

# Forest Bird Habitat Assessment

A Guide to Integrating Bird Habitat Data  
into a Vermont Forest Inventory



## Introduction

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This guide has been prepared to assist foresters interested in silviculture that integrates timber and songbird habitat management in Vermont. Information provided here is intended to support both the creation of Stewardship and Use Value Appraisal forest management plans and subsequent implementation of on-the-ground, stand-level management activities that can benefit breeding bird populations while producing timber products.

This document was created as one of three components of the *Foresters For The Birds* project, a collaborative partnership between the Vermont Department of Forests, Parks, and Recreation and Audubon Vermont. These three documents were developed over a period of two years by staff of these two organizations in collaboration with over 100 foresters participating in the project. In this guide, we provide considerations and tips to assist foresters in qualitatively assessing forest bird breeding habitat at the stand level in northern hardwood and associated forest types. This guide is intended to be used in conjunction with its two companion documents: *Birds with Silviculture in Mind: Birder's Dozen Pocket Guide for Vermont Foresters* and *Silviculture with Birds in Mind: Options for Integrating Timber and Songbird Habitat Management in Northern Hardwood Stands in Vermont*.

We assume users of these documents already have at least some experience in silviculture for timber production and an interest in managing for bird habitat as well. Our purpose is to provide relevant bird information and guidance on integrating bird habitat management concepts with accepted and widely applied forest inventory practices.

## Responsibility Birds

Responsibility birds are 40 species identified by Audubon Vermont as being of high conservation priority, because a significant percentage of their global breeding population is found in the Northern Forest and/or their populations are showing long-term declines. A list of the 40 responsibility birds is found at the end of this guide. The Birder's Dozen - a subset of twelve responsibility species - are highlighted in the two companion documents to this guide.

## Habitat Quality

Vermont's forests are among the world's most diverse and productive for breeding birds and abundant, high-quality habitat is available in our region. A high-quality breeding habitat for any given species is one where individuals survive and reproduce successfully. For forest birds, the ability to survive and breed is often related to the presence of specific forest structural conditions or attributes, 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. Sole reliance upon the presence or absence of a particular species to assess habitat quality is not recommended because detection may be limited by survey effort and time of year, and species presence alone does not necessarily indicate breeding success.

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## Landscape Level Considerations

Landscape composition and configuration around a forest stand(s) or property may affect 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 some landscape level influences are difficult to address through stand level forest management, they deserve attention. We recommend that forest managers consider landscape composition (the proportion of different land uses and forest ages) and configuration (size, shape, arrangement, and relative position of different land uses and forest ages) on the parcels and landscapes on which they work. A full explanation of these factors' relevance to habitat quality for forest birds is beyond the scope of this document.



*Landscape composition and configuration around a property may affect stand level songbird habitat quality.*

## Using this Guide

This guide provides background information and tips for understanding how information foresters already are collecting during their forest inventory is relevant to forest birds – as well as suggestions for additional features to pay attention to during your timber cruise. The descriptive data collected during inventory can be used to assess the habitat quality of a forest stand or stands and identify habitat attributes that could be enhanced through or protected during timber management activities.

This guide is organized around nine habitat attributes which are linked to habitat quality for one or more responsibility bird species. We explain the *function* of each habitat attribute and offer tips on how each might be measured, if the measurement is not already captured in a standard timber cruise. We created this guide in response to foresters' interest in evaluating habitat quality based on stand conditions as seen from the center of a prism plot, which may encompass an area of  $\frac{1}{4}$  -  $\frac{1}{2}$  acre. There is no single right way to collect this habitat information. Each forester will have a system that integrates best with his or her own forest inventory protocol.

The bird habitat information featured in this guide is primarily qualitative and descriptive. Although some attributes may include quantitative measures, they are not intended to provide numerical indices of habitat quality.

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## Understory Vegetation

### Definition

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

### Function for Forest Birds

High stem and foliage densities of woody plants in this forest layer provide potential nest sites, foraging substrates, and protective cover. Stand-wide coverage is desirable but not necessary; well distributed patches are sufficient. Herbaceous plants may also be used by songbirds for foraging and nesting, but generally less so than woody plants. Species in this layer frequently used by birds include sugar maple, American beech, hobblebush, red spruce, *Rubus* spp., 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 (early-successional habitat conditions).

### Inventory Integration Tips

When evaluating commercial regeneration at a plot, simultaneously evaluate density of all vegetation in the understory layer – whether shrubs, commercial species, or non-commercial species.

Note whether distribution is even or patchy at and between plots.

When inventorying during leaf-off, evaluate foliar density by trying to visualize what it would look like during leaf-on when nesting occurs.

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References: DeGraaf and Yamasaki 2001, Falls and Kopachena 2010, Holmes et al 2005, Holway 1991, Lambert and Faccio 2005, Reynolds and Mills 1981, Tate 1970



## Midstory Vegetation

### Definition

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

### Function for Forest Birds

High stem and foliage densities of woody plants in this forest layer provide potential nest sites, foraging substrates, and protective cover. 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 1-30 ft. layer of the forest. Nests of wood thrush, American redstart, black-throated green warbler, and blue-headed vireo are most commonly found in the midstory level.

### Inventory Integration Tips

When evaluating commercial regeneration at a plot, simultaneously evaluate density of all vegetation in the midstory layer – whether shrubs, commercial species, or non-commercial species.

Note whether distribution is even or patchy at and between plots.

When inventorying during leaf-off, evaluate foliar density by trying to visualize what it would look like during leaf-on when nesting occurs.

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References: *DeGraaf and Yamasaki 2001, Hoover and Brittingham 1998, James 1998, Morse and Poole 2005, Sallabanks 1998*

HIGH FUNCTION



LOW FUNCTION

INCREASING HABITAT QUALITY

## Coarse and Fine Woody Material

### Definition

Coarse woody material (CWM) is downed logs and branches >4 in. diameter. Fine woody material (FWM) is limbs and branches <4 in diameter including slash.

### Function 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 in. diameter as drumming perches. When aggregated in piles (slash piles) FWM offers a nesting substrate and cover for white-throated sparrows and veeries. Individual pieces have minimal habitat value.

### Inventory Integration Tips

Note decay stage of CWM. Sound pieces provide greater habitat function than soft material.

Note if fine woody debris is scattered or aggregated.

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References: *DeGraaf and Yamasaki 2001, Falls and Kopachena 2010, Johnsgard and Maxon 1989, Van Horn and Donovan 1994, VT Dept Fish and Wildlife 2007*

### Coarse Woody Material

HIGH FUNCTION



LOW FUNCTION

INCREASING HABITAT QUALITY

### Fine Wood Material

HIGH FUNCTION



LOW FUNCTION

INCREASING HABITAT QUALITY

## Snags and Cavity Trees

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### Definition

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

### Function for Forest Birds

Snags provide opportunities for nesting cavity excavation by yellow-bellied sapsuckers and northern flickers, and existing cavity trees provide potential nesting cavities for chimney swifts. Aspen and birch species are frequently chosen as trees to excavate. Cavities are often made in trees with the heartwood decay fungus *Phellinus tremulae* (*Fomes igniarius* var. *populinus*) and *Fomes fomentarius* and sapwood decay fungi *Trichaptum bififormis* and *Traemetes versicolor*. Suggested targets for snags and cavity trees combined in are  $\geq 6$  per acre, with one tree  $>18$  in. DBH and 3  $>12$  in. DBH. Branches on snags may be used as foraging perches and nest sites.

### Inventory Integration Tips

Include snags and cavity trees in tally at plot. Indicate whether trees are dead or alive and whether cavities are present.

Qualitatively assess snag and cavity tree abundance between plots: low (overall low abundance of any snags or cavity trees), moderate (snags and cavity trees present, but of small diameter(s) or minimal abundance of snags and cavity trees of target diameters), and high (abundance of target diameter snags and cavity trees).

Make special note of aspen and birch snags and cavity trees



ASPEN CAVITY TREE WITH  
YELLOW-BELLIED SAPSUCKER NEST CAVITY



YELLOW BIRCH SNAG

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References: Flatebo et al 1999, Kilham 1971, NH Forests Sustainability Standards Work Team 1997

## Deciduous Leaf Litter

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### Function for Forest Birds

An abundant layer of moist leaf litter is home to an array of insects, mites, and spiders. These arthropods make up a significant component of ovenbird, veery, and wood thrush diets during the breeding season. Ovenbirds also rely upon a deep layer of deciduous litter for constructing their ground nests, and nest site selection is strongly associated with this habitat variable. For these reasons the period from early May-late July is the best time to assess litter conditions.

### Inventory Integration Tips

Assess leaf litter within a 5 ft. radius of plot center.

Qualitative ranking of present or absent should be sufficient to assess function for responsibility birds.

Leaf litter thickness varies with season; it is thickest in fall and may decompose over the following growing season until it is absent.

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References: *Bevier et al 2005, Burke and Nol 1998, Roth et al 1996*



OVENBIRD NEST BUILT FROM LEAF LITTER

## Canopy Height

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### Function for Forest Birds

Canopy height influences nesting site potential for responsibility birds in both young, regenerating (early-successional) and mature (mid-late successional) forest habitat. For birds that nest in early-successional habitats – such as chestnut-sided and mourning warbler – once the regeneration attains a height of approximately 20 ft. 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.

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References: *DeGraaf and Yamasaki 2001, Hoover and Brittingham 1998, Morse 1976*



LOW CANOPY COVER MAKES THIS YOUNG FOREST SUITABLE FOR BIRDS THAT BREED IN EARLY-SUCCESSIONAL HABITAT.



# Canopy Closure of Dominant and Co-Dominant Trees

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## Function for Forest Birds

Forest stands of  $\geq 1$  acre with an open canopy (<30% closure) are likely to provide early-successional habitat conditions. An intermediate canopy (30-80% closure) often promotes advance regeneration and shrub development suitable for understory and midstory-nesting birds. Canopy closure tends to be inversely proportional to understory development.

## Inventory Integration Tips

Consider using three categories when describing canopy closure; open (<30%), intermediate (30-80%), and closed (>80%).

Describe canopy closure as observed within a 20 ft. radius from prism plot center.

Overall canopy closure description on a property is likely to be a mix of categories.

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References: *Thompson and Capen 1988*

## Canopy Closure Classes and Associated Responsibility Species

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| Canopy Closure > | Open (<30%)            | Intermediate (30-80%)       | Closed (>80%)                |
|------------------|------------------------|-----------------------------|------------------------------|
| Species >        | Nashville Warbler      | Black-throated Blue Warbler | Black-throated Green Warbler |
|                  | White-throated Sparrow | Veery                       | Scarlet Tanager              |
|                  | Chestnut-sided Warbler | Canada Warbler              | Blue-headed Vireo            |
|                  | American Woodcock      | American Redstart           | Blackburnian Warbler         |
|                  | Mourning Warbler       |                             |                              |

## Rocky Bottom Streams

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### Function for Forest Birds

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.

### Inventory Integration Tips

Note presence within and between inventory plots.

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References: *DeGraaf and Yamasaki 2001, Mattsson et al 2009*



## Forested Wetlands

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### Function for Forest Birds

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.

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References: *Chase et al 2009, Lambert and Faccio 2005*



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## Responsibility Birds of the Northern Forest

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

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## Birders Dozen

|                              |
|------------------------------|
| 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     |

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