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# 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



### Connecticut State of the Birds

www.ctaudubon.org

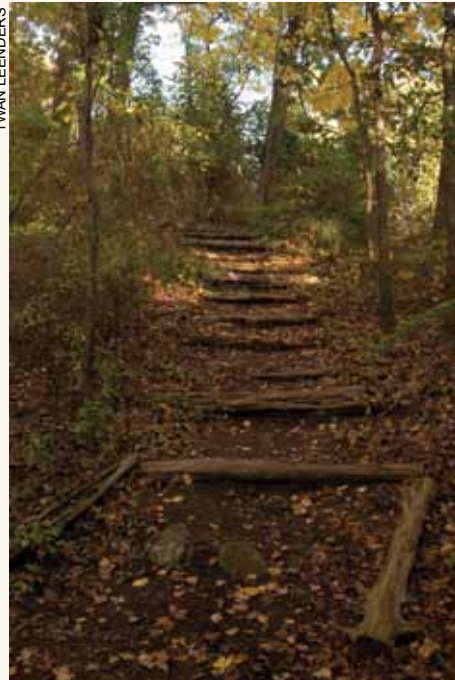
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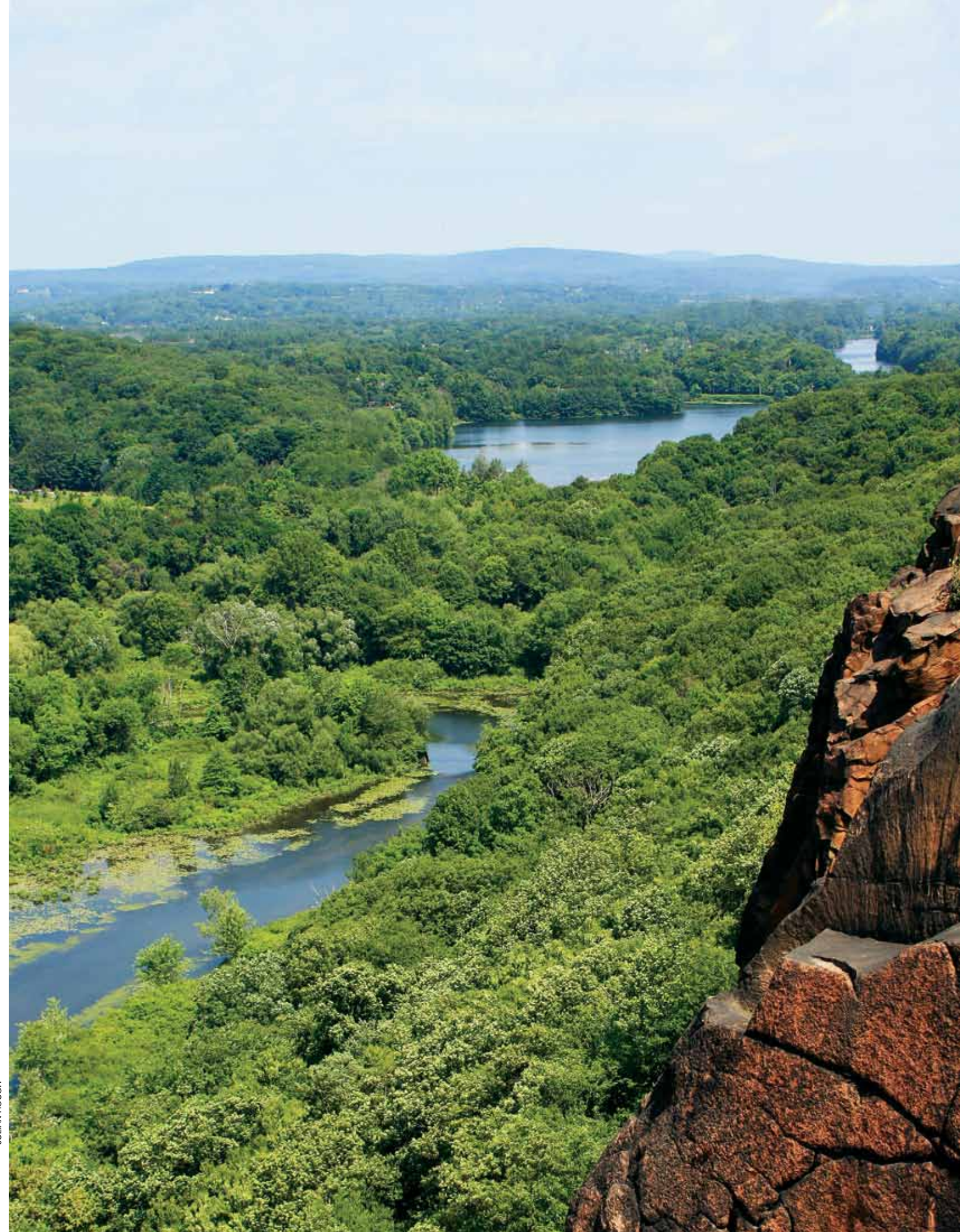
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#### Front cover:

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.



JULIAN HOUGH

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

Robert A. Askins  
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Connecticut College

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 de-



Isolated forests will not restore Ruffed Grouse populations.

PAUL J. FUSCO

clined 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

**Forest migrants had low reproductive rates in small, isolated reserves.**

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 Censuses had been initiated in more remote areas, the decades-long censuses were taken in relatively



Over-browsing by White-tailed Deer can reduce the density of forest birds.

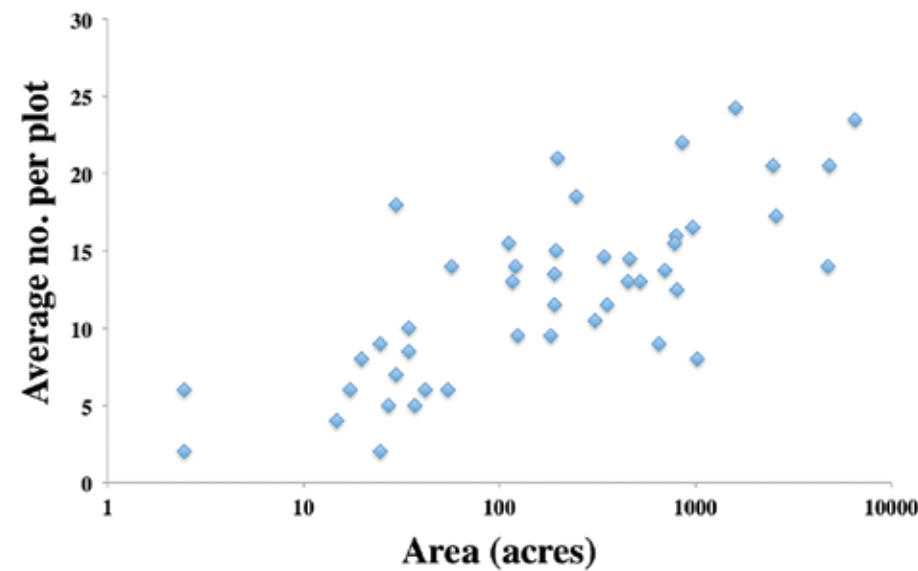
PAUL J. FUSCO (2)



Scarlet Tanagers are found in a variety of forest habitats.

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

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



isolated from other forests.

The alarm about declining breeding population of forest birds spurred ornithologists to focus on habitat conditions in these relatively small, isolated nature reserves. It soon became clear that forest migrants often had very low reproductive rates at these sites because eggs and nestlings were lost to raccoons, domestic cats, and other predators common in suburban areas. Moreover, forest birds at many of these sites were heavily parasitized by Brown-headed Cowbirds, so they ended up primarily raising cowbird 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

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.

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



Ground nesters, like this Ovenbird, are susceptible to predation by house cats.

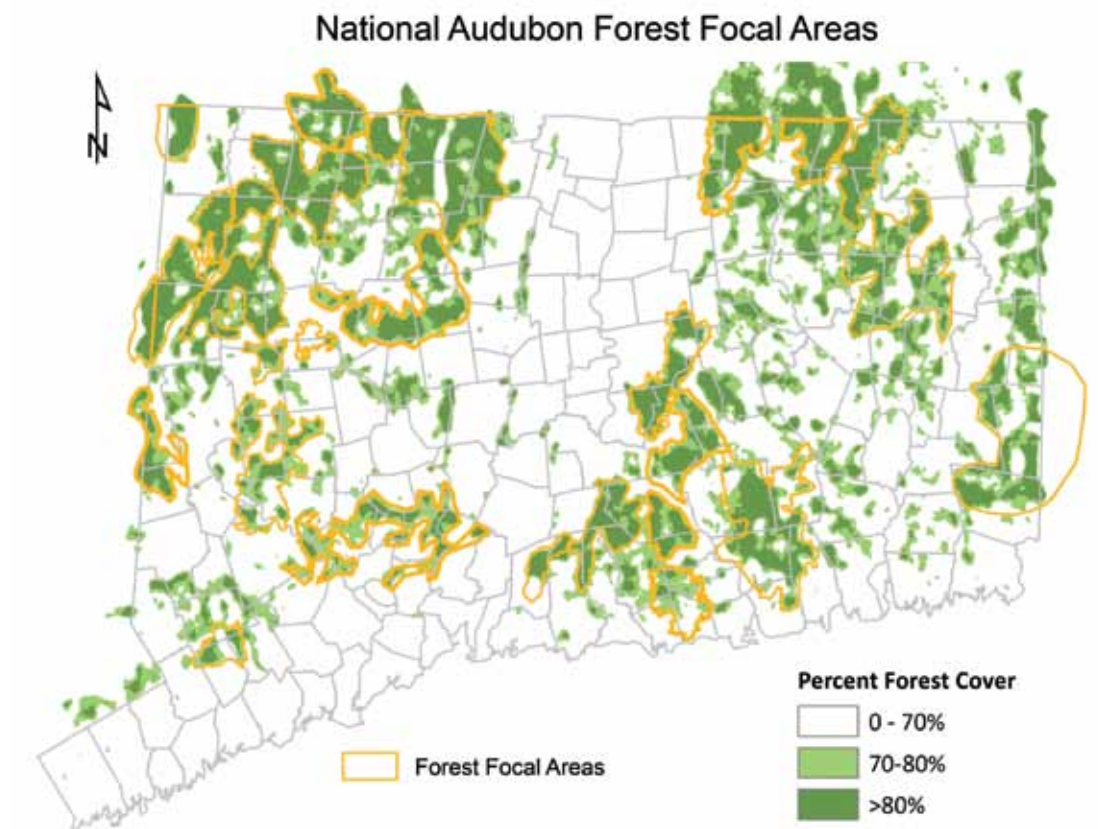
## Early Warning about How to Prevent Forest Bird Declines

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

**Figure 2. Forest focal areas recognized as regions of high conservation concern for forest birds by National Audubon.**



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 unbroken forest in Connecticut. Both organizations have identified large blocks of forest that should be given high



Forests are increasingly dominated by fewer and fewer tree species.

priority for conservation, and they work with partners to protect forests within these blocks on both public and private land. The two organizations used somewhat different criteria to identify large forests that are worthy of special concern. The Nature Conservancy identified forests throughout New England that are large enough to support not only a diversity of migratory forest birds, but also populations of species with large home ranges such as black bears and goshawks, and to absorb periodic disturbances such as windstorms and fires without the loss of a high proportion of the forest canopy. These “matrix forests” should be extensive enough so that natural disturbances are an advantage rather than a disaster. Natural disturbances create openings with early successional habitat that supports a distinct set of species. In contrast, the “forest focal areas” identified by National Audubon are based more specifically on habitat needs of forest birds (Figure 2). The Conservancy’s matrix forests and National Audubon’s forest focal areas show a high degree of overlap, however. If these forests are protected, they should be ex-

tensive enough to sustain a full set of migratory forest birds

### 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. 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.

### References

Askins, R. A. 2014. *Saving the World’s Deciduous Forests. Ecological Perspectives from East Asia, North America, and Europe.* Yale University Press, New Haven, CT.

Dorazio, R. M., E. F. Connor and R. A. Askins. In press. *Estimating the effects of habitat and biological interactions in an avian community.* PLoS One.

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# The Benefits of Open Space: Fresh Air, Wildlife, Happy Kids

Amy Blaymore Paterson

Executive Director

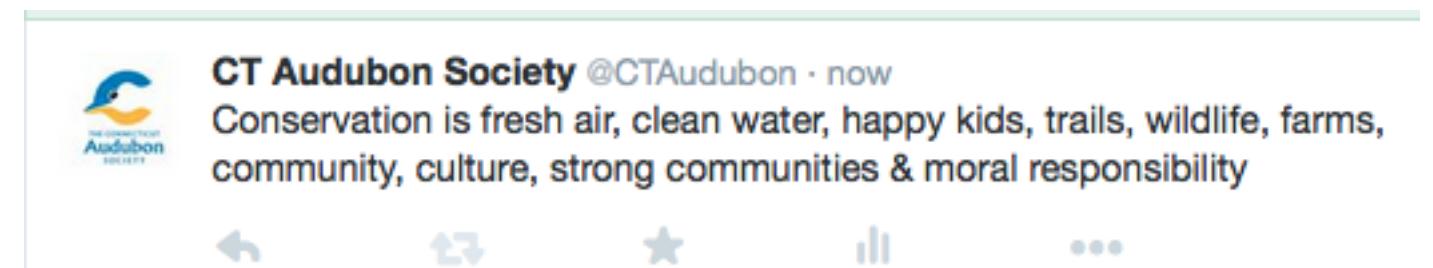
Connecticut Land Conservation Council



As the statewide umbrella organization for the land conservation community, the Connecticut Land Conservation Council’s mission is to advocate for land preservation, stewardship and

funding, and ensure the long term strength and viability of the land conservation community. To that end, we talk about the importance of and benefits of conserving open space in Connecticut every day.

Yet, in this day and age, delivering that message can be challenging. Attention spans are decreasing; information speed is increasing. One of the most powerful social media tools is Twitter, which describes its



## More Land Preservation, More Connections: The Time is Now

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. After a resurgence 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 trees store carbon, locking it away so it can't contribute to climate change - a function at which older trees get better and better at. Indeed, 35 years of measurements at the Harvard Forest in central Massachusetts have shown that as the forest matures, the rate at which it stores carbon increases.

Obviously, there are real societal incentives to protect more land. There is also a huge opportunity to do so: forestland still covers 65 percent of New England, and 79 percent of that is owned by private families.

The opportunity is there, waiting for us as Connecticut residents to take action: to embody an ethic of conservation and to dedicate the money necessary for preservation.

### 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.



ROBERT ASKINS



ALEXANDER R. BRASH



DAVID FOSTER



WENDY FRANCIS



SALLY HAROLD



DIANA ATWOOD JOHNSON

**ROBERT ASKINS** is Katharine Blunt Professor of Biology at Connecticut College, where he teaches ecology, animal behavior, conservation biology, and ornithology. He received a B.S. from the University of Michigan and a Ph.D. from the University of Minnesota. His research focuses on the ecology and conservation of migratory birds. He has published papers in numerous journals, including PLoS One, Science, and the Proceedings of the National Academy of Sciences. He has published two books, *Restoring North America's Birds* (2000) and *Saving the World's Deciduous Forests* (2014).

**ALEXANDER R. BRASH** is president of Connecticut Audubon Society. He spent nine years as northeast regional director of the National Parks Conservation Association, was chief of the Urban Park Service for New York City's Parks Department, and worked for the World Wildlife Fund and The Nature Conservancy. Alex has a B.S. in zoology from Connecticut College and an M.F.S. from Yale.

**DAVID FOSTER** is a Connecticut native and author of *Thoreau's Country - Journey through a Transformed Landscape*. He is director of the Harvard Forest, a 3,750-acre ecological laboratory, and serves on the boards of The Trustees of Reservations, Choate School, and Highstead Foundation. In 2010 David and colleagues developed *Wildlands and Woodlands - A Vision for the New England Landscape*.

**WENDY FRANCIS** is interim president of Y2Y. One of Canada's senior conservationists, she has dedicated most of her 30-year career to protecting wilderness and wildlife, and has championed the Yellowstone-to-Yukon vision since its inception. Educated in biology and environmental law, Wendy was the founding conservation director for the Canadian Parks and Wilderness Society in Calgary and director of conservation science for Ontario Nature in Toronto.

**SALLY HAROLD** is director of river restoration and fish passage for the Connecticut Chapter of The Nature Conservancy. She is responsible for planning, prioritizing, and managing river connectivity projects leading to more resilient and healthy freshwater systems. She works with state and federal partners, dam owners, and fellow conservationists. [sharold@tnc.org](mailto:sharold@tnc.org).

**DIANA ATWOOD JOHNSON** is chair of Connecticut's Natural Heritage, Open Space and Watershed Review Board. She serves on the board of the Trust for Public Land and chairs the Open Space Commission in Old Lyme. Diana is an accomplished nature photographer, birder, and naturalist. She is the publisher of *Swallow Tales*, a pictorial of the hundreds of thousands of Tree Swallows that gather over the lower Connecticut River each fall.

**ROB KLEE** is commissioner of Connecticut's Department of Energy and Environmental Protection. Previously, he was an attorney with Wiggin and Dana LLP, in New Haven, where he specialized in appellate work and energy and environmental law. He holds a Ph.D. from Yale's School of Forestry & Environmental Studies, a law degree from Yale, and an undergraduate degree from Princeton in geology and environmental science.

**WILLIAM "BILL" LABICH** is Highstead Foundation's regional conservationist and coordinator of the Regional Conservation Partnership Network. With a background in forestry and land use planning, Bill organizes, writes about, and assists in advancing collaborative approaches to large landscape conservation. [blabich@highstead.net](mailto:blabich@highstead.net).

**FRASER LOS** joined Y2Y as communications manager in 2014. Previously, he wrote about conservation issues as a freelance journalist and as associate editor of *Alternatives Journal*, an environmental magazine published at the University of Waterloo. Fraser has degrees in environmental science and philosophy from the University of Western Ontario.

**AMY BLAYMORE PATERSON** joined the Connecticut Land Conservation Council in 2010 as its first executive director. Previously, she served as a project manager for The Trust for Public Land and worked for over 20 years as an attorney, concentrating in land preservation and environmental protection. Before moving to Connecticut, Amy was an attorney with the U.S. Department of Justice. She received a B.A. from Franklin & Marshall College and a law degree from the University of Denver.

**KARL WAGENER** is executive director of the state Council on Environmental Quality (CEQ), which identifies environmental trends and recommends changes to state laws and policies. Much of his work involves investigating and finding solutions to complaints from the public about environmental problems. He oversees publication of the CEQ's annual report to the governor on the condition of Connecticut's environment. Previously he worked on environmental policy for the Connecticut Audubon Society and was its lobbyist at the state Capitol.



ROB KLEE



WILLIAM "BILL" LABICH



FRASER LOS



AMY BLAYMORE PATERSON



KARL WAGENER