The Critical Importance of Large Expanses of Continuous Forest for Bird Conservation

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Connecticut State of the Birds

Protecting and Connecting Large Landscapes

2015
# CONNECTICUT STATE OF THE BIRDS

## Protecting and Connecting Large Landscapes

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*Front cover:*

The Preserve, a new 1000-acre acquisition in Old Saybrook, with the Sound and the mouth of the Connecticut River in the distance.

Photo courtesy of Robert Lorenz.
The Critical Importance of Large Expanses of Continuous Forest for Bird Conservation

Robert A. Askins
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In 1952 permanent vegetation plots were established in the Connecticut College Arboretum. The goal was to monitor changes in the diversity and composition of plants in a protected study area (the Bolleswood Natural Area) that had been established for long-term ecological research. The next year, Barbara Rice Kashanski, an undergraduate student who knew how to identify birds, persuaded Professor William Niering to initiate a bird census in the same study area. They used a standard protocol for breeding bird censuses that had been developed by the National Audubon Society. Both the vegetation surveys and bird census have continued for more than 60 years, giving us a particularly rich picture of changes in the ecology of the study area.

In the early 1950s the forest at this site was still recovering from the 1938 hurricane. Young hemlocks and gray birches grew where ancient hemlocks had been toppled by the storm. The expectation was that populations of forest birds would increase as these storm-damaged openings filled with new canopy trees. Surprisingly, however, the opposite occurred. By 1976 many species of forest birds had declined or disappeared even as forest habitat appeared to recover. This included not only species that thrive in forest openings such as Ruffed Grouse, Hooded Warbler, and Canada Warbler, but also species that are associated with mature, closed-canopy forest such as Eastern Wood-Pewee, Red-eyed Vireo, and Black-throated Green Warbler. The disappearance of the hemlock-loving Black-throated Green Warbler was particularly perplexing given the rapid growth of young hemlocks that became established after the hurricane.

In the mid 1970s researchers realized that population declines in forest birds in the Connecticut College Arboretum were part of a larger pattern. Similar declines had occurred at numerous other Breeding Bird Census sites in eastern North America. In fact the loss of diversity and abundance of specialized forest birds in nature reserves in the Washington metropolitan area and northern New Jersey were even more severe than the declines at the Connecticut site. The woodlands in all of these areas were protected, so decreases in bird populations were not associated with construction or forest clearing within their boundaries.

Nearly all of the declining species were migratory birds that spend most of the year in tropical habitats in the West Indies, Central America, or South America. Initially it was hypothesized that forest birds had declined because of the destruction of their winter habitats rather than changes in their breeding habitat in protected nature reserves. It soon became clear, however, that this could not be the full explanation. A more important factor was where the breeding habitat was located. Although Breeding Bird Census sites had been initiated in more remote areas, the decades-long censuses were taken in relatively small protected woodlands near cities and suburbs, often near university campuses that were convenient to birders or ornithologists, and these were the studies that reported severe, even catastrophic, long-term population declines. At more remote sites such as Great Smoky Mountains National Park there were shifts in the relative abundance of different species of forest migrants, but generally little or no decline in the overall abundance of migratory forest birds. Also, by the 1980s it was clear from the more comprehensive Breeding Bird Survey program that most migratory forest birds had not declined along hundreds of randomly located roadside survey routes across eastern North America. In contrast, between the 1940s and the 1970s small nature reserves were enveloped by housing developments, highway interchanges, and new commercial areas, so they were increasingly...
Ground nesters, like this Ovenbird, are susceptible to predation by house cats. To have other disadvantages as well, such as lower rounded by more developed or open habitats appear chicks rather than their own young. Small forests surrounded by more developed or open habitats appear to have other disadvantages as well, such as lower density of leaf-litter insects due to drier conditions, the spread of non-native plants in the understory, and extremely high rates of browsing of the understory and ground cover by white-tailed deer. Even if migratory birds do not avoid these areas when choosing breeding territories, they may not return for a second year after unsuccessful attempts to raise young.

Whatever causes the low densities of forest birds in small forest patches, the difference between small and large forests is clear when large numbers of forests in the same region are compared. For example, when my students and I studied birds in 46 forests of a wide range of sizes in southeastern Connecticut, we found a clear relationship between forest area and the average number of forest migrants per survey plot (Figure 1). Plots in small forests had virtually no forest migrants (mature forest specialists that migrate to the tropics in the winter). Instead they are dominated by generalized species such as Downy Woodpeckers and Black-capped Chickadees. Only plots in continuous forests of hundreds or thousands of acres supported a high diversity and density of forest migrants. Studies of forests of different sizes in other regions of eastern North America revealed the same pattern.

Recently I worked with Robert Dorazio and Edward Connor to reanalyze the data from this study of 46 forests in southeastern Connecticut using a more refined approach to statistical modeling. We were able to analyze the effects of forest fragmentation and vegetation structure on birds while also considering the effects of errors in detection for each species and potential interactions (such as competition) between species. This model confirmed the importance of forest fragmentation for many species of migratory forest birds. The following species were significantly more abundant in survey plots in large forests located in more heavily forested regions than in small, isolated forests: Eastern Wood-Pewee, Yellow-throated Vireo, Red-eyed Vireo, Blue-gray Gnatcatcher, Hermit Thrush, Wood Thrush, Ovenbird, Worm-eating Warbler, Hooded Warbler, Cerulean Warbler, and Scarlet Tanager.

**Early Warning about How to Prevent Forest Bird Declines**

In one sense the severe decline in forest birds at Breeding Bird Census sites was a false alarm, because it did not reflect general population trends across eastern North America. Forests in more rural areas often became less fragmented as farm fields were abandoned and reverted to forest, so it’s not surprising that many migratory forest birds had stable or increasing populations in the decades after 1966, when the roadside Breeding Bird Survey was initiated. The population declines in small Breeding Bird Census sites are more appropriately described as an early warning rather than a false alarm, however. Even in many remote regions of eastern North America, low-density residential development threatens to fragment large forests into smaller woodland patches. In order to sustain a diversity of specialized forest birds, we need to protect some large areas of continuous or nearly continuous forest.

**Migrant birds need the protection of a large forest with an interior far from suburban and agricultural edges.**

Wooded corridors between small nature reserves probably will not help solve this problem. Small forests appear to be unfavorable habitats for these birds primarily because of “edge effects.” Medium-sized predators, cowbirds, invasive plant species, and deer typically penetrate forests from the forest edge, reaching the center of small forest reserves but only affecting the periphery of large forests. Hence, connecting several small forest reserves with wooded corridors will not make much difference for highly mobile forest birds (although it is likely to help sustain populations of other organisms such as salamanders, which colonize new areas by walking, or woodland wildflowers that have seeds dispersed by ants). The habitat in these small, connected forests will still be unfavorable for many forest birds. These species need the protection of a large forest, with an interior far away from suburban and agricultural edges.

**Applying Research Findings about Forest Fragmentation**

Hundreds of studies contributed to the conclusion that large, continuous forests are important for bird conservation. This goal was adopted by environmental agencies and conservation organizations remarkably quickly, perhaps because of the effectiveness of Partners in Flight, an international effort to protect migratory birds in the Western Hemisphere. Numerous federal and state agencies, non-profit organizations, and academic researchers participated in the meetings, workshops, and working groups sponsored by Partners in Flight, so there was effective communication between researchers and land managers.

Both the Connecticut Chapter of the Nature Conservancy and National Audubon have worked to protect the remaining large expanses of broken forest in Connecticut. Both organizations have identified large blocks of forest that should be given high

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**Figure 1. Relationship between forest area and the average abundance of migratory forest birds in 46 forests in southeastern Connecticut.**

**Figure 2. Forest focal areas recognized as regions of high conservation concern for forest birds by National Audubon.**
Forests are increasingly dominated by fewer and fewer tree species. This is due not only to the suppression of natural disturbances that create openings needed by plants such as oak seedlings that don’t grow well in the deep shade under a closed canopy of trees. Wild fires and seasonal flooding along rivers have been suppressed, so there are fewer natural openings in the forest. As a result, in many Connecticut forests oaks have been steadily replaced by more shade-tolerant red maples.

Some of the declining tree species such as hemlock, yellow birch, and various types of oaks are preferred foraging sites for some species of forest birds, so declining tree diversity will probably lead to declining bird diversity. Consequently, protecting large blocks of forest is not sufficient; it is also important to develop management plans to sustain their natural diversity. This will require new approaches to conservation such as protection of coyote populations to help control deer populations, and biological control of introduced pathogens and plants. Conservation plans must also accommodate shifts in geographical ranges as southern species of plants and birds move northward into Connecticut, while other species inevitably disappear from the state as their geographical ranges shift northward.

Other Threats to Forest Birds

Forest birds may be threatened by ecological changes even in the interior of extensive forests. Although invasive plant species are most prevalent near the forest edge, some introduced species such as Japanese barberry spread deep into the forest, reducing understory plant diversity and potentially reducing the abundance of insects needed by understory birds. Similarly, although deer densities tend to be highest in suburban woodlands, even the interior of large forests may suffer from intense browsing by deer, leading to a decline in birds that depend on the shrub layer of the forest. Invasive plant species and extremely high deer densities contribute to a larger trend of homogenization of deciduous forests. Both the understory and the tree canopy are increasingly dominated by fewer and fewer species. This is due not only to the loss of particular tree species killed by introduced pests and pathogens such as hemlock woolly adelgid and chestnut blight, but also to the suppression of natural disturbances that create openings needed by plants such as oak seedlings that don’t grow well in the deep shade under a closed canopy of trees.
Connecticut residents and New Englanders in general have been proficient lately in two contradictory areas: we have succeeded in protecting thousands of acres of forest, and we have allowed thousands of acres of forest to be developed.

Throughout New England, 22 percent of the land is preserved, and 47 percent of that preservation has occurred since 1990. Connecticut itself has protected an average of 5,200 acres a year.

In the meantime, development has permanently destroyed an average of 2,400 acres of Connecticut forest a year since 2000.

David Foster, director of the Harvard Forest, recently pointed out in his keynote talk at our Annual Meeting that lately it has been a losing battle.

A resurgent of forest growth since the end of the 19th century, the area of New England covered by forest has shrunk over the last five decades, converted into housing subdivisions, strip malls and highways.

How significant is this to us? New England’s forests provide a vast wildlife habitat. They protect our drinking water. They help prevent floods. Mature forests provide a vast wildlife habitat. They protect our drinking water. They help prevent floods.

Our Recommendations for Connecticut’s conservation community, elected officials and residents:

1. Begin a campaign to authorize and approve a statewide land preservation bond act, or some other appropriate form of long-term conservation financing, as has been done in many states. DEEP estimates that the state will need almost $500 million to meet its half of the state goal of protecting 21% of the land in Connecticut by 2023. To help meet the other half of that goal, municipalities should put open space referenda on their local ballots.

2. Until then, the General Assembly and the Governor should increase the annual bonding authorization for open space acquisition in the state budget and, most importantly, spend the money.

3. Continue to protect large tracts of forest while also recognizing that management plans are essential for sustaining natural diversity (see Askins, page 24).

4. Emphasize the value and heighten the priority of habitat connections in the Green Plan and all future Connecticut conservation efforts.

5. Landowners should get involved in their area’s regional conservation plan (as described in Foster and Labich, page 12).

6. Emphasize the importance of biological connections in each municipality’s state-mandated Town Plan of Conservation and Development.

7. Require all appropriate elected and appointed officials throughout the state to become familiar with the Green Plan.

8. Landowners should consider dam removal to improve habitat and increase connectivity. Interested landowners can contact Sally Harold at The Nature Conservancy.