

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



Audubon PENNSYLVANIA

Forest Bird Habitat Assessment

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Introduction

This guide has been prepared to assist foresters interested in silviculture that integrates timber and songbird habitat management in Pennsylvania. Information provided here is intended to support the creation of 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 *Forestry For The Birds* project by Audubon Pennsylvania. 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 mixed oak forest types.

This guide is intended to be used in conjunction with its two companion documents:

- *Birder's Pocket Guide for Pennsylvania Foresters*
- *Options for Integrating Timber and Songbird Habitat Management in Forest Stands in Pennsylvania.*

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.

Forest Birds of Pennsylvania

There are over 100 species of birds using forested habitat in our state, and 35 of them have been assigned some level of conservation status by one or more agencies (see the list at the end of this booklet).

To simplify getting to know the forest birds, Audubon Pennsylvania has selected a representative set of 20 species which use different features of the two

main forest types found in Pennsylvania. These 20 species are referenced in this booklet, and more information on each of them can be found in the *Birder's Pocket Guide for Pennsylvania Foresters*.

Habitat Quality

Pennsylvania'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.

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.

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. 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.



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



Type and density of understory vegetation plays a large role in which species of songbirds will nest in a forest.

Acknowledgements

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Materials are adapted from Audubon Vermont's
Foresters for the Birds Toolkit:
<http://vt.audubon.org/foresters-birds>

Photos provided courtesy of Aaron Worthley, Kristen Sharpless, Steve Hagenbuch, Roy Pilcher, Charley Eiseman, and the Powdermill Avian

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 tree seedlings, mountain laurel, *Rubus* spp., witch hazel and striped maple.

Black-throated blue warbler and wood thrush place nests in this layer, and ruffed grouse and veery tend to nest on or near the ground, concealed by dense understory growth. The best breeding habitats for eastern towhee 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.

References: DeGraaf and Yamasaki 2001, Holmes et al 2005, Holway 1991, 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 forest 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.

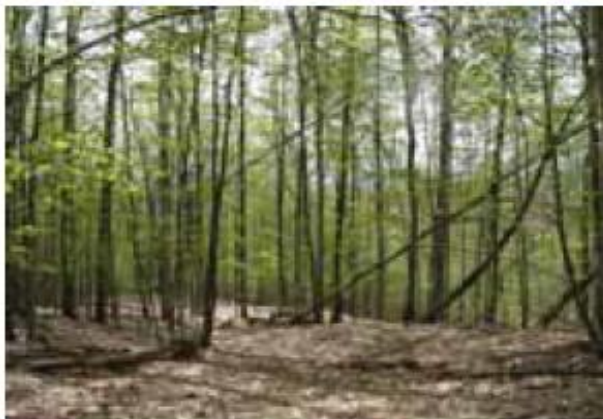
Inventory Integration Tips

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.

HIGH FUNCTION



LOW FUNCTION

INCREASING HABITAT QUALITY

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

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 ovenbird and veery. 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.

Coarse Woody Material

HIGH FUNCTION



INCREASING HABITAT QUALITY



LOW FUNCTION



Fine Wood Material

HIGH FUNCTION



INCREASING HABITAT QUALITY



LOW FUNCTION

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

Snags and Cavity Trees

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 pileated 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 decay fungus *Phellinus tremulae* (*Fomes ignarius* var. *populinus*) and *Fomes fomentarius* and sapwood decay fungi *Trichaptum bififormis* and *Traemetes versicolor*.

Suggested targets for snags and cavity trees combined are ≥ 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 sycamore, cottonwood, aspen and birch snags and cavity trees.



References: Flatebo et al 1999, Kilham 1971.

Deciduous Leaf Litter

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.

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



Ovenbird nest on the ground built from leaf litter.

Canopy Height

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 warbler and eastern towhee – 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 scarlet tanager, nest site selection is strongly associated with increasing canopy height.

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

Function for Forest Birds

Forest stands of ≥ 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 mid-story-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.

References: *Thompson and Capen 1988*



This intermediate canopy closure is promoting a vigorous growth of shrubs and young trees, attractive to thrushes and many species of wood warblers.

Canopy Closure Classes and Associated Species

Canopy Closure >	Open (<30%)	Intermediate (30-80%)	Closed (>80%)
Species >	American Woodcock	American Redstart	Black-throated Green Warbler
	Blue-winged Warbler	Black-throated Blue Warbler	Blue-headed Vireo
	Chestnut-sided Warbler	Veery	Scarlet Tanager
	Ruffed Grouse		

Rocky Bottom Streams

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.

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



Forested Wetlands

Function for Forest Birds

Woody wetland communities such as black spruce – tamarack palustrine forest and alder-dogwood floodplain thickets provide breeding habitat attributes important to birds such as Canada warblers and willow flycatchers.

Among the important attributes of these habitats are low average canopy height and abundance of ground cover, primarily ferns and shrubs. Structurally complex forest floors with hummocks, root-balls, and downed woody debris provide concealment for nests and young. Shrub-dominated wetlands provide habitat for American woodcock and alder flycatcher.

References: *Chase et al 2009, Lambert and Faccio 2005, Wilson et al 2012.*



Forest Species of Conservation Concern in Pennsylvania

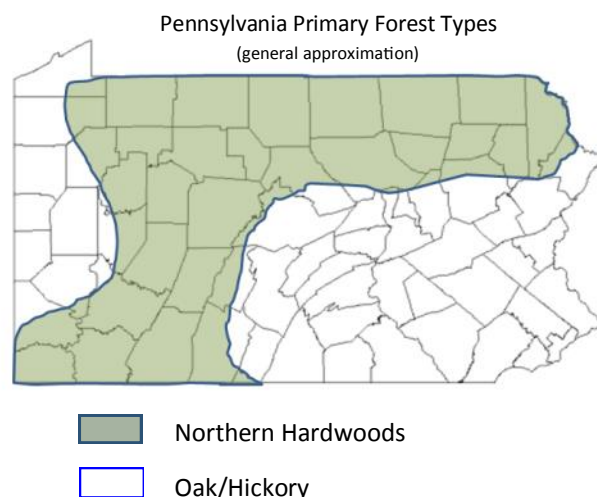
The list below are species in Pennsylvania that have shown a marked decline in population since the 1960s., primarily due to a loss or fragmentation of high value forest habitat in the state for nesting or finding food.

Acadian Flycatcher
 Alder Flycatcher
 American Woodcock
 Black-billed Cuckoo
 Blackburnian Warbler
 Blackpoll Warbler
 Black-throated Blue Warbler
 Black-throated Green Warbler
 Blue-headed Vireo
 Blue-winged Warbler
 Broad-winged Hawk
 Brown Thrasher
 Canada Warbler
 Cerulean Warbler
 Eastern Whip-poor-will
 Golden-winged Warbler
 Kentucky Warbler
 Long-eared Owl
 Louisiana Waterthrush
 Northern Goshawk
 Pine Siskin
 Prairie Warbler
 Prothonotary Warbler
 Red-headed Woodpecker
 Red-shouldered Hawk
 Scarlet Tanager
 Sharp-shinned Hawk
 Summer Tanager
 Swainson's Thrush
 Willow Flycatcher
 Winter Wren
 Wood Thrush
 Worm-eating Warbler
 Yellow-breasted Chat
 Yellow-throated Vireo

Birder's Twenty

The list below are the twenty species of focus for Audubon PA's "Forestry for the Birds" landowner education materials. Healthy forest habitat for these representative birds will help all of the species of concern listed at left.

Acadian Flycatcher
 American Redstart
 American Woodcock
 Black-throated Blue Warbler
 Black-throated Green Warbler
 Blue-headed Vireo
 Blue-winged Warbler
 Chestnut-sided Warbler
 Eastern Towhee
 Eastern Wood-Pewee
 Louisiana Waterthrush
 Ovenbird
 Pileated Woodpecker
 Ruffed Grouse
 Scarlet Tanager
 Veery
 Wood Thrush
 Yellow-bellied Sapsucker
 Yellow-billed Cuckoo
 Yellow-throated Vireo



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(others to be added upon revision and review)