FORESTRY FACTS

UW Extension

COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN-MADISON

Department of Forest Ecology and Management • School of Natural Resources

No. 77 **September, 1994**

Timber Harvest Effects on Nongame Birds
What Does the Evidence Show?

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More than 100 species of forest-dwelling birds can be found in the Great Lakes region. Many of these species are unfamiliar to most people because they spend most of their time in the tops of tall forest trees and are rarely seen at the backyard bird feeder.

One such group of elusive woodland birds--the neotropical migrants--has been the focus of intense concern in recent years because of reported population declines. Neotropical migrants are birds that winter in Mexico, the Caribbean, or South America, but breed in North American temperate forests during the summer.

While the population trends are not always clear, it appears that about 29 species have shown significant declines in the past thirty years and are at continued risk. About 16 species appear to be increasing and 81 species show no detectable change. Examples of species at risk include several species of warblers, thrushes, flycatchers, vireos, and even the whip-poor-will.

A number of factors have been implicated in the songbird declines, but most scientists agree on two major causes: increased predation and parasitism of songbird nests in the North American breeding grounds, and conversion of forest to agricultural lands in the tropical wintering grounds.

There is little evidence for conventional timber harvest in North America as a significant factor; indeed, two recent reviews of the songbird decline problem by prominent ornithologists don't even mention it as a possible cause. Nevertheless, some environmental groups have used the claim of detrimental effects as an argument for curtailing or eliminating logging on public lands. These claims have been attended by much publicity but have largely escaped careful public scrutiny.

The purpose of this report is to examine the actual scientific evidence regarding timber harvest effects on birds and its implication for public and private forest management, based on more than 50 research reports by leading scientists.

Disturbance and Bird Species Diversity

It has been known for more than 50 years that creation of openings in the forest canopy is important for high bird species diversity. All forests in North America--virtually without exception--are subject to periodic natural disturbances such as forest fires, insect epidemics, tornados, and hurricanes. These disturbances may kill only small pockets of trees in some cases but may remove thousands of acres in others.

Studies of the virgin forest in the Boundary Waters Canoe Area of Minnesota, for example, have shown that before European settlement, the average "life expectancy" of forest stands was only 50 years between severe fires that killed most of the trees. Disturbance was much less prominent in

the maple-hemlock forests of Wisconsin and Michigan, but nevertheless still had a major impact.

Land surveyors in the 1850s recorded more than 400 massive "windfalls" in northern Wisconsin caused by thunderstorms and tornados, averaging 200 acres in size but ranging up to 9000 acres. And while old-growth forest was common then, most old-growth stands were hit by intense winds felling 30-50% of the trees at least once during their potential lifespan.

Since natural disturbance is widespread, it is not surprising that many species of birds--as well as many other species of animals and plants--are adapted to or even dependent upon disturbed forest habitat. Among such species are a large number of the neotropical migrants, such as the Kentucky warbler, yellow warbler, chestnut-sided warbler, indigo bunting, and yellow-breasted chat (see Figure I and Table 1). These are species that typically require open, brushy conditions for feeding and reproduction, but do not find suitable habitat in mature or old forest. Not only do these species increase markedly after small or large patches of forest are cut, but their density will also decline quickly as the brushy and sapling habitat disappears under a closed canopy of maturing forest.

Recent studies of timber harvest effects on public lands in Missouri, Pennsylvania, and New Hampshire have indeed shown that the managed forest landscapes have higher bird species diversity (including a number of sensitive neotropical migrants) than landscapes where no timber harvest is being done.

What About "Forest Interior Birds?"

While some environmentalists acknowledge the importance of disturbance in providing essential habitat for various species, the argument is commonly raised that species requiring brushy or immature forest habitat are of little regional concern because there is already plenty of habitat for them. Rather, they say, the focus should be on preserving mature and old forest for species requiring that kind of habitat. Additional large forest preserves on public land have been proposed partly to provide habitat for a group of species known as "forest interior birds."

There are, of course, species that do require relatively mature or old forest habitat, and which will generally be uncommon in areas where most of the trees have been recently harvested. Management practices on public lands do maintain large areas of mature forest partly for this reason, and provisions for restoring old-growth characteristics are also being implemented. Discussions about "forest interior birds," however, have often been misleading for a number of reasons:

- The term "forest interior birds" as used by ornithologists refers to species that cannot breed successfully in small tracts of forest surrounded by agriculture or suburban development. The common requirement among these species relates to the size of the forest tract, not necessarily the age. In fact, many of these "forest interior birds" are actually species such as the Kentucky warbler, Canada warbler and American redstart that prefer brushy openings or young stands of trees.

- Most of the birds classified as being found in mature forest are actually not very fussy about the age of the stand. Most feed largely on insects, and need trees primarily for perching, foraging, or nest sites. Some "mature forest species" such as the red-eyed vireo and ovenbird will begin to return to stands within 10- 15 years after harvest. By the time a stand is 50-60 years old such species are once again the dominant birds in the forest. Most neotropical migrants do not continue to increase in abundance as the stand gets older (see Table 1).

- Most ornithologists agree that there are no bird species in the Great Lakes region or Northeast that require old-growth forest for their existence, unlike the situation of the spotted owl in the Northwest.

- In the Great Lakes region and Northeast, 75% of the neotropical migrants undergoing significant declines are species requiring brushy and young forest habitat. Of the neotropical migrants requiring mature northern hardwood stands, several (such as the red-eyed vireo, black-throated green warbler, and ovenbird) are already very abundant and show increasing population trends.

A Closer Look at the Prime Suspects

Virtually all observers agree that agricultural development and suburbanization have had major negative impacts on neotropical migrants due to their indirect effects on parasitism and predation. Edges of woodlands bordering farms or fields are ideal habitat for predators such as skunks and raccoons that are known to raid songbird nests, as well as for the brown-headed cowbird which lays its eggs in the nests of other birds.

Ornithologists have found astonishingly high rates of nest failure in these environments. One study of typical farm woodlots in Illinois reported that 80% of all young birds had been lost to predators, and 76% of nests that escaped predation were parisitized by cowbirds. Ornithologist John Terborgh concluded rather glumly that "there may be no place in the state of Illinois where such species can nest successfully."

The other major threat is the conversion of tropical forest to agricultural land in the wintering grounds. The loss of tropical forest--about 1% per year--closely parallels the rate of decline of many neotropical migrants. About 25 species are felt to be very susceptible to tropical habitat modification.

Fortunately, most other neotropical migrants are fairly tolerant of habitat change and can utilize citrus orchards, agricultural land, and disturbed forest habitat. While land use changes in the tropics will remain a serious concern, John Terborgh places more emphasis on the cowbird problem. "I suspect we shall lose several species to cowbirds before we lose any more to tropical deforestation," he predicts.

Does Timber Cutting Increase Parasitism and Predation?

Because nest predation and parasitism are higher along the edges of farm and suburban woodlots, some might assume that patch cutting has a similar impact. However, a small woodlot surrounded by a sea of corn or soybeans has a much different environment that a forest opening of 1/5 to 40 acres surrounded by a matrix of dense forest.

Cowbirds and predatory mammals thrive in agricultural areas because of the dependable food available year after year. Openings created within a forest by harvesting have comparatively little suitable food, especially for cowbirds, and the openings themselves are ephemeral, disappearing quickly under a layer of tall saplings.

None of the studies that have examined timber cutting effects in large tracts of northern hardwood and conifer forest have found significant numbers of cowbirds. While information on mammalian predation is still fairly limited, most of the available studies have not reported higher rates of predation near the edges of harvest openings. A number of studies are currently underway and will provide more definitive evidence within a few years.

What About "Resident" Bird Species?

Although most of the public discussion has focused on neotropical migrant birds, a brief discussion is also included here on timber harvest effects on other nongame birds that either remain in the Lake States during the winter or migrate to the southern U.S. In general, timber harvest effects are similar for these species as for the neotropical migrants. Residents and short-distance migrants also use a variety of forest age classes. Again, species diversity is typically highest when all stages of forest growth are present on the landscape.

One major difference, however, is that many of the resident species such as woodpeckers, owls, and bluebirds build nests in tree cavities. When marking stands for timber harvest, it is therefore important to retain some living cavity trees as well as some dead trees. Both large and small cavity trees are useful, although some birds such as the pileated woodpecker can only use trees larger than about 18 inches in diameter. Large fallen logs are also useful foraging sites for some birds. Landowners in the northern Great Lakes region can improve habitat for bald eagles by retaining tall dying or dead trees--especially pines--in the vicinity of lakes or rivers.

How Should Forests Be Managed?

Because bird species vary so much in their habitat requirements, a scientifically sound plan to maintain viable populations of neotropical migrants must provide all stages of forest growth on the landscape, from young brushy patches to mature and old forest. Ironically, large preserves of mature forest are likely to be undesirable for many neotropical migrants and beneficial only to a few, given that 75% of the declining species need young forest habitat.

A number of ornithologists, in fact, have attributed the disappearance of some bird species from existing preserves as a result of forest maturation and the loss of "early successional" habitat. Contary to popular belief, too much mature forest on the landscape is just as detrimental to biological diversity as too little.

Although natural disturbance could in principle provide the needed brushy habitat, natural openings in vigorous second-growth forest are too small and too rare to have much effect during the next 80-100 years.

Most public forest lands, such as national and state forests, are managed by a variety of techniques to provide a diversity of habitat conditions. For example, the pending master plans for Wisconsin national forests call for about half the northern hardwood stands to be managed by light selective cutting and the other half to be managed by heavier timber harvests known as the shelterwood system. The combination of these two techniques provides extensive areas of mature and old forest but also provides a variety of stand ages on the landscape. The two different harvest types are spatially segregated to avoid excessive fragmentation.

These plans continue to be revised in response to public input. The U.S. Forest Service is mandated by law to conserve biological diversity, and the state departments of natural resources are likewise sensitive to their responsibility in this area. Fourteen federal agencies have collaborated with state agencies in a formal program, known as "Partners in Flight," to conserve neotropical migrants.

Private landowners also share a large responsibility for conserving neotropical migrants and other birds since they own more than 60% of all forest land in the region. There are a number of ways that private landowners can help:

- Planting idle fields to trees will increase the suitability of adjacent woodlots for most neotropical migrants, especially in agricultural areas.
- Both light selective cutting and patch cutting can be beneficial to neotropical migrants, although different species will be favored in each case. If you own a large woodlot, consider using both methods but aggregate the patch cuts rather than scattering them throughout the woods.
- Maintaining mature forest cover along floodplains and small streams in the central hardwood (oak-hickory) region will be beneficial for several declining neotropical migrants such as the cerulean warbler, hooded warbler, prothonotary warbler, and Acadian flycatcher.
- If you own an isolated woodlot smaller than 50 acres and surrounded by cropland, its value for neotropical migrants is probably limited because of susceptibility to cowbird parasitism and predation. However, impacts can be minimized by using light selective harvesting of scattered trees and avoiding openings larger than 1/5 acre, especially near the center of the tract.
- When marking trees for a harvest, retain up to 2-4 living cavity trees and dead trees per acre for nesting and foraging sites.
- If your woodlot already contains a mixture of evergreen and deciduous trees, retain both types whenever you mark trees for harvesting. If the property contains only deciduous trees, consider planting small or medium-sized patches of conifer trees. This will increase bird diversity.

Because fragmentation of habitat by agriculture, suburbanization, and tropical forest clearing have been implicated as the major causes of songbird declines, a major reversal in these trends will not be easily accomplished. Nevertheless, prudent management of the North American temperate forest breeding grounds can be an important step in conserving these species.

For Further Information

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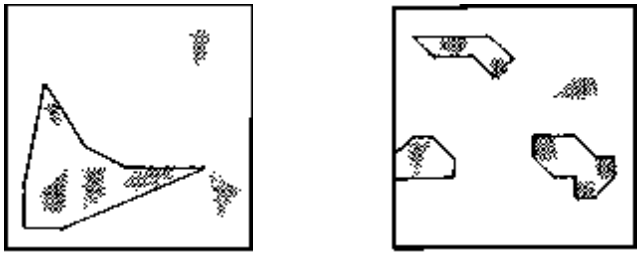
Kentucky Warbler



Ovenbird

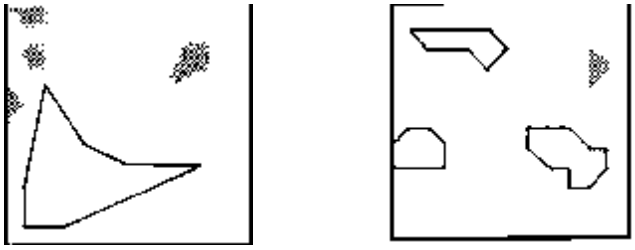


Figure 1. Habitat preferences for different neotropical migrants are clearly illustrated in this experiment in oak-hickory forests of Missouri. Each block shows a separate 45-50 acre stand that received patch cuts of two different sizes – a single 11-acre harvest on the left and three patch cuts of 3-5 acres on the rights. The boundaries of bird territories 3 years after harvest are stippled. Note that the Kentucky warbler has located its breeding territories preferentially within the harvest areas, while the ovenbird has avoided them. (From Thompson and Fritzell, USDA Forest Service Research Paper NC-293).

Table 1. The relative abundance of nongame birds in relation to the stage of forest growth in northern hardwoods. (Condensed from R. DeGraaf, Managing northern hardwoods for breeding birds, Soc. Amer. Foresters Publ. 87-03.)

	Brush Stage	Saplings	Pole	Mature	Old Growth
☐ Eastern Bluebird	▪				
☑ Philadelphia vireo	■				
☑ Chestnut-sided warbler	■	■			▪
☑ American redstart	■	■	■	■	■
☐ Winter wren	■			▪	▪
☐ American goldfinch	■	■			
☐ White-throated sparrow	■	■	▪	▪	▪
☑ Veery	▪	■	▪	▪	▪
☑ Canada warbler		■			▪
☐ Hermit thrush		■	▪	▪	▪
☑ Wood thrush		■	■	■	▪
☑ Scarlet tanager			■	■	▪
☑ Black-and-white warbler	■	■		▪	■
☑ Red-eyed vireo	■	■	■	■	■
☑ Ovenbird		■	■	■	■
☑ Black-throated blue warbler			■	■	■
☑ Blackburnian warbler				■	▪
☐ White-breasted nuthatch			▪	■	▪
☑ Black-throated green warbler			■	■	■
☑ Solitary vireo				▪	■

▪ = present; ■ = common; ■ = abundant; ☑ Neo-tropical migrant bird