintain or create a minimum of four downed trees or 16+ foot long logs per acre on average. Refrain from widespread use of whole tree harvesting and leave slash (branches, limbs, etc.) in the forest.
- ✓ **Minimize the extent of forest roads and skid trails.** Forest access roads can serve as pathways for nest predators and parasites, particularly in forests within an agricultural landscape. Maintain < 15% of a property in roads and skid trails and utilize the existing trail system as much as possible. Minimize long, straight stretches of access roads into the forest interior. Road/trail widths <20 ft. are preferred. Wider forest roads may decrease habitat quality for ground foraging bird species such as ovenbird along the road edge due to decreases in leaf litter moisture, increased leaf litter temperature, and subsequent lowered densities of leaf litter arthropods. Densities of birds and reproductive success may be negatively affected.
- ✓ **Monitor and control invasive plants.** The fruits of invasive plants such as buckthorn and honeysuckle are eaten by birds, but are of low nutritional value. Because many migrants focus their diets on fruits in the fall as they prepare for long migrations, their choice of these plants comes at an energetic cost at a critical time. Additionally, bird nests in invasive plants are more vulnerable to nest predators. When new light is allowed to reach the forest floor, due to either natural or human-induced changes in forest structure, the growth on invasive plants can be stimulated, and they can outcompete native, desirable plants. Monitor regularly for invasive plants on your property. Immediately remove scattered, individual plants. For more established infestations, create a weed plan to direct your control efforts. For information about controlling invasive plants refer to the Nature Conservancy's "Wise on Weeds" program: [vtinvasives.org](http://vtinvasives.org).
- ✓ **Conduct harvesting operations outside the bird breeding season when possible.** The forest bird breeding season in Vermont forests roughly extends from May-August. Harvesting during frozen ground conditions is preferable as it has no direct negative impacts on breeding birds. Winter harvesting can also help protect soils and the understory from damage. If harvesting outside of this time frame is required, try to



*Winter timber harvest*

schedule it after the second or third week of July, which will allow most birds to fledge a first brood.

- ✓ **Create protective buffers for streams and wetlands.** Establish, mark, and map protective buffers around streams and wetlands on your property to protect habitat for species including Louisiana waterthrush, white-throated sparrow, and Canada warbler. If you are enrolled in Current Use, these areas could qualify as ESTAs (Ecologically Significant Treatment Areas); ask your forester about this possibility. Buffers should be designed to minimize erosion; protect water quality and aquatic biodiversity; provide shade; and supply long-term supplies of downed woody material and leaf litter. Features to protect along shaded, rocky bottom streams where Louisiana waterthrush may be nesting include small hollows or cavities within the root base of upturned tree, within bank of stream, or under fallen log.

### Around Your Home or Camp

Adapted from Audubon at Home: [athome.audubon.org](http://athome.audubon.org)

- ✓ **Less lawn.** Lawns have very little habitat value for birds or other wildlife. Allowing some of your lawn to regenerate into a meadow or shrubland of native flowering and fruiting plants can attract birds and other wildlife closer to your home. Cutting down on mowing and lawn maintenance also reduces water and herbicide use and cuts energy costs. You can spend less time mowing and more time in the woods!



- ✓ **Reduce or eliminate pesticide and herbicide use.** Using fewer chemicals in your yard and home helps keep wildlife, pets, and people healthy. Whenever we use insecticides (for insect control), herbicides (for weed control), fungicides (for fungus control), rodenticides (for rodent control), or other pesticides, we must recognize that we are potentially exposing birds, beneficial organisms, pets, and people to risk. It is estimated that seven million birds die each year because of exposure to lawn pesticides.



*Elderberry*

- ✓ **Use native plants.** Natives provide birds with food in the form of fruit and seeds, and are also home to tasty invertebrates like bugs and spiders. Exotic plants are often high maintenance (pruning, shearing, etc), have the potential to become invasive, have greater dependence on water, and offer little or no wildlife value — the food, shelter, and nesting sites provided by plants that have co-evolved with native wildlife. Native birds and wildlife have evolved to use, and often require, the resources offered by plants native to the same region.
- ✓ **Keep cats inside.** Cats kill hundreds of millions of birds annually in the United States, often pouncing on ground-feeding birds and those dazed by window collisions. Responsible and caring cat owners keep their cats indoors, where they are also safer from traffic, disease, and fights with other animals. Outdoor cats are especially dangerous to birds in the early summer when fledglings are on the ground. Bells and bright kerchiefs on cat collars are usually ineffective for deterring predation. Keeping cats indoors ensures that birds outdoors stay safe and cats benefit too; indoor cats live much longer than cats that go outside.

- ✓ **Prevent window collisions.** In the United States, approximately 1 billion birds die from flying into windows each year. Protect birds from collisions by placing feeders within three feet of windows, if possible. Mobiles and opaque decorations hanging outside windows help to prevent bird strikes, or attach fruit tree netting outside windows to deflect birds from the glass. In addition, put up screens, close drapes and blinds when you leave the house, or stick multiple decals on the glass (decals need to be spaced closely together to be effective - no more than two to four inches apart).
- ✓ **Help birds stay on course.** Close your blinds at night and turn off lights you aren't using during bird migration season (April-June and August-October). Some birds use constellations to guide them on their annual migrations, and bright lights can disrupt them.
- ✓ **Provide cover and nesting sites around your home.** Leave snags and around the edges of your yard and fields for nesting places. Stack downed tree limbs to create brush pile along forested edges and islands, which is a great source of cover for birds during bad weather.



*Soft edge*

predators (such as raccoons and skunks) and nest parasites (such as the brown-headed cowbird) that are frequently found in open and developed areas. A gradually increasing canopy height will help shield interior nesting birds from view by predators and nest parasites. Additionally, the brushy conditions that often develop in a soft edge may provide breeding habitat for early-successional bird species including chestnut-sided warbler and white-throated sparrow.

- ✓ **Brush hog meadows every two years.** Brush hogging every other year – rather than every year – favors a greater diversity of flowering plants, which in turn attract a greater diversity of native insects and birds.

- ✓ **Keep some shrubs and trees around ponds.** If you have a pond, maintain at least one edge of the pond in a forested or dense, shrubby condition. Doing so may attract and provide habitat for flycatchers, common yellowthroats, goldfinches, veeries, cedar waxwings, and a diversity of other species associated with open water and shrubby growth.

- ✓ **Soften edges between field or yard and forest habitats.** Create and maintain gradual vegetation transitions between openings and forest to buffer interior forest bird species like the wood thrush from the incursions of nest



*Hayfields can be habitat for grassland birds.*

- ✓ **Delay mowing of large (> 20 acres) hayfields until after August 1.** Grassland birds such as boblink, savannah sparrow, and eastern meadow lark nest in large hayfields. Delaying mowing of these fields until after August 1 when most young have fledged and are capable of sustained flight is ideal. If fields cannot be cut that late, delaying cutting until after July 4 allows most birds to raise young. NRCS provides a cost share program to compensate landowners and/or farmers for the economic losses of delayed mowing.

#### **In Your Neighborhood and Town**

- ✓ **Look at the landscape beyond your property lines.** Find out how your property fits into the bigger picture by looking at maps or aerial photos of your town or neighborhood. Google Earth and Google Maps are great, free sources of aerial imagery.
- ✓ **Talk with your neighbors.** When neighbors keep in touch about planning management activities across property boundaries they can maximize the benefits of their actions for birds and forest health. If it's an option, take some time to look at maps together, share management plans, talk about planned management activities and strategies, and take a walk on each other's properties.
- ✓ **Find out if birds and wildlife have been considered in your town plan and zoning ordinances.** Find out if birds, wildlife, and habitat have been inventoried and assessed in your town and if clear provisions exist for protecting them. If this work has been done, look it over for helpful information on the landscape that surrounds your property and the planning that is in place. If it hasn't been done, talk to your Select Board and/or Conservation Commission about possibilities of considering birds, wildlife, and habitat in future planning.
- ✓ **Go birding with an expert.** You don't need to take up birding as your next full-time hobby, but spending a little time outside looking and listening with some experts is the best way to learn. Many communities have birding groups or Audubon Chapters that sponsor public walks. The Green Mountain Audubon Center in Huntington hosts regular bird monitoring walks and other educational programs: [vt.audubon.org](http://vt.audubon.org).



- ✓ **Look at invasives on the landscape.** Even if non-native, invasive plants have not yet arrived on your property, they're likely on their way. A new, regional monitoring and mapping project is getting started at iMapInvasives: <http://www.imapinvasives.org/>. Get trained and start contributing information. One of the great features is that you'll be able to see if there are plants next door that you should be on the lookout for; if you can catch and remove new plants early, you'll avoid bigger infestations that are harder and more expensive to remove. Contact the Nature Conservancy's Wise on Weeds program for more information.



## **Additional Resources**

### **Books and Publications**

*The Northern Forest* by David Dobbs and Richard Ober, 1996.

*Northern Woodlands Magazine*. <http://northernwoodlands.org>

*The Tree Identification Book* by George W.D. Symonds, 1958.

*The Sibley Field Guide to Birds of Eastern North America* by David Allen Sibley, 2003.

*Sibley's Birding Basics* by David Allen Sibley, 2002.

*New England Wildlife: Habitat History, and Distribution* by Richard M. DeGraaf and Mariko Yamasaki.

*Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont* by Elizabeth H. Thompson & Eric R. Sorenson, 2000.

*The Nature of Vermont; Introduction and Guide to a New England Environment* by Charles W. Johnson, 1980.

*More Than a Woodlot: Getting the Most from Your Family Forest* by Stephen Long, 2012. Published by Northern Woodlands.

*Working with Your Woodland: A Landowner's Guide* by Mollie Beattie, Charles Thompson, and Lynn Levine, 1993, revised edition.

*Landowner's Guide to Wildlife Habitat: Forest Management for the New England Region* by Richard M. DeGraaf, Mariko Yamasaki, William B. Leak, and Anna M. Lester, 2005.

*The Audubon Society Guide to Attracting Birds: Creating Natural Habitats for Properties Large & Small* by Stephen W. Kress, 2006.

*Trees, Shrubs, & Vines for Attracting Birds* by Richard M. DeGraaf, 2002.

### **Websites**

All About Birds – online bird guide – [www.allaboutbirds.org](http://www.allaboutbirds.org)

Audubon Vermont – <http://vt.audubon.org>

eBird – online citizen science database – amateurs welcome – [www.ebird.org](http://www.ebird.org)

Timberdoodle – American woodcock habitat management information – [www.timberdoodle.org](http://www.timberdoodle.org)

Vermont Center for Ecostudies - <http://vtcostudies.org/>

Vermont Coverts - [www.vtcoverts.org](http://www.vtcoverts.org)

Vermont Family Forests – <http://familyforests.org>

Vermont Fish and Wildlife Department – [www.vtfishandwildlife.com](http://www.vtfishandwildlife.com)

Vermont Invasives – [www.vtinvasives.org](http://www.vtinvasives.org)

Vermont Department of Forests, Parks, and Recreation - [www.vtfpr.org](http://www.vtfpr.org)

Vermont Land Trust – [www.vlt.org](http://www.vlt.org)

Vermont Natural Resources Conservation Service (NRCS) – EQIP and WHIP financial incentives and cost-share programs - [www.vt.nrcs.usda.gov](http://www.vt.nrcs.usda.gov)

Vermont Woodlands Association – includes association of consulting foresters - [www.vermontwoodlands.org](http://www.vermontwoodlands.org)

### ***Aps for Smart Phones***

Audubon Guides – electronic guides to birds, plants, and more – [www.audubonguides.com](http://www.audubonguides.com)

Bugwood – electronic guide to non-native, invasive plant ID and control -  
<http://apps.bugwood.org/>

iBird – electronic bird guides – <http://iBird.com>

Leafsnap – electronic tree identification guide – <http://leafsnap.com>

### **Glossary**

**Acre:** A standard unit of area measure. One acre equals: 43,560 square feet; 4840square yards; 10 square chains.

**Advance regeneration:** Natural regeneration that is established prior to a timber harvest.

**Age Class:** One of the intervals, commonly 10-20 years, into which the age range of trees are divided for classification.

**AMP's:** Accepted management practices pertaining to logging operations developed by the Department of Forests, Parks and Recreation and outlined in the booklet titled "Acceptable Management Practices for Maintaining Water Quality on Logging Jobs in Vermont."

**Browse:** Buds, leaves, and twigs of seedling and sapling regeneration that are utilized as a food resource by wildlife.

**Canopy:** The combined cover of individual tree crowns.

**Clearcut:** A silvicultural method which removes all trees from a designated area at onetime for the purpose of creating a new, even-aged stand. This management system is usually used to regenerate shade-intolerant tree species. Variations include patch and strip clearcutting.

**Coarse woody material (CWM):** Downed logs and branches >4 inches diameter.

**Codominant:** Trees with crowns forming the general level of the forest canopy and receiving full sunlight from above but comparatively little from the sides.

**Crop Trees:** Trees to be grown to the end of the rotation in evenaged management or trees to be favored for future growth in unevenaged management.

**Crown:** The branches and twigs of the upper part of a tree.

**Cruise:** A survey of forest stands to determine the number, size and species of trees, as well as terrain, soil condition, access and any other factors relevant to forest management planning.

**Diameter at Breast Height (dbh):** The diameter of a standing tree measured at 4.5 feet above the ground and expressed in inches.

**Dominant:** Trees with well-developed crowns which are above the canopy and receive direct sunlight from above and partially from the side.

**Early-Successional Habitat:** An area – usually larger than 1 acre in size - dominated by a high-density of shrubs and pioneer species seedlings and saplings. Regenerating forest and brushy, overgrown fields are two of the most common types of early-successional habitat. These conditions are temporal; generally lasting for 15-20 years in regenerating forest area, longer on old fields.

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

**Even-aged:** An age class description of a stand in which the age of the trees is relatively close, usually within 20 years. Stands with two distinct age classes can also be referred to as even-aged.

**Even-aged Management:** Timber management that produces a stand of trees with relatively little difference in age usually 10-20 years. Even-age silvicultural systems include clearcut, seed-tree and shelterwood.

**Fine woody material (FWM):** Limbs and branches <4 inches diameter including slash.

**Forest Management Plan (FMP):** A long range plan designed to identify a landowner's goals and objectives and the silvicultural methods that will be employed to achieve those goals. FMP's in Vermont are typically written for a 15 year period and updated every 10 years.

**Forest Type:** A natural group or association of different species of trees which commonly occur together over a large area. Forest types are defined by one or more of the dominant species of trees in the type. Common commercial types in the northeast are: beech-birch-maple; beech-red maple; mixedwood; spruce-fir; white pine.

**Forester:** A professional trained in forestry. Consulting foresters help landowners reach their management goals through inventory, planning, and making decisions about which trees are cut and which are left to grow.

**Forestry:** The art and science of growing and managing forests and forest lands for the continuing use of their resources.

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

**Girdle:** To destroy the conductive tissue of a tree in a ring around the bole.

**Group Selection:** An uneven-aged harvesting method designed to favor intolerant or intermediate species. Trees are generally removed in groups in areas ranging from 1/20-2 acres in size.

**Habitat:** The place where a plant or animal can live and maintain itself.

**Hardwoods:** Broad-leaved trees which lose their leaves in the fall.

**Harvest:** A silvicultural treatment that is intended to establish regeneration. A harvest is generally a higher level of cutting intensity than a thinning.

**High-grading:** A liquidation cut in which only the best quality, highest value trees are removed. Cuts of this nature are short sighted and exploitative and result in the degradation of the forest ecosystem.

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

**Improvement Cutting:** A silvicultural treatment in which poor quality and low value trees are removed to give the best trees more room to grow.

**Individual Tree Selection:** An uneven-aged harvesting method designed to favor tolerant species. Trees are removed individually to maintain a continuous and uniform crown cover. Also referred to as single tree selection.

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

**Intermediate:** Trees whose crowns reach the canopy level but receive little or no direct light from above and none from the sides.

**Intermediate Treatments:** Harvesting methods employed during even-aged management. The removal of trees from a stand between the time of establishment and the final harvest with the purpose of improving stand growth and/or species composition and/or health.

**Intolerant Species:** Trees unable to grow and develop in the shade of other species. Intolerant commercial species in Vermont include: paper birch and aspen.

**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.

**Landing:** Any place where logs are assembled for further transport.

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

**Logger:** A person who cuts trees, moves them to a landing, and often markets the wood products to a buyer as part of a timber harvest.

**Mast:** Nuts, berries, and seeds utilized by wildlife as a food resource. Soft mast are soft fruits, such as blackberries, raspberries, and cherries.

**Maturity:** Expressed in two ways: 1. Financial maturity occurs when a tree has reached the point where it has maximized value growth from the perspective of the market place; 2. Biological maturity occurs when a tree has reached the point where the energy cost of maintaining itself exceeds the energy input from photosynthesis. Financial maturity is reached long before biological maturity.

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

**Natural Community:** An interacting assemblage of plants and animals, their physical environment, and the natural processes that affect them.

**Old growth forest:** a forest in which human disturbance has been minimal and natural disturbance has been limited to small-scale windthrow events or natural death of trees.

**Outcrop:** A portion of bedrock that is exposed and protruding through the soil layer.

**Overstory:** Those trees making up the main canopy. The overstory is usually referenced as the larger trees in the stand.

**Pioneer:** Shade intolerant species that are the first trees to develop in an area after a large scale disturbance or after the abandonment of a field. Pioneer species include aspen, gray birch, pin cherry, and paper birch.

**Pole or Pole Timber:** A tree or trees greater than 4.0 inches dbh and less than 10.0 inches dbh.

**Precommercial Thinning:** An intermediate harvesting operation in a young stand that does not generate income.

**Prescription:** A course of action to effect change in a forest stand (harvest, planting, TSI).

**Regeneration:** Renewal of a tree crop by natural or artificial means.

**Release:** The freeing of well-established seedlings or saplings from competition by surrounding growth.

**Residual:** Trees that are left to grow in a stand after a silvicultural treatment.

**Salvage Cut:** The removal of dead, dying and damaged trees after a natural disaster or insect or disease infestation to utilize the wood before it loses all of its commercial value.

**Sapling:** Trees taller than 4.5 feet but less than 5.0 inches dbh.

**Sawlog:** A log considered suitable in size and quality for producing lumber. Regional standards apply for diameter, length and freedom from defect. Sawlog is also used to refer to a tree that has reached sufficient size to produce a sawlog. Small sawlog trees are 12-16 inches dbh, medium sawlog trees are 17-20 inches dbh, and large sawlog trees are 22 inches dbh or greater.

**Sawtimber:** Trees that have obtained a minimum diameter at breast height that can be felled and processed into sawlogs. Typical minimum size limits for commercial species in Vermont are 8 inches dbh for softwoods and 12 inches dbh for hardwoods.

**Seedlings:** Trees that are less than 4.5 feet tall.

**Shade tolerance:** The ability of trees to reproduce and grow in the shade of other trees. Tolerance ratings are very tolerant, tolerant, intermediate, intolerant, and very intolerant.

**Shelterwood:** An even-aged silvicultural system in which the mature trees are removed in a series of partial cuts that take place over a small portion of the rotation. The residual trees are left as a seed source and to provide shade and protection for the new seedlings. Three types of cuttings are used in this method:

1. The preparatory cut, in which the least desirable trees are removed to improve the quality and growth of the stand,
2. The seed cut, in which the regeneration is established,
3. The removal cut (or cuts) in which the mature trees are cut to release the regeneration.
4. Variations of this method include the group, irregular, strip, and uniform shelterwood.

**Shrub:** A multiple-stemmed or low-branching woody plant generally less than 16 feet tall at maturity.

**Silviculture:** The art and science of tending forest trees.

**Skid Trail:** Any path in the woods over which multiple loads of logs are hauled, usually by a skidder or tractor. Primary skid trails are the main pathways that enter the landing.

**Skidder:** A four wheel drive, tractor-like vehicle, articulated in the middle for maneuverability, with a cable or grapple on the back end designed to bring logs or whole trees to the landing once that they have been felled.

**Slope:** A relative measure of steepness of the ground. Slope can be computed by dividing the rise in elevation by the horizontal distance traveled. Slope is usually expressed in percent (rise in ft /run) X 100. Slope can be derived automatically using various forest measurement tools.

**Snag:** A standing, dead tree.

**Softwood:** Coniferous trees, usually "evergreen" (the exception being tamarack), with needles or scale-like leaves.

**Stand (Treatment Unit):** A community of trees possessing sufficient uniformity in regards to composition, constitution, age, spatial arrangement or condition to be distinguishable from adjacent communities.

**Stocking:** An indication of the number of trees in a stand as compared to the optimum number of trees required to achieve some management objective, usually improved growth rates or increased timber values.

**Stocking Level:** Stocking levels are calculated by comparing either the basal area or the number of trees the site could support, if the growth potential of the land was fully utilized, to the basal area or number of trees actually on the site. UVA stocking categories include: understocked, adequately stocked, or overstocked.

**Succession:** The orderly and predictable replacement of one plant community by another over time in the absence of disturbance.

**Suppressed:** Trees with crowns entirely below the general level of the forest canopy that receive no direct sunlight from above or the sides.

**Thinning:** A silvicultural treatment that reduces stand density to allow the best trees to grow with less competition. There are three kinds of thinning: crown thinning, low thinning, and free thinning.

**Timber Stand Improvement (TSI):** A non-commercial timber harvest conducted in stands of timber to improve the health, growth rate, and form of the remaining trees.

**Tolerant Species:** Trees that can grow satisfactorily in the shade of other trees. Tolerant species of commercial importance in Vermont include sugar maple, beech, red spruce, and hemlock.

**Truck Road:** A road capable of supporting a trailer truck that hauls logs from the landing to the mill.

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

**Uneven-aged:** An age class description of a stand of trees that contains more than two distinct age classes and a variety of size classes.

**Uneven-aged (All-aged) Management:** Timber management that produces a stand composed of a variety of age classes. Harvesting methods used in uneven-aged management include individual tree and group selection.

**Vernal pool:** A small, temporary body of water that occurs in a forest depression.

**Vertical Structure:** The complexity of vegetation and other structures as they are vertically arranged in the forest. A forest with a well-developed understory, midstory, and canopy exhibits complex or diverse vertical structure. Non-living features, such as coarse woody material and the microtopography of the forest floor, add to the complexity of vertical structure as well.

**Vigor:** The health and vitality of a tree. Vigor can most accurately be assessed by observations of foliage (density, width and color) and percent live crown.

**Windthrow:** A tree or trees that have been toppled by high winds. A common phenomena along the edge of strip cuts and clearcuts.

### Sources

Adapted from Vermont Land Trust glossary using the following sources:

- Audubon Vermont. 2012. Forest Bird Habitat Assessments. Terms and Explanations.
- Thompson, Elizabeth H. and Eric R. Sorenson. 2000. *Wetland, Woodland, Wildland: A Guide to the Natural Communities of Vermont*.
- Vermont Fish and Wildlife Department website. January 23, 2012.  
[www.vtfishandwildlife.com](http://www.vtfishandwildlife.com)

## Appendices

### Appendix A: Vermont County Foresters

Vermont County Foresters provide information, technical assistance, and outreach to the people of Vermont about managing and stewarding forestland. They are ready to assist you, so call today.

More information at [www.vtfpr.org](http://www.vtfpr.org)

Nancy Patch

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## **Appendix B: A Quick Landowner Guide to Applying for NRCS Funding**

### **About the Natural Resource Conservation Service**

The Natural Resource Conservation Service (NRCS) is a nation-wide agency within the United States Department of Agriculture (USDA). It provides technical assistance to private landowners to help them conserve, maintain, and improve their natural resources. The NRCS works in partnership with local conservation districts and other private and public partners to implement conservation practices. Every state in the country has the NRCS which can be of assistance to private landowners.

### **NRCS Programs and Practices for Forest Landowners in Vermont**

As of 2012, in Vermont the NRCS has two programs that provide forest landowners with funding and technical assistance for forestry, wildlife habitat improvement, and other conservation practices: the Environmental Quality Incentives Program (EQIP) and the Wildlife Habitat Incentive Program (WHIP). Practices that have been covered under these programs include:

- Forest management plan development
- Erosion control for forest trails and landings
- Pest management – invasive plant control
- Non-commercial forestry practices that improve forest bird habitat and timber resource
- Early-successional habitat management — grasslands, old fields, shrub land, young forest
- Mast tree and apple tree release
- Fencing to protect sensitive areas

Note that since NRCS program funding is subject to change, the practices listed above are only examples of what may be available. Check with your contact at NRCS to confirm whether funding is currently available and which program to apply for before submitting your application.

### **Who Is Eligible?**

Currently, EQIP and WHIP programs only provide assistance to private landowners with an annual income of less than \$1 million. There is no minimum acreage needed to be eligible to receive funding from the NRCS, but projects are evaluated and funded by the level of resource impairment. In addition, projects that address priority habitat improvements in target areas will be funded first. For EQIP, if eligible participants will be engaged in agricultural production or forestry management or have an interest in the agricultural or forestry operation, the applicant must document that \$1,000 in agricultural products has been produced, sold, or both from the applicant's operation or from the land in which the applicant has an interest. Applicants requesting assistance on nonindustrial private forest land are exempt from the \$1,000 in agricultural production requirement. EQIP participants who will have practices applied in forest land must provide NRCS a copy of a forest management plan (at least to a Use Value Appraisal standard) prior to applying a conservation practice.

For WHIP, owners of private agricultural land or non-industrial private forest land are eligible for WHIP. Forestry practices do require a forest management plan before the practices can be put in a contract.

### **Applying for and Receiving WHIP or EQIP Funding**

1. **Landowner submits application and eligibility information.** Eligibility must be established before the application is valid. No commitment to do the practices is required to apply. If your application is accepted, you will have the option to sign a contract agreeing to do the practices.
2. **NRCS arranges a site visit.** During the visit, NRCS field staff will work with the landowner to determine management objectives, resource concerns, special resources, opportunities, and alternatives.
3. **Draft plan developed for practices and activities.** Landowner reviews and approves plan for which practices will be implemented.
4. **NRCS ranks the proposed project.** Ranking is based on several factors.
5. **NRCS awards contracts to projects.** Landowner signs a contract agreeing to complete the project in exchange for financial funding or assistance. If landowner is not awarded funding in this round, s/he may re-apply during the next round.
6. **Landowner completes work.** Assistance from NRCS and partner organization staff is available for laying out practices and completing job sheets describing activities. Landowner notifies NRCS when project is complete.
7. **NRCS staff visit site** to certify the practice meets standards and to document conditions.
8. **NRCS processes payment.** A direct deposit is made to the landowner.

### **Tips for Success**

NRCS is a federal agency with many programs working with many landowners. Staff is ready and willing to help you, but you will likely need to be proactive to learn and navigate the system. If you meet with frustrations, don't give up! The ultimate reward of getting help making good things happen in your woods is well worth the effort. Use the following tips to help you find your way and ultimately meet with success:

- **Fill out your eligibility and application forms at your regional NRCS office.** Since the application process for WHIP and EQIP are lengthy and can be confusing if you are seeing them for the first time, it's a good idea to go into your regional office to fill out your forms with a staff member. S/he can guide you through the process, make sure your application is complete, and answer your questions.
- **Follow up.** If you mail in your application, call your regional office to confirm everything arrived and your application is complete before the application deadline. If you are wondering about the status of your application, call the office to check in.
- **Involve your forester and Audubon Vermont.** Ask your forester to help you decide which practices to apply for based on your management objectives. S/he can help you communicate with NRCS staff and get work done if you receive a contract. If you are implementing non-commercial forestry practices designed to improve forest bird habitat, call Audubon Vermont and/or your County Forester and let us know. We can also work with NRCS staff to make sure your goals are met.

- **Be patient and persistent.** NRCS is a federal agency with many programs working with many landowners. Funding and practices are subject to change, so check in regularly to make sure you have the latest information. If you aren't successful with your first application, apply again.

**Contacting NRCS**

Berlin: 802-828-4493

Brattleboro: 802-254-9766

Middlebury: 802-388-6748

Morrisville: 802-888-4935

Newport: 802-334-6090

Rutland: 802-775-8034

St. Albans: 802-524-6505

St. Johnsbury: 802-748-2641

White River Jct.: 802-295-7942

Williston: 802-865-7895

## **Appendix C: Bird Feeding Basics**

Adapted from *Audubon at Home*

Bird feeding can benefit birds and also provides great bird watching from your home and yard. In Vermont, the best time of year to feed birds is in winter when wild foods are scarce. Put seed feeders up no earlier than November 1 and take them down by April 1 to avoid attracting other wildlife, such as bears. Wild foods – such as insects – are plentiful during the summer and early fall which will keep most forest birds contentedly foraging in the woods. Landscaping with native plants is a great way to attract birds close to your home during the warmer months with flowers, fruits, and seeds.

To keep birds coming back to your feeders provide them with the following three essential elements:

- Variety of quality seed.
- Fresh water for drinking and bathing.
- Ample cover, preferably provided by native plants. Native plants also provide potential nesting sites and a source of natural food.

Keep in mind bird feeders also present potential risks, such as window collisions, predation, and exposure to disease. Following are some topics and tips for safely attracting and feeding birds.

### ***Feeder Location***

There are a few key points to consider when deciding where to put your feeder. Hang a variety of feeders at different heights from the ground. To avoid crowding and attract the greatest variety of species, provide table-like feeders for ground feeding birds, hopper or tube feeders for shrub and treetop feeders, and suet feeders well off the ground for woodpeckers, nuthatches, and chickadees. To avoid window collisions, place feeders within 3 feet of windows if you are hanging them near your house.

### ***Selecting Seeds***

Different birds are attracted by different kinds of seed, so try offering a variety of the nutritious and popular examples below in separate feeders:



Sunflower

#### **Sunflower seed**

Black-oil seed is the preferred seed of many small feeder birds, especially in northern latitudes. Striped sunflower seed is also readily eaten, especially by large-beaked birds. Hulled sunflower seed is consumed by the greatest variety of birds; it attracts jays, red-bellied woodpeckers, finches, goldfinches, northern cardinals, evening grosbeaks, pine grosbeaks, chickadees, titmice, nuthatches, and grackles.



Thistle (nyjer)

### **Thistle (nyjer)**

A preferred food of American goldfinches, lesser goldfinches, house finches, and common redpolls, nyjer is sometimes called "black gold," because it is fairly expensive. Do not confuse it with prickly thistle, a pink-flowered weed used by goldfinches to line their nests.



Suet

### **Suet and bird puddings (beef fat and seed)**

This mixture attracts insect-eating birds such as woodpeckers, wrens, chickadees, nuthatches, and titmice. Place the suet in special feeders or net onion bags at least five feet from the ground to keep it out of the reach of dogs. Do not put out suet during hot weather as it can turn rancid; also, dripping fat can damage natural waterproofing on bird feathers.



Peanuts

### **Peanuts**

Whole and crushed peanuts attract woodpeckers, jays, chickadees, titmice, bushtits, nuthatches, brown creepers, wrens, kinglets, northern mockingbirds, brown thrashers, starlings, and yellow-rumped and pine warblers. Provide these in tube-shaped, metal mesh feeders.

**Fruit for berry-eating birds:** Fruit specialists such as robins, waxwings, bluebirds, and mockingbirds rarely eat birdseed. To attract these birds, soak raisins and currants in water overnight, then place them on a table feeder, or purchase blends with a dried fruit mixture. To attract orioles and tanagers, skewer halved oranges onto a spike near other feeders, or provide nectar feeders.

**Nectar for hummingbirds:** Make a sugar solution of one part white sugar to four parts water. Boil briefly to sterilize and dissolve sugar crystals; no need to add red food coloring. Feeders must be washed every few days with very hot water and kept scrupulously clean to prevent the growth of mold.

### **Feeder Maintenance & Hygiene**

Cleaning birdfeeders and birdbaths is a crucial practice in preventing the spread of disease between birds. Birds with disease are more likely to die from starvation, dehydration, predation, and severe weather, so protect them by following these tips:

- **Disinfect your feeder and birdbath.** To keep pathogens at bay, immerse your seed feeder or birdbath in a nine to one water-bleach solution, rinsing it thoroughly, one to two times per month (for tips on cleaning hummingbird feeders, [click here](#)). In the presence of outbreaks, disinfect twice as often.
- **Empty water from your birdbath every day.** Brush or wipe it clean and rinse, then refill the birdbath with fresh water.

- **Discard old seed and hulls.** When you clean your feeder, get rid of the old seed. Rake or sweep up any uneaten hulls on the ground. The disease-causing Trichomonad protozoan, for example, can live for up to five days in food and several hours in water.
- **Avoid overcrowding.** If possible, provide more than one feeder and spread them out. Crowding only expedites the spread of disease so give the birds variety and plenty of room.

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