THE CONNECTICUT Audubon SOCIETY

Connecticut State of the Birds

Gains, Losses and the Prospect of Extinction

2016

CONNECTICUT STATE OF THE BIRDS

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Connecticut State of the Birds

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PAUL J. FUSCO

Indigo Bunting

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Photo by Paul J. Fusco

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Photo by Julian Hough

Introduction

Do We Have the Will to Save Our Birds?

Milan G. Bull
Senior Director of Science and Conservation
Connecticut Audubon Society

After a decade of producing our *State of the Birds* reports, we asked our original authors to return and review the successes and challenges in Connecticut bird conservation over the last ten years. The result is a mix of wins and losses, with significant challenges ahead.

Chris Elphick's article, on the status of tidal marsh birds, gives us a shocking perspective of the effects of global warming and sea level rise on our coastal tidal marshes. This is the bad news. Given the current rate of sea level rise, virtually all of our coastal marshes will flood, extirpating many of our tidal marsh birds, such as Seaside Sparrow and Clapper Rail, and causing the extinction of Saltmarsh Sparrow. We will need to act quickly to find ways to help marshes migrate inland with the rising tides, a tough proposition considering that most of the areas immediately adjacent to tidal marshes are well armored by development.

Our wetland birds, according to Min Huang, are one of the few groups of birds across the state that are doing fairly well, with long-legged waders holding their own and Great Blue Herons and waterfowl, with some exceptions, increasing. Invasive plants and wetland infringements are primary challenges.

Similarly, many of our coastal birds, the terns, plovers, and oystercatchers that nest along our shoreline, are doing well. This is largely due to a tremendous conservation and protection effort by volunteers who monitor and protect the nesting beaches. Patrick Comins reports that the challenges of human conflict between beach use of the shoreline and the needs of our coastal birds continue to grow.

Connecticut's grasslands, a dominant landscape feature in the 19th century and earlier, have nearly completely reverted to forests or been developed, severely reducing our populations of Eastern Meadowlark, Grasshopper Sparrow, and other grassland-dependent birds. However, according to Jenny Dickson, we've been fortunate in that the Connecticut Department of Energy and Environmental Protection's Grassland Habitat Initiative has resulted in the addition of hundreds of acres of grassland habitat over the last decade, conserving nearly 85% of the targeted 800 acres needed to support grassland birds. But management, maintenance, and continuing development pressure remain significant challenges.

The ebb and flow of Connecticut's forests over the last two centuries has created dramatic changes in our bird populations.

JULIAN HOUGH

Great Blue Herons are one of the few wetland species that are increasing.

Bear with me if you will: a little forest history may help set the stage for the current state of forest birds in Connecticut.

One of the biggest challenges facing the early-19th-century conservationists, such as Theodore Roosevelt, Gifford Pinchot, and others, was the loss of our forests to unregulated timber harvesting. Forests across America were being cut for profit at an alarming rate by everyone with an axe and a saw. Clearly, without federal protection and before the establishment of forest reserves and national parks, our forests were disappearing fast—very fast. The Forest Reserve Act of 1891, which authorized withdrawing land from the public domain as "forest reserves," began to set aside large tracts of (mostly western) forests. These were managed by the new Bureau of Forestry in 1901, which became the U.S. Forest Service.

The efforts to protect our forests were driven by

the public, which became aroused and concerned at the loss not only of forests, but also of our connected reserves of fisheries and wildlife. During the late 19th century, bison, Passenger Pigeons, Carolina Parakeets, and other species were quickly disappearing from the national map. A national campaign led by the Forest Service to preserve and protect our forests swept across the country. In 1944, the well-known advertising mascot Smokey the Bear was created to educate the public about the dangers of forest fires.

This sentiment continues today, and much of the public continues to oppose cutting in our public forests and elsewhere. The result is that, for the most part, we have saved huge swaths of public forests, allowing them to grow and reach a state of maturity we have not known since colonization.

Now the problem is that complete protection of our forests by fire suppression and logging reduction has led to the loss of diversity of the stages of forest growth needed to support the many species that depend on young forest in order to thrive. Mature forests, without the regular creation of large and small openings, eliminate the growth of young forests, the shrub-scrub habitat required by many species of birds, such as Yellow-breasted Chat and Brown Thrasher. Thus, as Robert A. Askins and Christopher R. Field describe in their article, "Rabbits & Rebounding Populations," this suite of birds is quickly declining in our state. There is hope, however, as state and federal agencies and an increasing public are beginning to realize the importance of creating young forest habitat through clear cuts and controlled burns.

The future of avian diversity and abundance in our state will depend on the public will to conserve these resources.

* * * * *

JULIAN HOUGH

Without public support conservation efforts cannot succeed.

Recommendations

On the grand scale, we must institute policies that will slow sea level rise and reduce global warming.

On the state level we recommend that the Connecticut DEEP be provided with sufficient funding to analyze and plan for landscapes that will allow the migration of tidal marshes inland as sea levels rise.

State officials, conservation groups (including the state's 100-plus land trusts), private landowners, and local planning and land-use officials must recognize that historically Connecticut's forests were a mosaic of habitat types, including shrubby openings. All of these land managers should look for opportunities to maintain or expand shrub-scrub habitat, within existing forests or as newly-restored or created habitat.

Three decades after our neighbors in New York completed their state's first breeding bird atlas project, Connecticut still lacks this basic and indispensable inventory and data source. We recommend that the DEEP, the Connecticut Audubon Society, Audubon Connecticut, the Connecticut Ornithological Association, and leading academic ornithologists continue to collaborate on the basic planning and funding needed to get the project started.

We must work with our non-profit partners and the Connecticut General Assembly to find new and novel funding mechanisms for non-game conservation efforts.

We must also increase our land acquisition effort to meet the state's goal of protecting 21% of the state's land by 2023 and 10% for state parks, forests, and wildlife management areas.

We look forward to working with our conservation partners and regulatory agencies to help reach our conservation goals and create a lasting future for our birdlife.

PAUL J. FUSCO

As the Tide Continues to Rise, Marsh Birds Face a Perilous Future

All the Trends Point Down

Chris S. Elphick

Department of Ecology & Evolutionary Biology, Center for Conservation & Biodiversity, and Institute of Biological Risk, University of Connecticut

Although there is much that we do not know about the status of Connecticut's birds, there is one group—tidal marsh birds—for which our knowledge has improved dramatically over the last decade. A clear upshot of this improved knowledge is that we now know these birds are in even more trouble than was suspected, and that we need to act soon if we wish to protect them. This work illustrates what can come from a concerted regional effort to understand what is happening to a group of birds and perhaps what can be done to help them.

In 2006's *State of the Birds* report, I noted that we lacked a basic inventory for most of Connecticut's birds, the exceptions being a few game species, some colonial waterbirds, and the rarest of the rare. We knew a little more about population trends because of the U.S. Geological Survey's Breeding Bird Survey, which systematically assesses population trends by visiting the exact same places every year, using the same protocol, and often the same observers. But even that survey does not adequately monitor all of the state's birds. Although these shortcomings were widely recognized at the time, looking back, I am saddened, though not surprised, to realize how little has changed. The pipedreams of 10 years ago are still that, and we continue to lack even basic inventory and monitoring data for most species.

Tidal marsh birds have been especially poorly served by standard monitoring programs. The Breeding Bird Survey provides little information about them. Most species are migratory and leave the Northeast before Christmas Bird Count season begins. And, their secretive nature and hard-to-access habitat mean that eBird produces only a rudimentary picture, heavily influenced by the travel patterns of birders. Some tidal marsh species also have been suspected of being in serious trouble because of the

limited amount of salt marsh, much of which has been greatly altered by the high human densities along the coast and is threatened by the rapid rate of sea-level rise caused by recent climate warming.

Given these concerns, the Saltmarsh Habitat and Avian Research Program (SHARP) was initiated in 2010, with the goal of better understanding the ecology and conservation status of tidal marsh birds and their habitat. Initially a collaboration among scientists at the Universities of Connecticut, Delaware, and Maine, and the Maine Department of Inland Fisheries and Wildlife, the partnership has grown to include researchers at the University of New Hampshire and the State University of New York.

PAUL J. FUSCO (2)

The Saltmarsh Sparrow may be the first victim of sea level rise.

SHARP now works closely with many state and federal wildlife agencies in the Northeast and Mid-Atlantic states, and a key goal has been to provide state-specific information that could help local organizations decide how to act. In Connecticut, for example, we now have population estimates for all tidal marsh specialist species. These results suggest that the state supports breeding populations of approximately 150 Clapper Rails, 800 Willets, 1,600 Saltmarsh Sparrows, and 1,000 Seaside Sparrows. Our surveys also collect data on all of the other birds that use coastal marshes during summer, so we have similar information for 17 other species identified by the state as being of "greatest conservation need." More information on all of these population estimates can be

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Saltmarsh Sparrow nestlings experiencing a tidal flooding event.

found in a report by the SHARP team, with Tom Hodgman as lead author, and in a 2016 paper led by Whitney Wiest and published in the journal *Condor: Ornithological Applications*. Links to these documents are available on the SHARP web site (see below).

One surprise from the surveys was that Saltmarsh Sparrow numbers were much lower than we had previously estimated. The earlier study was not designed to produce a population estimate, though, and we knew that it was a rough approximation at best. The new survey, in contrast, was carefully designed both to estimate current numbers and to compare them with those obtained in the past. Our trend analyses, which are described in a 2016 paper in the journal *Conservation Biology* led by Maureen Correll, showed that Saltmarsh Sparrows have declined by about 9% per year—not only in Connecticut but throughout their entire range. This decline is equivalent to losing three out of every four Saltmarsh Sparrows since the 1990s.

Across the Northeast, Saltmarsh Sparrow is clearly the species in most serious trouble, but it is not the only one. Clapper Rails are also disappearing—by about 4% per year, with a much steeper annual decline of almost 13% in Connecticut. Farther north, Nelson's Sparrows are declining too. Seaside Sparrow and Willet numbers appear to be stable overall, but nesting data suggest that the former species may be starting to decline in Connecticut, albeit at a lower rate than the other species. That trends for Clapper Rails and Seaside Sparrows in Connecticut appear to be more serious than elsewhere in the region is especially troubling because we are near the northern edges of these species' ranges. Declines at the edge of a species range, where populations are often small and suitable habitat limited, could be an early warning signal of more widespread declines to come.

Although we are still investigating the causes of these declines, it is clear that flooding during high spring tides is the major cause of nest failure in Saltmarsh Sparrows. The restrictions to natural tidal flow created by roads and other infrastructure that crosses marshes also seem to play a major role,

perhaps because the restrictions limit the flow of sediment—which is necessary to counterbalance the effects of sea-level rise—into the marsh.

Even more worrisome is that data on nesting success and adult survival collected by the SHARP team and analyzed by Chris Field suggests that Saltmarsh Sparrows are on a clear trajectory towards extinction within the next 50 years. Other data described in a 2016 paper in the journal *Biological Conservation*, also with Chris Field as the lead author, suggest that marshes throughout the state are getting wetter, but not moving inland to counterbalance losses of the high-elevation marsh that is necessary for successful nesting.

PAUL J. FUSCO (2)

Surveys suggest that Seaside Sparrows may be starting to decline.

Given these steep losses, what can be done? Ultimately, policies to slow sea-level rise are needed both for the birds and for coastal land owners, but past carbon emissions are enough to ensure that we will see sea levels continue to rise for at least a generation. Conservation will succeed only if we plan for change, protecting places that support large numbers of birds now, and those that are capable of doing so in the future. We also need to find ways to help marshes move inland into habitats that are currently forests or park lawns. Such "marsh migration" is likely to be the only way to counterbalance losses of the high elevation marsh that nesting birds require.

Perhaps the biggest lesson arising from this research, however, is that, by getting a detailed understanding of how saltmarsh birds are faring in this rapidly changing world, we are now able to make a clear plan for how to move forward with coastal marsh conservation. This work will involve a combination of identifying specific policy and management actions that will benefit the species in most trouble; a holistic look at the entire suite of saltmarsh-dependent species to prioritize conservation work; and new research on the effectiveness of management actions to ensure that they are done as cost-effectively as possible.

Without a serious initiative to inventory and monitor the rest of the state's birds, though, we will

Healthy salt marshes are essential habitat for many bird species.

PAUL J. FUSCO (2)

Clapper Rails are near their northern range limit in Connecticut.

continue to lack the data necessary to develop a similarly complete vision for how to make the best conservation decisions about other habitats. One ray of sunshine is that the Connecticut Department of Energy and Environmental Protection has shown a strong commitment to supporting a statewide inventory in the form of a year-round bird atlas. Implementing that project, however, will require the full support of the bird conservation community both to help collect data and to ensure that there is adequate funding.

* * * * *

For more of our results, and full details of the papers referred to, see the SHARP web site www.tidalmarshbirds.org and www.elphick.lab.uconn.edu.

The piercing call of the willet is heard along our barrier beaches and salt marshes.

Rabbits & Rebounding Populations Bring Hope for Shrubland Birds

Robert A. Askins, Katharine Blunt
Professor of Biology, Connecticut College
Christopher R. Field
Postdoctoral Researcher, University of Connecticut

A decade ago, we had little reason to believe that the rapid decline of Connecticut's shrubland birds could be reversed. Blue-winged Warblers, Chestnut-sided Warblers, Indigo Buntings, Prairie Warblers and many other species seemed destined to all but disappear. But today — unexpectedly — Indigo Buntings and Prairie Warblers are on the rise. And there is larger hope for the other species in the form of an unlikely ally—a rabbit. To explain what is happening, and why, requires some history.

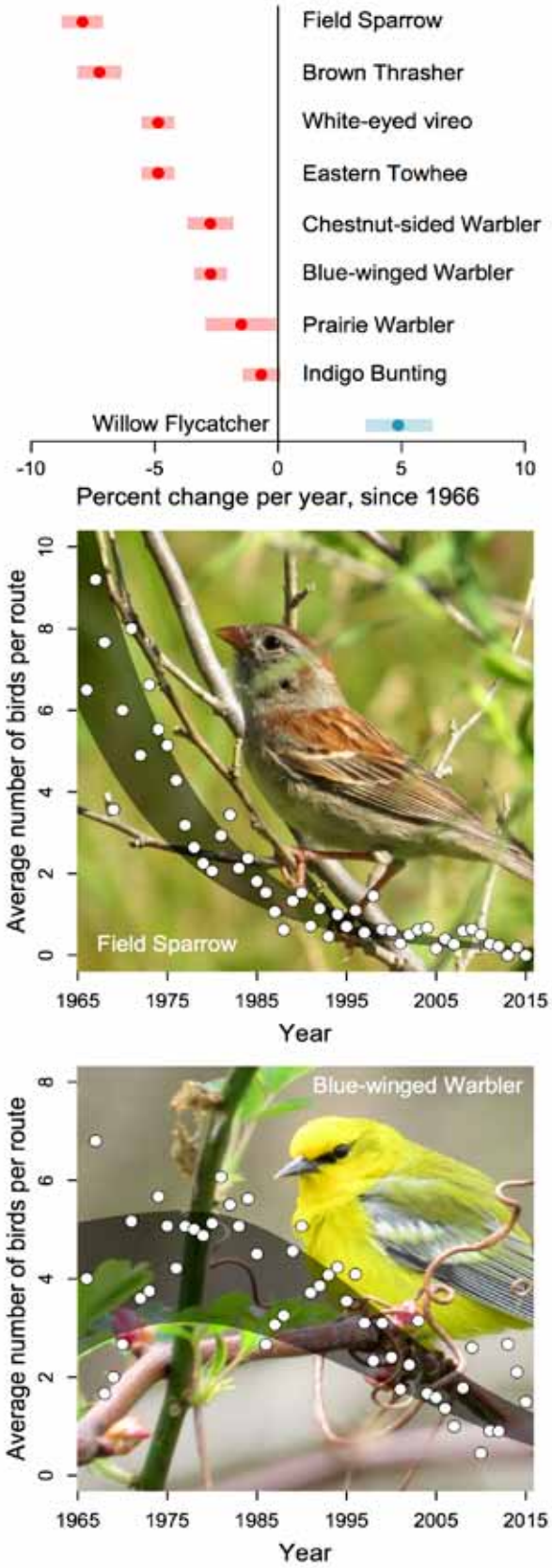
PAUL J. FUSCO

Found only in second growth and scrubby forests, the Chestnut-sided Warbler is distinctive in appearance.

In the early 1800s only about 25 percent of Connecticut was covered with forest, and much of what remained was in heavily logged and grazed woodlots. During the next hundred years, as farms were vacated, second-growth forests grew up in the abandoned fields. Between 1880 and 1925, this forest was heavily cut over, often repeatedly, for charcoal. Hence forests, which had been the dominant natural habitat in the state, were at one time or another almost entirely cleared, and they were not allowed to grow back completely after farming was abandoned. As a result, land conservation efforts focused almost entirely on saving trees and forests. Until relatively recently other natural ecosystems, such as salt marshes, meadows, and wild rivers, received little attention from conservationists.

After other fuels replaced charcoal for manufacturing, the amount of forest steadily increased. Today about 60 percent of the state is covered with forest. Early conservationists probably never anticipated such a massive resurrection of the state's woodlands. And not surprisingly, since the Breeding Bird Survey began in 1966, many forest birds appear to be doing well, with stable or even increasing populations. These include Eastern Wood-Pewee, Veery, Red-eyed Vireo, Ovenbird, and Scarlet Tanager. But even though the amount of forest in the state was increasing during much of this period, the populations of other forest birds declined. Some of these may have been driven down because of destruction of winter habitat in the tropics or the thinning of the forest understory by dense populations of deer or the interruption of habitat by roads and new houses. Other species, however, have declined primarily because the even-aged, homogeneous woodlands that have grown up after the charcoal era do not provide suitable habitat. These second-growth forests have the characteristics of neither an old-growth forest (giant trees, large snags, and large canopy openings caused by the collapse of ancient, massive trees) nor an early successional forest (a dense layer of shrubs and tree saplings that gradually changes into a young, open-canopy woodland with a dense shrub layer). Birds that need open scrub/shrub, open young woodland,

Figure 1. Percent change per year of early successional forest birds (shrubland specialists) on Breeding Bird Survey routes in Connecticut between 1966 and 2015.



Bird photographs courtesy of NIALL DOHERTY

or canopy openings in old forest are prominent on the list of declining bird species in Connecticut.

Early Successional Decline

The early successional or shrubland birds are usually considered a group apart from forest birds, but this view is anchored in a static view of forests. Before agricultural clearing, the forests of Connecticut were a mosaic of habitat types, from shrubby openings where fire, storm, or beavers had destroyed the trees to tracts of ancient trees that had escaped such disruption for centuries. The open, shrubby areas were an important site of repair and regrowth after the tree canopy had been damaged or destroyed. The early successional plants, insects, birds, and other animals were a critical component of a natural successional cycle. They were an integral part of the forest landscape.

After European settlement, people actively suppressed wildfires, seasonal flooding of rivers, and beaver activity. An entire set of species that originally depended on natural disturbances was forced to depend on human activities, such as farming. As farming was abandoned or became too intensive to allow for shrubby, fallow fields and hedgerows, these species began a long, steady decline. Many are now in danger of disappearing from the state. Despite this, they were only recently perceived as a group in need of protection. Because of the long tradition of equating protection of trees with protection of biological diversity, these species are often seen as intruders on a landscape that should properly be covered with forest. If the forest is viewed as a dynamic ecosystem rather than a museum diorama, however, then early successional species clearly are important components of the forest ecosystem.

Although some young-forest species such as Rose-breasted Grosbeak have declined since 1966, the most severe declines have occurred among birds that are restricted to early successional scrub/shrub habitat. This, of course, is the first successional stage to disappear as the forest matures. Since 1966,

Where do these data come from?

These graphs use data from the Breeding Bird Survey, a long-term monitoring program that is coordinated by the U.S. Geological Survey and conducted by volunteers. *www.pwrc.usgs.gov/bbs/*.

How do we estimate the population trends?

Our approach is the same as calculating returns on an investment or compound interest. This allows us to calculate trends for each species in terms of the percentage change, per year, in Connecticut's population. These statistical models also tell us how certain we should be about the trends. There is always some degree of uncertainty because over the years there are population fluctuations, different observers (who are best at identifying different birds), and variable weather conditions. More information on how these trends were estimated is available at *www.ctbirdtrends.org*.

How do I interpret the graphs?

The bars in the top graph show us the range that we are 95% sure contains the actual trend. For context, 95% is about the same probability as seeing an American Robin during a spring visit to Hammonasset Beach State Park. We can be confident that a species is declining if the bar lies completely below zero. The dots on these bars show our best estimates. The graphs with pictures show trends over time in the average number of birds seen on Breeding Bird Survey routes, which we use as an indicator of the statewide population size. The dots are the data collected by volunteers and the shaded areas show the modeled trend.

early successional birds as a group have steadily declined, with species such as Field Sparrow and Brown Thrasher losing 5 percent of their population each year (Figure 1). The only species that has increased since 1966 is Willow Flycatcher, but in recent years even this species has declined.

A Rabbit Comes to the Rescue

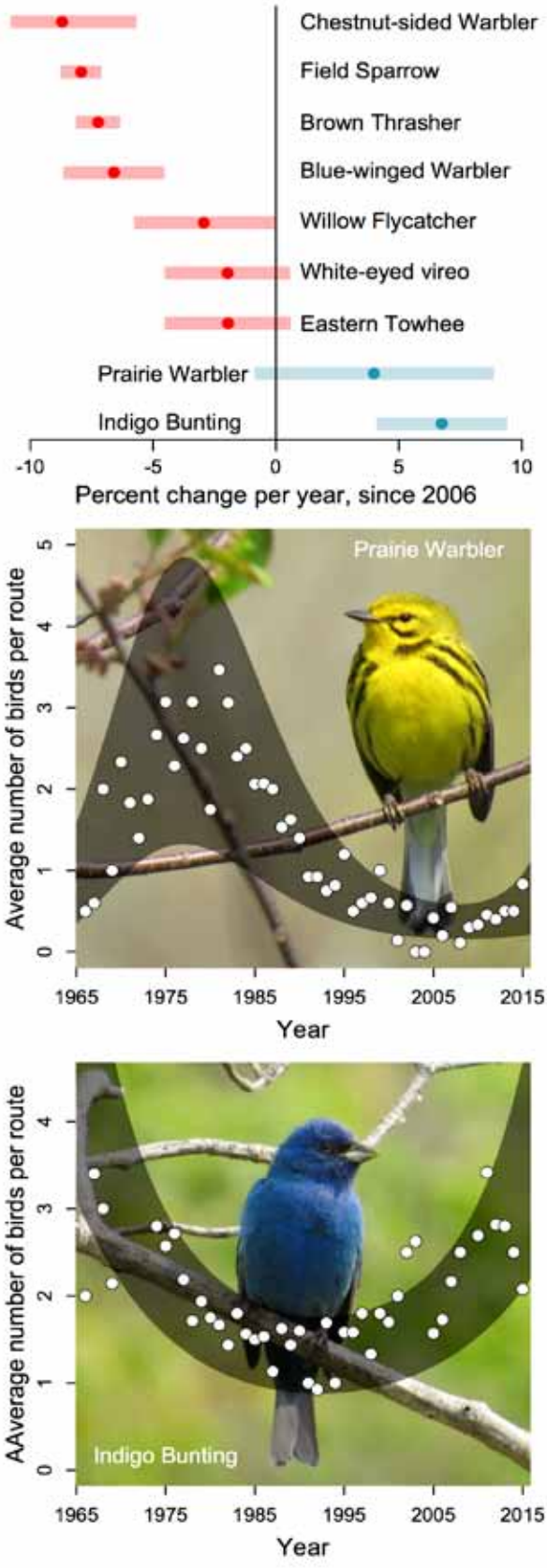
In 2006 one of us (Robert Askins) wrote an article in the first issue of Connecticut State of the Birds conceding that the conservation of birds restricted to thicket and scrub/shrub habitats would be a major challenge. The wildfires, beaver activity and seasonal flooding that originally sustained their habitats were no longer practical in a heavily populated state. Moreover, given the expense of active vegetation management and the problem of controlling invasive species in disturbed habitats, it seemed unlikely that enough land would be managed specifically for shrubland conservation to reverse the decline of early successional birds. Thickets and overgrown fields seldom inspire poems or paintings. The destruction of a patch of trees in the forest is often viewed as an environmental disaster regardless of whether it is caused by logging or a severe storm. In fact, creating early successional habitat by removing trees is resisted by some conservationists. Even with the future of attractive tropical migrants such as Blue-winged and Chestnut-sided Warblers at stake, conservation groups and agencies are unlikely to create and manage enough thicket to make a difference. Consequently, the 2006 article emphasized the role of economic activities such as logging and maintenance of utility corridors that result in early successional vegetation.

This situation changed dramatically soon after the article was published because the New England cottontail was listed as a candidate for protection under the Endangered Species Act. This rabbit, which is restricted to New England and adjacent New York, had declined steadily and steeply throughout its range, and only a few isolated populations survived, because they require the same type of low, woody, early successional vegetation as shrubland birds. Although they are difficult to distinguish from the closely related eastern cottontail, New England cottontails have distinctive behavior and ecology. While eastern cottontails are adapted to more open, grassy habitats and tend to freeze and rely on camouflage to escape predators, New England cottontails respond to predators in Br'er Rabbit fashion, diving into the nearest thicket, where they dash quickly away through the stems and thorns. These rabbits must have been an important component of the pre-agricultural forest landscape, browsing on the plants in forest openings and supporting predators such as bobcats.

As soon as the New England cottontail was listed as a candidate for protection, federal and state agencies began a concerted program to identify surviving populations where habitat could be enhanced or created. The goal was to create 27,000 acres of rabbit habitat in five focus areas in six states by 2030. These habitat creation efforts were so successful that by 2015 the New England cottontail was removed from the list of candidates for endangered or threatened status.

In Connecticut habitat for New England cottontails has been

Figure 2. Percent change per year of early successional forest birds (shrubland specialists) on Breeding Bird Survey routes in Connecticut between 2006 and 2015



Bird photographs courtesy of NIALL DOHERTY

created on both state and private land, especially in state forests and wildlife management areas, according to Lisa Wahle of the Wildlife Division of the state Department of Energy and Environmental Protection. In June 2016, 842 acres had been cleared of tall vegetation or were slated for clearing in the near future—not including areas where trees were removed primarily for timber harvesting. In addition, since 2012, 1,133 acres have been contracted for creation or enhancement of New England cottontail on private land (including conservation land) under a wildlife program sponsored by the U.S. Department of Agriculture. Another 223 acres were slated for cottontail habitat creation with funding from the Landowner Incentive Program with support from a grant from the U.S. Fish and Wildlife Service.

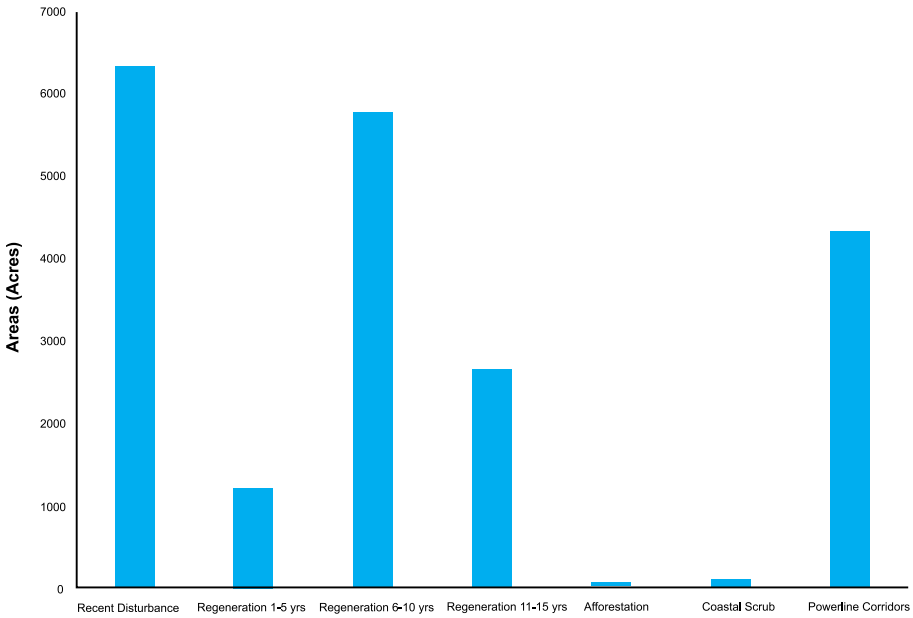


Figure 3. Total area of different types of upland early successional vegetation in Connecticut in 2011 (Rittenhouse, 2014). Only patches of vegetation ≥ 5 acres are included.

Although it is too early to know whether the work of the past 10 years has had a positive effect on early successional birds, preliminary evidence from Connecticut Breeding Bird Survey routes suggests that the populations of two species, Prairie Warbler and Indigo Bunting, may have increased (Figure 2). The uptick for Prairie Warbler is small and only time will tell whether it is part of a larger increasing trend. Indigo Buntings, in contrast, have increased steadily since the early 1990s (before habitat management for cottontails was widespread), almost recovering from declines in the 1960s, '70s, and '80s.

Early successional habitat in Connecticut and other northeastern states will increase substantially if the proposal for a Great Thicket National Wildlife Refuge is approved. The goal of the proposal is to generate up to 15,000 acres of early successional habitat in six states by purchasing acreage or conservation easements on private property, and by funding habitat enhancement on existing conservation land. The focus would be on 10 areas, two of them in Connecticut: Pachaug/Ledyard in New London County, and Northern Housatonic in Litchfield County and adjacent New York. The refuge would facilitate not only funding, but also collaborative efforts among private landowners, conservation organizations, and land-management agencies.

Regional conservation planning has been hampered by inadequate information about the extent and location of early successional habitat in Connecticut. Recently,

JULIAN HOUGH

Powerline corridors now provide the majority of shrubland habitat in Connecticut.

PAUL J. FUSCO

Habitat restoration projects for the New England Cottontail benefit decling shrubland birds.

JULIAN HOUGH

Large clear-cuts help create forest diversity by encouraging young forest growth.

however, Chad Rittenhouse of the University of Connecticut Wildlife and Fisheries Conservation Center used images from Landsat and aerial photographs to map the distribution of Connecticut's early successional habitats, classifying them as permanent, regeneration, or afforestation. Permanent shrub habitats show very slow change over time; they include palustrine (wetland) shrub habitats such as alder swamps, and powerline rights-of-way that are managed to maintain a stable shrub layer. Regeneration habitats are areas that are recovering from removal or major disruption of the forest canopy, so clearcuts would be in this category. But trees quickly grow back, and after 15 years these areas typically provide habitat for mature-forest birds rather than early successional species. In contrast, afforestation occurs on abandoned farmland that has not been covered with forest for decades or centuries, so forest grows back much more slowly.

Figure 3 shows the availability of the different types of early successional habitat in Connecticut in 2011. Afforestation in old fields was once a major source of habitat for shrubland birds but no longer contributes significantly. Most early successional habitat occurs in regeneration and powerline corridors, and most of the regeneration results from timber harvesting. Areas with recent disturbance do not support many shrubland birds, but these will become valuable habitat in a few years.

Powerline Corridors Result in a Diverse Shrub Community

Powerline corridors can potentially provide habitat for a high density and diversity of shrubland birds. This is often interpreted as a fortunate accident, but it actually results from a vegetation management technique developed by plant ecologists: selective removal of tall trees that interfere with powerlines, as well as removal of invasive introduced species. The result is a diverse shrub community that is usually dominated by native plant species.

First, however, the power companies must address potential problems caused when Eversource Energy modified its methods for managing powerline corridors in response to new regulatory guidelines for rapid restoration of power following storms, as Anthony Johnson, the manager of transmission vegetation management for Eversource, explained. Although vegetation management in the corridors has not changed, the access roads are being covered with gravel, and when new poles are installed, gravel pads are laid down to stabilize cranes for current and future pole replacement. This gravel reduces habitat for early successional species, especially plants and animals associated with more disturbed habitat along the original dirt roads. The resulting fragmentation of shrubland habitat is a particular concern for New England cottontails, because powerline corridors are the most effective "rabbit highways" connecting rabbit populations in isolated forest openings. Interruption of the continuity of early successional habitat may also affect shrubland birds, which will be more exposed to predators and have less usable habitat. In some key areas, however, Eversource Energy has worked with conservation organizations to restore vegetation over gravel pads. Storm protection measures have also made some powerline corridors wider, according to Anthony Johnson, of Eversource, thereby generating additional shrubland habitat that should benefit early successional species.

Most shrubland bird species have been on a declining trajectory that would lead to their disappearance from the state during the next decade or two, repeating the history of once-common grassland birds. But the effort to save New England cottontails is creating partnerships among non-profit conservation organizations and state and federal land management agencies that not only promise to save this distinctive New England mammal, but also to save an array of other early successional forest species, including birds.

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Grassland Conservation:
Sustained, Statewide Effort Needed to Save Rapidly Vanishing Habitat

Jenny Dickson
Supervising Wildlife Biologist
Connecticut Department of Energy and Environmental Protection

The bubbling call and black, white, and buffy feathers of a Bobolink readily bring to mind visions of old fields, pastures, and the rolling grasslands that have historically been a part of Connecticut's natural heritage. Glacial activity, river flood plains, and beaver activity created grasslands long before the agricultural boom of the 1800s expanded those habitats even further. Birds such as the Upland Sandpiper, Henslow's Sparrow, and Heath Hen thrived in farm fields, meadows, and coastal heathlands. Today, however, grasslands are one of our most rapidly disappearing habitats.

Grassland plant communities include a mix of grasses, forbs, herbs, and ferns, and less than 25 percent of each area is composed of scattered trees or shrubs. Such areas are commonly divided into two categories—warm season grasslands and cool season grasslands.

Warm season grasslands are dominated by native species such as little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardii*), and Indiangrass (*Sorghastrum nutans*). These grasses thrive on dry, sandy soils and flourish in the hot summer sun. Their clumping nature also makes them ideal for Upland Sandpiper and Grasshopper

Sparrow, which nest in the grass tussocks and forage in the open areas between clumps. This structure also provides shade and cover for eggs and young.

Examples of cool season grasslands are typical hayfields, old fields, or other managed grasslands. They often consist of naturalized European grasses that provide good livestock forage, grow in much denser patches, and prefer the well-drained soils of prime agricultural lands. These fields are often favored by species such as the Bobolink, which will readily use smaller fields and wetter edges than other grassland birds.

The primary threat to grasslands is habitat loss because of development or succession. Grasslands are often fragmented by roads and utility rights-of-way.

PAUL J. FUSCO (2)

The clear, plaintive whistle of the Eastern Meadowlark is now a rare sound on our grasslands.

Invasive and woody vegetation encroach. Pollution and illegal ATV use cause damage. With the elimination of natural processes such as flooding and fire, grasslands require active management. But insufficient or inappropriate management can decrease their productivity and value for wildlife.

80 Nesting Species

Grasslands were identified as a priority habitat in Connecticut's 2005 Wildlife Action Plan (known then as Connecticut's Comprehensive Wildlife Conservation Strategy). They provide essential breeding and nesting habitat for approximately 80 bird species, including Horned Larks, Northern Harriers, and Long-eared Owls. They also host numerous mammal, amphibian, reptile, and invertebrate species of conservation concern including smooth green snakes, blue-spotted salamanders, and bumblebees. The importance of conserving these critical natural resources led to the creation of the Grassland Habitat Initiative, the first statewide action implemented from the Wildlife Action Plan.

This 2006 initiative aimed to conserve both warm and cool season grassland habitats. The revised Wildlife Action Plan, completed in 2015, combined with a decade of carrying out conservation actions, provides the perfect opportunity to review our progress and to assess Connecticut's future grassland conservation needs.

The grassland initiative set the following goals:

- Identify the location and quality of existing or potential grasslands;
- Determine the minimum acreage necessary to maintain a diverse population of grassland birds statewide;
- Expand efforts to acquire or protect grasslands to help prevent future state or federal listings under the Endangered Species Act;
- Prioritize wildlife habitat in the Department of Energy and Environmental Protection's (DEEP) Open Space Acquisition Plan;
- Develop partnerships and enhance information available to state and local officials and private landowners; and,
- Participate in regional grassland conservation efforts.

A first step in conserving grasslands involved finding where the best habitats existed. Through a computer-based screening process, areas with ideal soil types, land cover, and size were identified for further investigation. Limiting the selected habitats to those of 50 acres or more helped ensure that the areas were big enough for Upland Sandpiper and Grasshopper Sparrow—the grassland birds that need the most acreage. Areas big enough

JULIAN HOUGH

Bobolinks are in serious decline because of loss of undisturbed grasslands.

PAUL J. FUSCO (2)

Northern Harriers are iconic grassland raptors.

for those species would also meet the needs of many other grassland birds. Researchers visited these areas from 2006 through 2008, conducted bird surveys, and evaluated the condition of the habitat and the suitability of the sites for grassland species conservation.

The initiative's Resource Review Subcommittee developed goals for grassland conservation statewide. Partners in Flight estimated that for much of New England and southern New York, between 24,000 and 37,000 acres of grassland would be needed to sustain regional populations of 250 pair of Upland Sandpipers, 800 pair of Grasshopper Sparrows, and 15,000 pair of Bobolinks. The subcommittee set an initial target for Connecticut of 800 acres of newly acquired or otherwise protected grassland, with a particular focus on the Connecticut River Valley. A key to achieving these targets involved maintaining and improving both public and private grasslands.

Upland Sandpipers are rare nesting species in Connecticut grasslands.

The Wildlife Habitat Incentives Program, established under the Farm Bill and administered by the Natural Resource Conservation Service, served as an extremely effective way to manage public

continued on page 20

▼ ***Saltmarsh Sparrow**: predicted to be extinct in 50 years*

▼ ***Clapper Rail**: population declining by 13% a year in Connecticut*

▼ ***Roseate Tern**: only 50 pair nesting in Connecticut*

▼ ***Seaside Sparrow**: population declining in Connecticut*

▼ ***Brown Thrasher**: population of this shrubland bird has been falling by 5% a year*

Saltmarsh Sparrow, Clapper Rail & Brown Thrasher (PHOTO BY PAUL J. FUSCO)

Roseate Tern & Seaside Sparrow (PHOTO BY JULIAN HOUGH)

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Overall, losses in t outweigh gains.

But if the trends c ultimate loss—the Saltmarsh Sparrow the first avian extir continental United Heath Hen in 1932

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THE CONNECTICUT Audubon SOCIETY

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per left, the birds ges represent a he species most at g the best.

▼ **Black Duck:** *declining in Connecticut because of habitat loss and hybridization*

▲ **Prairie Warbler:** *a slight uptick in population*

▲ **Indigo Bunting:** *populations have recovered since the 1990s*

▲ **Piping Plover:** *Still vulnerable despite recent success*

▲ **Wood Duck:** *population is increasing both in Connecticut and across the country*

Marsh habitat, Piping Plover, Indigo Bunting, Prairie Warbler & Black Duck (PHOTO BY JULIAN HOUGH)

Wood Duck (PHOTO BY PAUL J. FUSCO)

Grassland Conservation
continued from page 17

lands. Over a 14-year period, funding obtained through the program helped maintain 614 acres of cool season grasslands, 198 acres of warm season grassland, and roughly 485 acres of old field and coastal grasses on publicly owned lands. These efforts were impeded by the 2008 Farm Bill, which made all public lands ineligible for management funding. The NRCS continues to be an important partner in grassland conservation on private lands statewide by supporting warm-season grass plantings, pollinator habitat enhancements, delayed mowing, and rental payments for long-term easements under the federal Grassland Reserve Program. Connecticut's Landowner Incentive Program, another discontinued federal program, funded grassland restoration projects in Sherman, Coventry, and Norfolk. Grassland enhancement projects were completed on an additional 258 acres of state, corporate, municipal, and private properties through a variety of funding sources.

Under the Grassland Habitat Initiative, Connecticut has been fortunate to secure several large grasslands in conservation ownership or easement. Nearly 200 acres of grasslands and old-fields that are part of the Department of Corrections complex in Enfield and Somers were placed under conservation easement—protecting the land essentially forever— for grassland bird conservation. In 2008, Connecticut and Massachusetts joined forces to purchase 450 acres of grasslands in Suffield and Southwick. An additional 55 acres were added to the Suffield Wildlife Management Area, creating a block of over 500 acres managed for grassland birds and other wildlife. In Windsor, 133 acres along the Farmington River were acquired for grassland birds and invertebrates, to be managed as a Wildlife Management Area by the Department of Energy and Environmental Protection.

One unique site evaluated under the grasslands initiative, the 96-acre closed landfill in the North Meadows Area of Hartford, is now home to nesting Grasshopper Sparrows, Eastern Meadowlarks, Savannah Sparrows, and a non-typical grassland bird, the Bald Eagle. Plans are underway for further improvements to benefit larger numbers of grassland birds and native pollinators including monarch butterflies, and to provide viewing opportunities. The City of Hartford has enthusiastically embraced its winged residents and is working with Hartford Audubon and the DEEP to conserve this important grassland.

Connecticut's efforts have succeeded in conserving nearly 85 percent of the target of 800 acres

JULIAN HOUGH

Grassland conservation is a high priority for the Connecticut Department of Energy and Environmental Protection.

of grassland habitat and species. Hundreds of additional acres of public and private grasslands have been improved and managed with grassland species in mind. In addition, information on the importance of managing and establishing grasslands has been made more accessible to state, municipal, and private landowners through projects with the University of Connecticut and Cooperative Extension Education, via the Center for Land Use Education and Research (CLEAR) and Non-point Education for Municipal Officials (NEMO) websites.

As we carry out the new Wildlife Action Plan, it's important to recognize that the successes of the past decade were accompanied by new conservation challenges. Habitat loss, degradation, and fragmentation have caused many species, such as the Eastern Meadowlark and the Grasshopper Sparrow, to decline. Henslow's Sparrows have disappeared from the region and Vesper Sparrows have become rare. Funds to maintain and manage grasslands, both public and private, have disappeared, seriously jeopardizing the gains of the past decade.

To continue to meet these new challenges over the next decade, Connecticut needs to build upon our success. Grasslands remain a high conservation priority. A coordinated and sustained effort statewide is critical. Partnerships with federal, state, and local governmental agencies such as agriculture, economic and community development, and transportation, as well as with conservation organizations, academic institutions, corporations, private landowners, and the public, are necessary for successful stewardship into the future.

Working together will not only benefit butterflies, bumblebees, and the beautiful and bubbly bobolink, it will help us protect the beauty, charm, and unique natural resources that make Connecticut a special place to live and safeguard these natural treasures for future generations.

* * * * *

JULIAN HOUGH (3), JIM ZIPP (Henslow's Sparrow)

Open grassland provides essential habitat for many sparrow species.

Vulnerable Coastal Birds Waning

Patrick Comins
Director of Bird Conservation
Audubon Connecticut

JULIAN HOUGH

Conservation efforts have helped American Oystercatchers increase along our shoreline.

There have been profound changes in Connecticut's bird life over the past decade and perhaps nowhere is this truer than in our coastal environments. Only three Connecticut species were considered to be of global conservation concern when the inaugural *Connecticut State of the Birds* report was published. Today that number is nine and that is just considering our coastal birds. On a positive note, two of Connecticut's nesting coastal species seem to be doing better. For those, the improvement seems to be at least partly because of direct management by conservationists. The vulnerability of all these species, however, derives from the precarious nature of life on the coast.

Coastal environments and the birds that depend on them tend to be dynamic, adapting to shifting sands and food supplies and subject to the boom-and-bust lifestyle associated with such an ever-changing landscape. These birds are especially vulnerable to human disturbance and to pressures from predators that find nesting colonies and wreak havoc to the point where a colony may be abandoned. Rising sea levels inundate nests and make available habitat even smaller.

In 2006, at the time of the first *Connecticut State of the Birds* report, the annual Red List of vulnerable or near-threatened birds compiled by the International Union for the Conservation of Nature (the world's main authority on the conservation status of species) included two of Connecticut's coastal birds: Saltmarsh Sparrow and Piping Plover (plus Cerulean Warbler, a species found mostly inland). A decade later, an additional

PAUL J. FUSCO

PAUL J. FUSCO

Snowy Egrets nest on only a few undisturbed offshore islands in Long Island Sound.

nine of the state's regularly occurring coastal birds are on the Red List: Common Eider, Black Scoter, Long-tailed Duck, Horned Grebe, King Rail, Buff-breasted Sandpiper, Semipalmated Sandpiper, Red Knot, and Razorbill.

A number of Connecticut's coastal birds are also protected under the state Endangered Species Act: Roseate Tern and King Rail (both endangered); Seaside Sparrow, Great Egret, Snowy Egret, Piping Plover, American Oystercatcher, and Least Tern (all threatened); and Saltmarsh Sparrow, Little Blue Heron, Yellow-Crowned Night Heron, Glossy Ibis, Pied-billed Grebe, and Common Tern (all special concern). Roseate Tern is federally endangered and Piping Plover is federally threatened.

Perhaps the most significant change for Connecticut is the IUCN Red-Listing of Semipalmated Sandpiper as vulnerable. These small shorebirds have suffered massive global population declines, perhaps by more than 70 percent since the 1980s. Parts of the Connecticut coast are an important migratory stopover, providing places to rest and refuel for the long journeys to Central and South America. Recent studies using radio transmitters and other tracking devices show that many Semipalmated Sandpipers fly non-stop from the Northeast and Canada directly to their wintering areas, underscoring the important role our coast plays in the survival of this species. Connecticut-specific trends for Semipalmated Sandpipers are not particularly relevant, because numbers vary widely depending on migration weather patterns and breeding success. However, we know that Sandy Point in West Haven, Griswold Point in Old Lyme, Milford Point, and Stratford Point continue to harbor significant numbers of this species in migration.

Two other species new to the list have ramifications for Connecticut's conservation priorities. Long-tailed Duck is now listed as vulnerable and Horned Grebe as near-threatened. Connecticut hosts significant concentrations of both in migration and winter. We know that late winter congregations of Long-tailed Duck reach globally significant proportions off Long Beach in Stratford, around the Norwalk Islands, and possibly in other areas. There may also be globally significant concentrations of Horned Grebes along some areas of our coast, particularly in the nearshore waters off Sherwood Island State Park in Westport.

Two additional species are of interest because both are actually increasing in Connecticut while undergoing dramatic population declines nearly everywhere else. Razorbills, which breed in the coastal areas of the Arctic and sub-Arctic, were a surprise addition to the IUCN list in 2015, when they were listed as near threatened. They have been undergoing major population declines throughout their range, with some important colonies having virtually no nest-

ing success in recent years. At the same time, they have gone from being a rare vagrant to an annual occurrence in Connecticut's Long Island Sound. Possibly they are being seen more regularly in Connecticut because they are expanding their winter ranges to take advantage of different food supplies and perhaps because of recovering fish stocks in the Sound.

Common Eiders were also listed in 2015 because of major population declines, primarily in Europe where the bulk of their global population is based. They appear to be holding their own or increasing as a nesting species on New England shores and now have been documented as nesting just over the border in New York's Fisher's Island. They are becoming a regular feature along the shoreline in eastern Connecticut.

For all of those species Connecticut plays only a non-breeding role, although in some cases a very important one. But how are Connecticut's nesting coastal birds doing? Terns continue to be of concern. Least Terns are listed as threatened in the state, and in the first *Connecticut State of the Birds* report we had singled them out as one of our greatest conservation concerns in Connecticut. Numbers and breeding success continue to languish,

JULIAN HOUGH

Nesting pairs of Common Terns are on the increase in our coastal waters.

with nearly the same number of nesting pairs in 2015 (241) as in 2005 (247), but with fewer chicks fledged, 27 compared to 70. Disturbance, predation, tidal flooding, and perhaps lack of foraging opportunities continue to limit the success of Least Terns in Connecticut.

More than 90 percent of Connecticut's Common Terns nest on Falkner Island, off Guilford, and they appear to be doing well. There were just over 1,000 pairs in 2006 and today there are more than 3,000 pairs. Roseate Terns on the other hand appear to have declined slightly, from just over 50 to just under 50 pairs. But there are signs of hope in that productivity has reached one chick per pair in all but one year since 2007, as opposed to none of the years between 1996 and 2007. It's also worth noting that the largest tern colony in the Northeast is on Great Gull Island, off the tip of Long Island's North Fork; almost 11,000 pairs of Common and Roseate Terns nest there.

Continental and global populations of our nesting wading birds appear to be robust, with a few possible exceptions. Glossy Ibis

Semipalmated Sandpipers have dramatically declined since the 1980s.

PAUL J. FUSCO

PAUL J. FUSCO

Many of our coastal birds lay their eggs in sandy depressions on open beaches.

and Little Blue Heron are both of continental conservation concern, and Black-crowned Night-Heron may be declining overall but is still globally abundant. Great and Snowy Egrets are threatened in Connecticut because their nesting populations are concentrated on only a handful of offshore islands. Problems, such as disturbance or predation, with any one of these islands could cause a sudden crash in their local populations. The Connecticut Summer Bird Count is our best tool for tracking populations of these nesting birds, and while these data have significant limitations they appear to show that Snowy and Great Egrets and Black-crowned Night-Herons are all languishing at population levels well below those of the 1990s.

On a positive note, it appears that two of our coastal birds of conservation concern are doing well. American Oystercatchers had a record season for nesting success in 2015, producing more than one chick per pair for the first time since record-keeping began in 2011. This is likely to be the highest productivity in modern times, since American Oystercatchers returned to Connecticut as a nesting species only in the 1990s after having been extirpated in the 19th

JULIAN HOUGH

Long-tailed Ducks breed in the Arctic but many winter along the Connecticut coast.

PAUL J. FUSCO

Roseate Terns, a Federally Endangered Species, nest on Falkner Island off the Guilford coast.

century. Piping Plovers also had a record-breaking year for nesting success in 2014, with 51 nesting pairs and 116 chicks fledged, and a record number of nesting pairs in 2015, with 62 nesting pairs and 112 chicks fledged. Compare this with 2005 when 34 pairs produced 55 chicks.

This improvement has not come without a lot of effort from municipal, state, and federal agencies and non-governmental partners. The Audubon Alliance for Coastal Waterbirds invests tens of thousands of dollars each year, matched by grantors such as the National Fish and Wildlife Foundation, and hundreds of volunteers log thousands of hours in efforts to conserve these birds along the coast. The Audubon Alliance for Coastal Waterbirds is a partnership among Audubon Connecticut, the Connecticut Audubon Society, and the Roger Tory Peterson Institute of Natural History.

While things are looking up for Piping Plovers and American Oystercatchers, many challenges lie ahead. Those two species are doing so well because of the efforts of conservation organizations, municipalities, state and federal agencies, and volunteers, but the effort to garner financial resources and maintain excitement among volunteers continues to be an annual challenge. Additionally, as more and more people flock to our beautiful coastlines, conflicts between human use of the shoreline and the needs of our coastal birds are likely to grow. The problem with terns is even more vexing. We don't fully understand why particularly Least and Roseate Terns continue to struggle. Forage availability, for example, is a complex problem to understand, let alone rectify. Our migratory shorebirds such as Semipalmated Sandpiper and Red Knot, as well as our non-breeding species of global concern such as Horned

Grebe, Common Eider, and Long-tailed Duck, face a variety of challenges on their northern breeding grounds as well as on stopover areas and wintering areas, some of which are in South America. We will need to coordinate our conservation efforts, not only across flyways and the hemisphere but also here in Connecticut, in order to improve the prospects for these highly migratory species.

Perhaps the biggest challenge and the biggest unknown we face is climate change. Some species, such as Horned Grebe, appear to be struggling from its direct effects, such as changing temperature regimes. Others, such as Razorbills, must contend with diminished or changing food supplies, while others may be impacted by still unknown effects such as changing precipitation patterns. Perhaps the biggest threat to our coastal birds from climate change lies with rising sea levels, which will cause dramatic changes to our coastline in the coming century. In fact, we are feeling some effects now (see Chris S. Elphick's article about tidal marsh birds). As nesting areas erode into the Sound, will they be replaced by other areas as the sands shift, or will they simply vanish? Will our critical tidal marshes migrate landward, or can we protect them through other measures? Many such questions remain unanswered, but it is certain that in the coming decades our birds must either adapt to a vastly different coastline or they will fade away. Our biggest challenge is to better understand what changes are in store and to find innovative solutions to protect our coastal ecosystems and help our birds adapt to the changes ahead.

JULIAN HOUGH (2)

Hundreds of volunteers monitor and protect the beach-nesting Piping Plovers.

* * * * *

Lack of Good Surveys Hampers Understanding of Wetland Birds

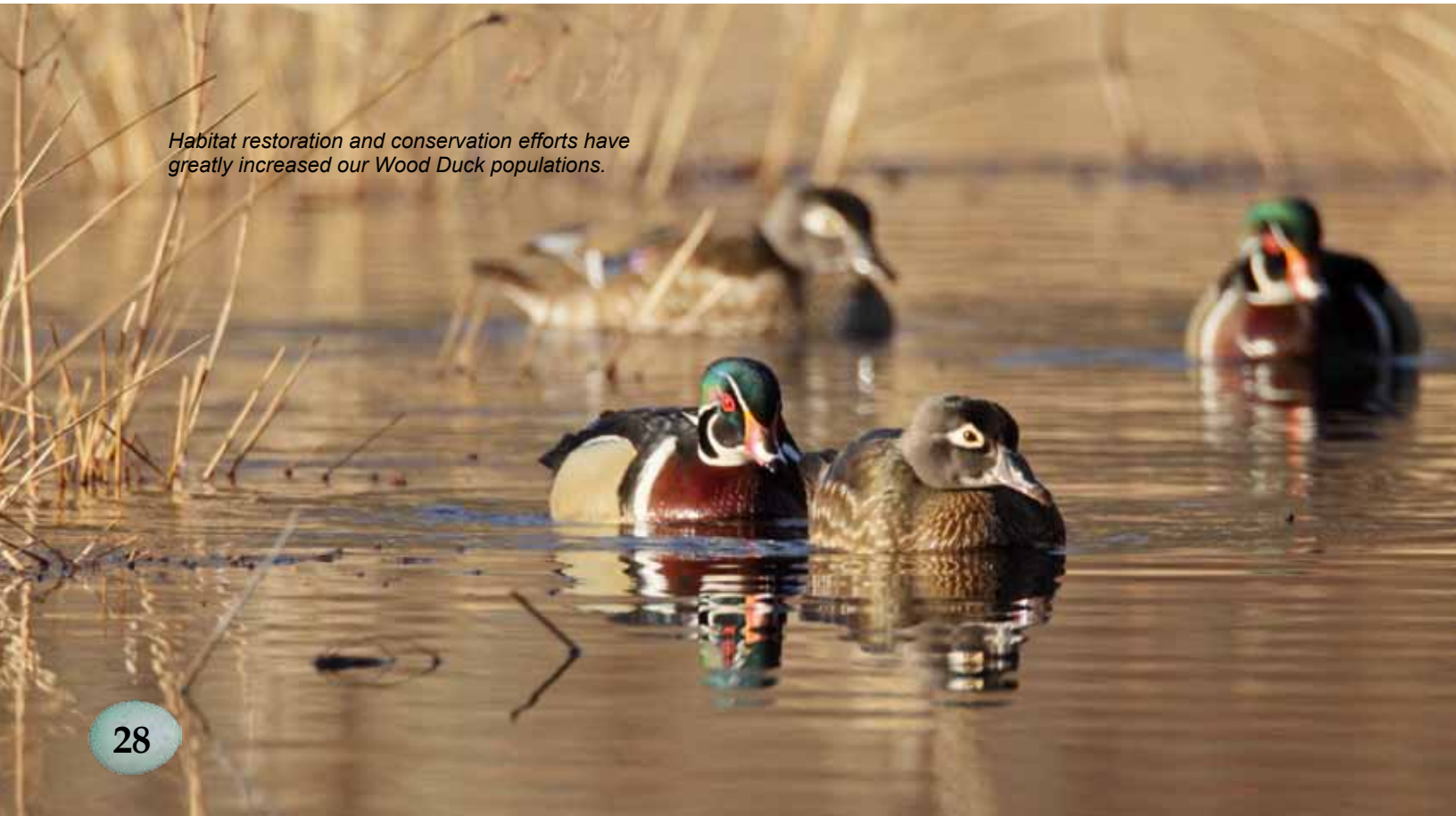
Min T. Huang
Wildlife Biologist
Connecticut Department of Energy and Environmental Protection

In the past decade there have been many changes, both good and bad, to the two dozen or so bird species that rely on Connecticut's wetlands. We annually survey breeding waterfowl in the state, and most waterfowl, with the exception of Black Duck, are doing better, with Wood Duck and Canada Goose at the top of this list. Many of our marsh birds, however, such as Green Heron and Red-winged Blackbird, seem to be declining. Other wetland species such as Clapper Rail, Pied-billed Grebe, and Sora are also in decline while some wetland-dependent songbirds, such as Marsh Wren and Willow Flycatcher, are increasing.

Overall, wetland birds are one of the few suites of avian species across the continent and in our state that are faring relatively well. By comparison, over 80 percent of our shrubland birds are declining, as are about 30 percent of our forest interior species. But many wetland species are seeing marked increases in population size. Over the past decade many of the long-legged waders that nest in our state have actually been holding their own or increasing. Great Blue Heron, for instance, is much more abundant now than 10 years ago.

Our knowledge and analysis of trends for many wetland species, however, is hampered by the lack of good standardized avian surveys, largely due to a paucity of funding. Hunted species are surveyed, but with limitations. A recent influx of federal grant money allowed for several years of coastal marsh surveying that indexed all marsh-nesting birds, with an emphasis on tidal marsh sparrows. So for the most part we can look only at trends, and sometimes only at a very coarse scale. We can, for instance, say with some certainty that we have between 28,000 and 40,000 breeding Mallards, but we can say of breeding Great Blue Herons only that over 10 years their numbers have increased.

Currently four yearly surveys are conducted in Connecticut. The CT DEEP conducts annual breeding waterfowl surveys and midwinter waterfowl surveys. The DEEP also conducts secretive water-



Habitat restoration and conservation efforts have greatly increased our Wood Duck populations.

bird breeding surveys in 10 representative marshes. These surveys indicate that the entire suite of these species is declining.

The North American Breeding Bird Survey (U.S. Geological Survey) is a large-scale, long-term monitoring program designed to track the status and trends of North American bird populations using roadside survey routes. In Connecticut, there are about 17 routes, each of 24.5 miles. The Survey's usefulness for tracking wetland species is limited, however, because few if any of these routes bisect large wetlands.

The Connecticut Ornithological Association's Summer Bird Count censuses breeding birds in Connecticut, largely using the National Audubon Society's Christmas Bird Count areas, 15-mile diameter circles generally determined by species diversity, not by habitat. Finally, there's the National Audubon Christmas Bird Count itself, a winter census. These counts are located in areas where birders expect to find the most species; therefore they don't adequately survey a cross-section of wetland habitats.

Wood Ducks Are on an Upward Trend

Despite these limitations, we know how many of the state's wetland birds are faring. About seven waterfowl species regularly nest in Connecticut, including Mute Swan and Canada Goose, and about another 20 migrate through the state. Over the past 10 years both the numbers and the distribution of these species have fluctuated. Breeding Black Duck and Mallard have declined slightly, while Canada Goose, Wood Duck, and Hooded Merganser have been on an upward trend. Migrant waterfowl populations are surveyed yearly by the DEEP Midwinter Waterfowl Survey. These (mostly coastal) results indicate that some of our wintering waterfowl may have increased, with Canada Goose, Atlantic Brant, Mallard, Black Duck, Long-tailed Duck, and scaup species showing the largest gains over the last five years and other species remaining about the same.

PAUL J. FUSCO

Marsh Wren populations are increasing in our wetlands.

PAUL J. FUSCO

JULIAN HOUGH

Great Blue Herons nest in inland wetlands away from human disturbance.

JULIAN HOUGH

The secretive Sora, among other marsh birds, is difficult to survey.

Wood Duck is showing a general population increase not only in Connecticut but across the U.S. This may be due, especially in Connecticut, to the increase in mature forest, which provides greater availability of natural nesting cavities, as well as a consistent nest box placement and repair program conducted by DEEP, private individuals, and non-profits.

The U.S. Fish and Wildlife Service reports that Mallard breeding populations in their core breeding areas, including western Canada and the prairie pothole districts of the upper Midwest, have increased slightly over the past two years, while the annual trend in Connecticut is declining.

PAUL J. FUSCO

The American Bittern is a Connecticut Endangered Species.

Resident Canada Goose populations continue to trend upward, and the migratory sub-species, which nest mainly from eastern Canada to Labrador, are slowly increasing. Conservation and management practices throughout their migration routes limit their availability to waterfowl hunting by adjusting the seasons and bag limits on resident birds to avoid the migratory species.

Black Duck is continuing its declining trend in Connecticut, according to ctbirdtrends.org, but the USGS North American Breeding Bird Survey indicates a slight population increase nationwide. Black Ducks face a number of challenges during their life cycle. Incremental habitat loss over the last 50 years throughout the Northeast and eastern Canada is likely the main factor, but hybridization with Mallards in Connecticut and elsewhere is also weakening Black Duck genetics. Agriculture and forestry practices have altered much of the Black Duck's original breeding habitat in the northeastern United States and eastern Canada. This alteration has allowed Mallards to expand their range eastward, leading to more interaction with Black Ducks and increasing opportunities for hybridization.

Although many of our waterfowl species are thriving, the North American Breeding Bird Survey tells us that some other wetland-dependent species, such as Sora, King, and Clapper Rail, American Bittern, and Pied-billed Grebe, are declining nationwide. King Rail, Common Moorhen, American Bittern, and Pied-billed Grebe are listed as Connecticut Endangered Species and Least Bittern is listed as Threatened. These species are a bit more specialized, requiring different wetland habitat types, ranging from short to tall vegetation. Keeping and restoring these microhabitats across Connecticut is a management challenge, and although we have made great strides in habitat protection and enhancement, there is still far to go.

Wetland destruction for development, although not completely eliminated, has slowed dramatically, with most towns strictly enforcing wetland laws. Restoration of both coastal and inland wetlands is at an all-time high as federal and state grants have become available.

Unfortunately, many of our wetlands are being degraded by invasive plants and impacts of development, which reduce the natural buffer zones necessary for the undisturbed nesting of species such as herons and egrets. Although we have made progress against some inva-

sive species (Phragmites), we have been largely unable to remove significant numbers of others. In fact, many more have surfaced and taken hold (Fanwort, Water Chestnut, etc.). Exotic species often affect our wetland-dependent avian fauna by outcompeting native species, changing food availability, or reducing overall vegetation diversity. Climate change, pollution, changing land use patterns, and increasing development are also affecting our fragile wetland ecosystems.

Stemming the decline of avian species requires substantial effort and coordination. As we mark the centennial of the Migratory Bird Treaty between Great Britain and the United States, we need to highlight the importance of partnerships across international borders. Birds require different and ample habitats and resources throughout their annual cycle (breeding, migration, wintering). If habitat quantity or quality on the breeding grounds isn't sufficient, for example, populations may decline even though habitat conditions on migratory stopovers and wintering areas are great.

The Migratory Bird Treaty Act of 1918 recognized this problem of declining habitats and populations, and conservation actions over the past century have been predicated on it. The Flyway system that was born in the 1950s, the joint ventures begun in the 1980s through the North American Waterfowl Management Plan, and now the regionalization of the individual State Wildlife Action Plans—all of these have fostered partnerships resulting in unprecedented conservation achievements across the continent. But there is so much more we need to do.

One of the greatest challenges is the continued paucity of financial resources. The old adage "habitat is the key to wildlife" is timeless and apropos. Wetland protection and restoration in Connecticut are conducted mostly through federal grant money and state grants to partners such as land trusts and municipalities. Other wetland work is conducted through non-profits such as The Nature Conservancy. As budgets shrink, the "luxury" of conservation becomes less and less appealing to legislators.

In Connecticut, we have been relatively fortunate, protecting and restoring over 3,989 acres of wetlands and associated upland buffers. This includes several North American Wetlands Conservation Act (NAWCA) grants that have totaled over $1.3 million and an additional $4.3 million in leveraged money, resulting in over 1,200 acres protected and restored. NAWCA has been a very good source of wetland money for the state, with four successful grants being supplied to the DEEP and another two to our collective conservation partners.

The total acreage of some wetland types—freshwater emergent marsh and open-water ponds, for example—has increased. Wetland birds have directly

Connecticut Migratory Bird and Conservation Stamp sales have leveraged over $4 million resulting in 3,545 acres of restored Connecticut wetlands.

JULIAN HOUGH

Small ponds and marshes with thick vegetation are the habitat of the Pied-billed Grebe.

benefited from the Connecticut Migratory Bird Conservation Stamp program, modeled after the popular and successful Federal Duck Stamps. The sale of these stamps has generated over $1.5 million in Connecticut, which has been used to leverage over $4.7 million in conservation dollars and the protection of more than 3,545 acres of wetlands, mostly on state-owned Wildlife Management Areas. Projects have been conducted at over 50 sites. One acquisition, a chunk of the Wangunk Meadows Wildlife Management Area in Portland, helped protect one of the largest heron rookeries in the state. Connecticut Duck Stamps were often the only source of money for these projects.

While all of this is indeed good news, it doesn't compensate for the loss of significant acreage in critical forested wetlands, scrub-shrub wetlands, and tidal and brackish marshes. And the gains don't take into account habitat quality. Most open-water ponds, for example, don't provide meaningful habi-

PAUL J. FUSCO

Cattail marshes are important wetland habitats for a variety of species.

tat. Thus, we are likely looking at a net loss in habitat that birds actually need.

Nationwide, the trends might be even worse. Over the past decade, wetland loss has accelerated by 140percent. Much of this has occurred in the Midwest in the prairie pothole region. The other major loss of wetlands has been due to salt water intrusion and conversion of salt marsh to open water and mud flats as the sea level has risen.

Although habitat protection is key, managing existing habitat is also critical for sustaining bird populations. Whether it be inland or on the coast, habitat restoration is one tool that does have a positive effect on populations. As an example, in 1999 at East River Wildlife Management Area in Guilford over 150 acres of saltmarsh were restored by plugging ditches, creating open-water ponds, and allowing full tidal flow in and out of the marsh. Prior to these management efforts, this marsh received negligible use by waterfowl and other birds. Systematic surveys conducted by the Wildlife Division have documented significant increases in use of the restored area by all types of birds, with the most dramatic increase being in numbers of waterfowl and shorebirds. Surveys conducted three years and then again six years after the project was completed indicated that the number of waterfowl and shorebirds using the restored sites was 18 times greater than on unrestored areas nearby. Wading bird use of the area increased immensely and was almost exclusively within areas that were restored, since restoration increases food availability. Habitat management has also resulted in greater use by targeted species. Many of the inland marshes where we have conducted water level and vegetation management (e.g., Charter, McQuade, and Ross marshes) have seen marked increases in marsh bird and waterfowl usage during the breeding season.

Over the past decade we have made great strides toward our conservation goals for various wetland bird populations. But clearly all these efforts aren't enough. Loss and degradation across the habitats our wetland birds need are far outpacing conservation efforts. We cannot continue to rely upon outside grant funding and shrinking state money if we are to secure a truly stable future for our cherished wetland birds. We must find new sources of funds. Whether these come from a tax similar to the Pittman-Robertson Act, which provides money through the sale of sporting firearms and ammunition, from a re-apportionment of existing funds (e.g., offshore drilling money), or from some other novel approach, in the absence dedicated funding we will continue to watch our wetlands and the birds that inhabit them disappear.

More importantly, we need to better influence policy decisions that affect our wetlands. Changes in the language of influential legislation such as the Farm Bill or the Clean Water Act can have huge im-

pacts on natural ecosystems and associated fauna.

Relative to most other suites of birds, the state of our wetland birds is not bad. That doesn't say much, however, because the majority of all bird species are in decline. In fact 37 percent of all species are of greatest conservation need and in need of immediate action. We have made great progress in keeping many of our wetland birds abundant. As we move into the future we need to do a better job of working together towards common goals. Our current efforts can't be merely matched. They need to be increased, because the pressures on our birds continue to mount.

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PAUL J. FUSCO (2)

Black Ducks, once one of our most abundant waterfowl species, are in decline throughout their range.

Ponds and rivers with emergent plants provide food and cover to a diversity of water birds.

JULIAN HOUGH

About The Authors

ROBERT ASKINS

ROBERT ASKINS is Katharine Blunt Professor of Biology at Connecticut College, where he teaches courses in 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 in both their northern breeding areas and tropical wintering areas. He also has studied Blue-winged Warblers, Prairie Warblers, and other species that are restricted to early successional habitats. He has published scientific papers in numerous journals including *Current Ornithology*, *Studies in Avian Biology*, *Wilson Bulletin*, and *Conservation Biology*. In 2000 he published *Restoring North America's Birds* (Yale University Press), a book on the ecology and conservation of North American birds. He also published a book on ecology and conservation of northern deciduous forests (*Saving the World's Deciduous Forests*, Yale University Press, 2014).

MILAN G. BULL

MILAN G. BULL is senior director of science and conservation for the Connecticut Audubon Society and is a long-time expedition leader to destinations throughout the Americas, and to Australia, Antarctica, and Africa. He has a B.S. degree in wildlife management from the University of Connecticut and a M.S. degree in biology from the University of Bridgeport. He currently is a member of the Citizens Advisory Council to Connecticut's Department of Energy and Environmental Protection, and was a founding director and past president of the Connecticut Ornithological Association. He has also published numerous articles and speaks statewide on topics relating to ornithology and the environment. Milan and his wife, Cathy, reside in Fairfield.

PATRICK COMINS

PATRICK COMINS is a graduate of Trinity College in Hartford, and has worked in the bird conservation field for 20 years. He began his career with the Connecticut Audubon Society undertaking bird surveys at the McKinney National Wildlife Refuge, then as biological technician for the U.S. Fish and Wildlife Service at the McKinney NWR. Patrick is with Audubon Connecticut as the director of bird conservation and is a past president of the Connecticut Ornithological Association. He has written several articles on bird conservation and identification for *The Connecticut Warbler*. As a member of the Connecticut Forestlands Council he serves as liaison to the Forest Ecosystem Health Committee of the Council. He is the Northeastern representative to Partners In Flight for the National Audubon Society.

JENNY DICKSON

JENNY DICKSON is Supervising Wildlife Biologist employed by the Connecticut Department of Energy and Environmental Protection. As leader of the DEEP's Wildlife Diversity Program (WDP), she specializes in songbirds, inland and freshwater wetland birds, and small mammals, including bats. She received a Bachelor of Science degree in Natural Resource Conservation with a specialty in wildlife from the University of Connecticut and a Master of Science degree in Wildlife Management from West Virginia University. Jenny has also worked as a research biologist for the federal Environmental Protection Agency on songbird toxicology and as a naturalist at the Kellogg Environmental Center in Derby, Connecticut. She has served as Vice-Chair of the Northeast Partners in Flight Working Group, president of the New England Chapter of The Wildlife Society, and is on the executive committee of the Northeast Bat Working Group.

CHRIS ELPHICK is an assistant professor at the University of Connecticut. He earned his Ph.D from the University of Nevada for his work on the conservation benefits of managing California's rice fields for wetland birds. His work continues to focus on the conservation ecology of birds, especially in wetland and agricultural settings. Recently, he has worked on the population dynamics and management of endangered waterbirds, and on the ecology and conservation of saltmarsh nesting birds. His work on Saltmarsh Sparrows earned him a 2004 National Investigators Award by Partners in Flight for contributions toward bird conservation. With over 20 years of field experience, his research has been published in peer-reviewed conservation journals including *Biological Conservation*, *Journal of Applied Ecology, and Ibis*. He was one of the co-editors of the *Sibley Guide to Bird Life & Behavior* and writes for the nationally syndicated newspaper column "Sibley on Birds."

CHRIS FIELD is a postdoctoral researcher in the Ecology and Evolutionary Biology department at the University of Connecticut, where he received his Ph.D. in 2016. He has researched bird song, the transmission dynamics of zoonotic diseases, and the demography of early-successional forest birds. His current research focuses on tidal marsh ecology and conservation, with an emphasis on predicting the fate of bird populations and habitat in the face of sea-level rise. In addition to research, he previously worked for Audubon Connecticut, where he coordinated Connecticut's Important Bird Areas Program. He is currently working as part of the Saltmarsh Habitat and Avian Research Program (SHARP; *www.tidalmarshbirds.org*).

MIN HUANG is a wildlife biologist for the Connecticut Department of Energy and Environmental Protection and heads the Migratory Bird Program for the State. Min received a B.S. in natural resource conservation and a B.A. in English from the University of Connecticut and received his M.S. in wildlife management from Frostburg State University. He received his Ph.D. from the University of Connecticut, researching sub-population structure and survival of resident Canada Geese. He has worked as a wildlife biologist for the Florida Fish and Wildlife Conservation Commission, where he managed a wildlife management area, working primarily with deer and various endangered species such as the Florida Grasshopper Sparrow, Red-cockaded Woodpecker, Florida Scrub Jay, and Whooping Crane. He also spent five years working for the Washington Department of Fish and Wildlife as a district biologist, where he primarily worked with ungulates and endangered species such as the Spotted Owl and Marbled Murrelet.

CHRIS ELPHICK

CHRIS FIELD

MIN HUANG

CONNECTICUT AUDUBON SOCIETY

The Connecticut Audubon Society conserves Connecticut's environment through science-based education and advocacy focused on the state's bird populations and habitats. Founded in 1898, the society has centers in Fairfield, Milford, Glastonbury, Pomfret, and Old Lyme, a museum in Fairfield, and an EcoTravel office in Essex. It also manages 19 wildlife sanctuaries, preserves over 2,600 acres of open space, and educates over 200,000 children and adults annually. Working exclusively in Connecticut, the society is the state's original and still independent Audubon.

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Centers

HEADQUARTERS
314 Unquowa Road, Fairfield, CT 06824
203-259-0416

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Interim Director: Michelle Eckman

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218 Day Road
Pomfret Center, CT 06259
860-928-4948
Director: Sarah Heminway

BIRDCRAFT MUSEUM
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203-259-0416
Director: Nelson North

TRAIL WOOD
93 Kenyon Road, Hampton, CT 06247
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Director: Sarah Heminway

ROGER TORY PETERSON ESTUARY CENTER
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Director: Eleanor Robinson

ECOTRAVEL
30 Plains Rd., PO Box 903, Essex, CT 06426
860-767-0660 800-996-8747
Director: Andrew Griswold

Connecticut Audubon Society's Wildlife Sanctuaries

Connecticut Audubon Society (CAS) manages 19 wildlife sanctuaries and nature preserves around the state, comprising over 2,600 acres of important wildlife habitat. Most sanctuaries are open daily from dawn to dusk.

THE CONNECTICUT Audubon SOCIETY

1 Grace Robinson Nature Sanctuary (37 acres) Lords Highway, Weston FOR; IW

2 H. Smith Richardson Wildlife Preserve and Christmas Tree Farm (74 acres), Sasco Creek Road, Westport SH; IW

3 Birdcraft Sanctuary (6 acres) adjoining CAS Birdcraft Museum, 314 Unquowa Road, Fairfield FOR; SH; IW

4 Roy and Margot Larsen Wildlife Sanctuary (155 acres) adjoining CAS Center at Fairfield FOR; IW; SH

5 Elsa Feiler Denburg Woodland Conservation Area (10 acres), adjoining CAS Center at Fairfield FOR; IW

6 Banks South Farm (60 acres), Fairfield FOR; SH; IW

7 John W. Field Sanctuary & John Mahoney Sanctuary (14 acres), Fairfield FOR; IW

8 *Hayes Meadow Tidal Marsh (0.5 acres) & ***N.B. Sargent Sanctuary** (0.5 acres), Fairfield TM

9 Edward Steichen Memorial Wildlife Preserve (54 acres), Redding FOR; IW

10 Smith-Hubbell Wildlife Refuge and Bird Sanctuary (8 acres) adjoining CAS Coastal Center, Milford TM; CO

11 Jane and George Pratt Valley Preserve (150 acres), Bridgewater and New Milford FOR; IW; SH

12 Richard G. Croft Memorial Preserve (700 acres), Goshen FOR; IW

13 *Cromwell Meadows (79 acres), Middletown IW

14 *Haddam Wildflower Gorge (4 acres) adjoining Hurd State Park, Haddam FOR; IW

15 Harlo N. Haagenson Preserve (65 acres), East Haddam FOR; IW; SH

16 Morgan R. Chaney Sanctuary (233 acres), Montville FOR; IW; SH

17 Trail Wood—the Edwin Way Teale Memorial Sanctuary (168 acres), adjoining CAS at Trail Wood, Hampton FOR; IW; SH

18 Bafflin Sanctuary at Pomfret Farms (670 acres), near CAS Center at Pomfret GR; FOR; IW; SH

19 Wilcox Preserve (0.7 acres), Stonington CO

Bird Habitats Found in Connecticut Audubon Society Sanctuaries: FOR = Forest; GR = Grassland; SH = Shrubland; CO = Coastal; IW = Inland Wetlands; TM = Tidal Marshes.

Connecticut Audubon Society's Nature Centers and Offices

A Center at Fairfield.
2325 Burr Street, Fairfield, CT 06824. Tel. 203-259 6305

B Birdcraft Museum and Sanctuary.
314 Unquowa Road, Fairfield, CT 06824. Tel. 203-259 0416

C Coastal Center at Milford Point.
1 Milford Point Road, Milford, CT 06460. Tel. 203-878 7440

D Center at Glastonbury.
1361 Main Street, Glastonbury, CT 06033. Tel. 860-633 8402

E EcoTravel.
30 Plains Road, PO Box 903, Essex, CT 06426. Tel. 860-767 0660 / 800-996 8747

F Center at Pomfret.
218 Day Road, Pomfret Center, CT 06259. Tel. 860-928 4948

G Trail Wood, The Edwin Way Teale Memorial Sanctuary.
93 Kenyon Road, Hampton, CT 06247. Tel. 860-928 4948

H Roger Tory Peterson® Estuary Center.
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3 & 4 *have Wheelchair-accessible nature trails.*

** Indicates sanctuaries with limited public access.*

For more details or directions, please visit www.ctaudubon.org

THE CONNECTICUT
Audubon
SOCIETY

314 Unquowa Road, Fairfield, CT 06824