THE STATE OF NEW HAMPSHIRE'S BIRDS

A CONSERVATION GUIDE

A report on the status of New Hampshire's birds, the challenges they face, and the actions we can take to help them.

NH AUDUBON

The State of New Hampshire's Birds – A Conservation Guide

Written by
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NH AUDUBON

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LEN MEDLOCK

Above: Blackburnian Warbler.

A Bird Population Primer

Why Pay Attention to Birds?

We can see wild birds virtually everywhere in New Hampshire. They are a familiar, highly visible part of our urban, suburban, rural, and wilderness landscapes. They are also an integral part of our ecosystem. Birds can tell us about our environment, and what the birds are telling us may be important, not only to their survival but to ours. How New Hampshire's birds are faring reflects on our stewardship of the earth and our impacts on it, both positive and negative.

More specifically, birds offer us potentially life-saving information about the environment we share with them. We learned, for example, from canaries in coal mines when deadly gases were life-threatening and from thin shelled eagles' eggs the extent to which DDT permeated our environment. Birds help keep insect populations under control, safeguarding agricultural crops and forests, and even us. The habitats birds rely on – forests, wetlands, lakes, and fields – provide us essential services by filtering pollutants, helping to control climate change, containing flood waters, providing water supplies, food, and wood products. Plus, people like birds. We like protecting them, watching them, feeding them, hearing them, and we anticipate their return in the spring and their fall exodus. For many of us, birds bring joy. And for many people, the fate of birds and other life forms on earth is a responsibility that we humans are uniquely qualified to assume.

In 2010, New Hampshire Audubon and the New Hampshire Fish and Game Department issued a technical report, *The State of New Hampshire's Birds*. That document looked at population trends for the 186 species known to breed in New Hampshire. It reviewed what we know about the reasons behind those trends and recommended conservation actions to limit population declines. This publication, *The State of New Hampshire's Birds – A Conservation Guide*, presents the results of that report in a less technical, easy to understand format to broaden the audience.

LEN MEDLOCK

Cape May Warbler.

Some Bird Basics

Bird Populations Fluctuate

Bird populations are constantly changing, with natural upward and downward swings. An extraordinarily wet spring may result in more baby birds dying of starvation or other weather-related causes. An unusual abundance of caterpillars will benefit the birds that eat them. A year of high maple and beech seed production provides rich food supplies for chipmunks and squirrels, swelling rodent populations. This provides food for hawks and owls but the following spring, rodents seek food themselves, including the eggs of birds. Weather, food supplies, and predator populations on the breeding grounds can – and regularly do – affect wild bird numbers.

As distinguished from these short term natural fluctuations, population *trends* reflect more general increases or decreases in populations over time. The longer time periods captured in trends tend to minimize yearly ups and downs and focus on the bigger picture. Thus a decreasing population over the long term is of concern, since it is less likely to be part of a normal pattern, and more likely to be a threat to that species.

Migrating Birds Face Additional Challenges

Among our breeding species, about 15 percent are year-round **residents**, including most owls and woodpeckers, crows, ravens, grouse, Wild Turkey, Northern Cardinal, and both Boreal and Black-capped chickadees. All others usually migrate south for the winter. **Short-distance migrants** like Eastern Phoebe, Hermit Thrush, Yellow-rumped Warbler, and Chipping Sparrow travel a relatively short distance to winter grounds, typically in the southern United States. **Long-distance migrants** like Wood Thrush, American Redstart, Scarlet Tanager, and Baltimore Oriole make amazing flights each fall to Central and South America or the Caribbean and return again in the spring.

The annual migration adds to an already complex mix of factors that influence population size. Migrating birds are highly vulnerable. Severe weather and collisions with man-made structures are often fatal. Habitat loss or food shortages along a migration route threaten survival. Once on their wintering grounds, birds need habitat where they can find food and shelter all winter in order to survive. Studies of migratory birds have shown that roughly half the individuals that migrate south survive to make it back to nesting sites; the other half succumb to various threats during migration or on their wintering grounds.

For birds that migrate, conditions on the breeding grounds tell only part of their story. Fortunately, widespread interest in the status of birds has sparked many regional and continental bird conservation initiatives that provide a way for sharing research, monitoring, and management data. The first national trends assessment, *The State of the Birds, United States of America,* was published in 2009 by the U.S. Fish & Wildlife Service. Efforts such as Partners in Flight (www.partnersinflight.org) are striving to connect conservation efforts across international boundaries to capture the entire ranges of migrating birds.

Habitat Changes Benefit Some Birds at the Expense of Others

Nothing in nature is static. Trees grow into abandoned fields. Beavers build dams that flood forests, creating wetlands. One habitat type succeeds another. Introduce people into the mix, and the picture changes even more dramatically. As a habitat changes, the mix of bird species occupying it also changes. Good habitat for one species isn't necessarily good for another. Here in New Hampshire, finding an appropriate balance between fields, shrublands, and forests will mean managing for certain habitats without compromising others.

MIGRATING AND WINTERING BIRDS IN OUR STATE

While this study focuses on species that breed in New Hampshire, it is important to recognize that New Hampshire is also habitat for migrating birds. Each year hundreds of thousands if not millions of birds representing more than 200 species pass through New Hampshire en route to or from breeding grounds farther north. Sandpipers, plovers, and other shorebirds stop to feed in New Hampshire's coastal marshes each fall, and migratory ducks and geese follow the Merrimack and Connecticut rivers north each spring.

New Hampshire is also a winter destination for birds that breed farther to the north. Species such as the Common Redpoll and Pine Siskin are familiar visitors to backyard bird feeders – common in some years but absent in others. And our coastal waters host northern species such as the arctic-nesting Long-tailed Duck.

Efforts we in New Hampshire take to protect our nesting birds will also help migrating and wintering birds in our state. Other efforts, such as the Important Birds Areas program, also help identify important migration habitat and conservation strategies.

LEN MEDLOCK

Long-tailed Duck.

NEW HAMPSHIRE'S SPECIAL RESPONSIBILITY

With so much forest in New Hampshire, our forest-breeding birds are usually considered common, so why should we be concerned about them? New Hampshire is in the heart of a large forested landscape extending from New York and western Massachusetts to the Maritime Provinces of Canada. Here is found some of the best quality breeding habitat for forest songbirds. New Hampshire's unfragmented forests provide "source" habitats that foster more young birds than small fragments of forested habitat. These birds in turn can disperse into other, less ideal habitat throughout their ranges. Without New Hampshire's forests, certain forest-dependent species may disappear from backyards in other states, not just in ours.

In addition, many of our common forest species are "responsibility species," meaning that their populations reach high densities in New Hampshire, even though the state is a small portion of their range. The most striking example of this is the Bicknell's Thrush – an estimated 30 percent of the world's population of Bicknell's Thrush breeds in New Hampshire's high elevation forests. For other forest species, such as the Black-throated Blue Warbler, New Hampshire's proportion of the world's population is higher than our geographic proportion of the species' range. If we fail to protect our forests, populations of such species could suffer, not just in New Hampshire but beyond our boundaries.

MARK SUOMALA

Black-throated Blue Warbler.

PAMELA HUNT

New Hampshire's Forests Provide Significant "Source" Habitat

Approximately 80 percent of our state is forested, and these forests support about half of our breeding bird species, providing a relatively safe, productive environment for raising young. Yet not all forests offer equally good habitat. From the perspective of supporting and sustaining wild forest birds, many of our forests are already compromised. Roads, houses, office complexes, athletic fields, and other alterations eliminate the forest's uninterrupted cover, creating smaller patches of forest. Such forest fragmentation can in turn affect the availability of food, access to shelter, and freedom from predators and parasites, such as cowbirds. Birds breeding in these small forest fragments are often less successful and produce fewer young. Many birds will persist, but ultimately, their populations will not be self sustaining – and one day we will notice a favorite forest bird has disappeared from our backyard.

Conversely, larger, unfragmented forests provide "source" habitat where birds can produce enough young to populate smaller forests, not only in New Hampshire but also in states where forest habitats are less intact (see sidebar). Keeping large forest blocks intact and free of roads and houses is key to keeping New Hampshire's common forest species common and abundant.

Knowledge Is Power

Birds respond to environmental change. Sometimes the changes are obvious – roads and buildings, for example, in what were once forests or fields. Many other changes, however, are much more subtle, like a shift in the timing of insect hatches due to climate change, or the leaching of calcium from the environment as a result of acid rain. Both these changes, and others like them, can profoundly impact bird survival and reproduction.

If we know there is a problem, we understand its source, and we invest the necessary resources, we can bring imperiled birds back. The recovery of Bald Eagles, Peregrine Falcons, and Osprey after DDT and other harmful pesticides were banned in the United States is among the most familiar bird conservation success stories. Intensive predator control actions initiated in 1997 at Seavey and White islands in the Isles of Shoals have restored Common Terns to the Isles, from which they had disappeared. Today, this colony is once again one of the most significant tern colonies in the Gulf of Maine.

If we don't know there is a problem, or we ignore the trends, or we fail to get to the root of the problem, we are powerless to do anything about it. This publication summarizes what we do know as described in the longer, more technical analysis presented in *The State of New Hampshire's Birds*, available at www.wildnh.com/birds. For more information on what you can do to help New Hampshire's birds, see page 28.

LEN MEDLOCK

Above: Barn Swallow.

How Are Our Birds Doing?

Overview of Current Trends

Roughly 300 species occur regularly in New Hampshire, of which 186 breed here. Each breeding species was assigned a trend category based on Breeding Bird Survey and other data, both from New Hampshire and across the Northeast as a whole, over the past 40 years.

There are five trend categories in the *State of the Birds* report:

1. **Increasing:** populations show persistent increases both in New Hampshire and regionally
2. **Stable:** populations show no significant increases or decreases
3. **Declining:** populations show persistent declines both in New Hampshire and regionally
4. **Uncertain:** population trends for New Hampshire are different from those across the region (e.g., decline in New Hampshire and increase across southern New England)
5. **Unknown:** there are too few data to determine a trend.

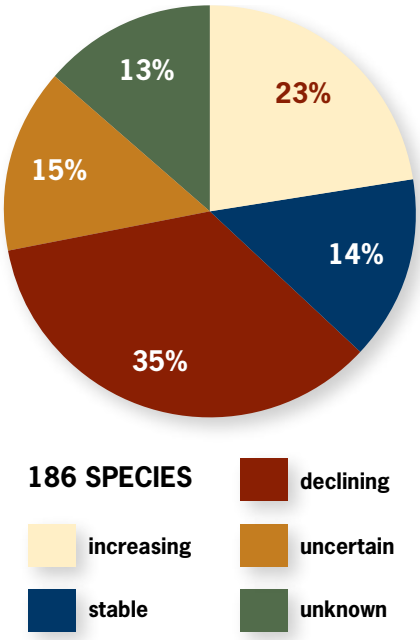


Figure 1. Proportion of New Hampshire's breeding bird species in each of five trend categories.

FOR OUR BREEDING BIRD SPECIES, THE DATA SHOW:

- **69 (37%)** species have **increasing or stable** populations
- **65 (35%)** species are in **decline**
- **52 (28%)** species have **uncertain or unknown** population trends. Most species in this category inhabit wetlands, offshore islands, northern forests, and other hard-to-survey habitats.

Trends by Habitat

To better understand these trends and the reasons behind them, species were grouped according to their breeding habitats, which are key to reproductive success (Figure 2). The data suggest two key breeding habitat issues.

1. **Significant declines have occurred among species dependent on shrubland and grassland habitats.** As New Hampshire's economy has shifted away from rural agricultural, the associated field and farmland habitats are disappearing. Today, these formerly common habitats often occur only when landowners consciously create and manage their land specifically for wildlife dependent on early successional and grassland habitats.

2. **Significant declines have occurred among forest-dependent species.** Key elements of these declines include changing forest management practices and the conversion of forest land to other uses. As suggested earlier, even a change that seems innocuous can affect breeding bird habitat, like a road through a forest that consumes only a fraction of the forest but in effect creates two forests where before there was only one uninterrupted tract. The impact is exacerbated when road-related activity follows, such as motorized vehicles, recreation, and development.

For further analysis, the five original categories were condensed into three categories, as follows:

1. **STABLE OR INCREASING:** These species do not appear to be in trouble, although it is important to continue monitoring their populations.

2. **DECLINING:** These species are in long-term decline, and should be the focus of most conservation activity.

3. **UNCERTAIN OR UNKNOWN:** The data needed to fully evaluate the conservation status of these species are missing or unclear. Collecting better data on their population trends is a critical first step in prioritizing them for future conservation.

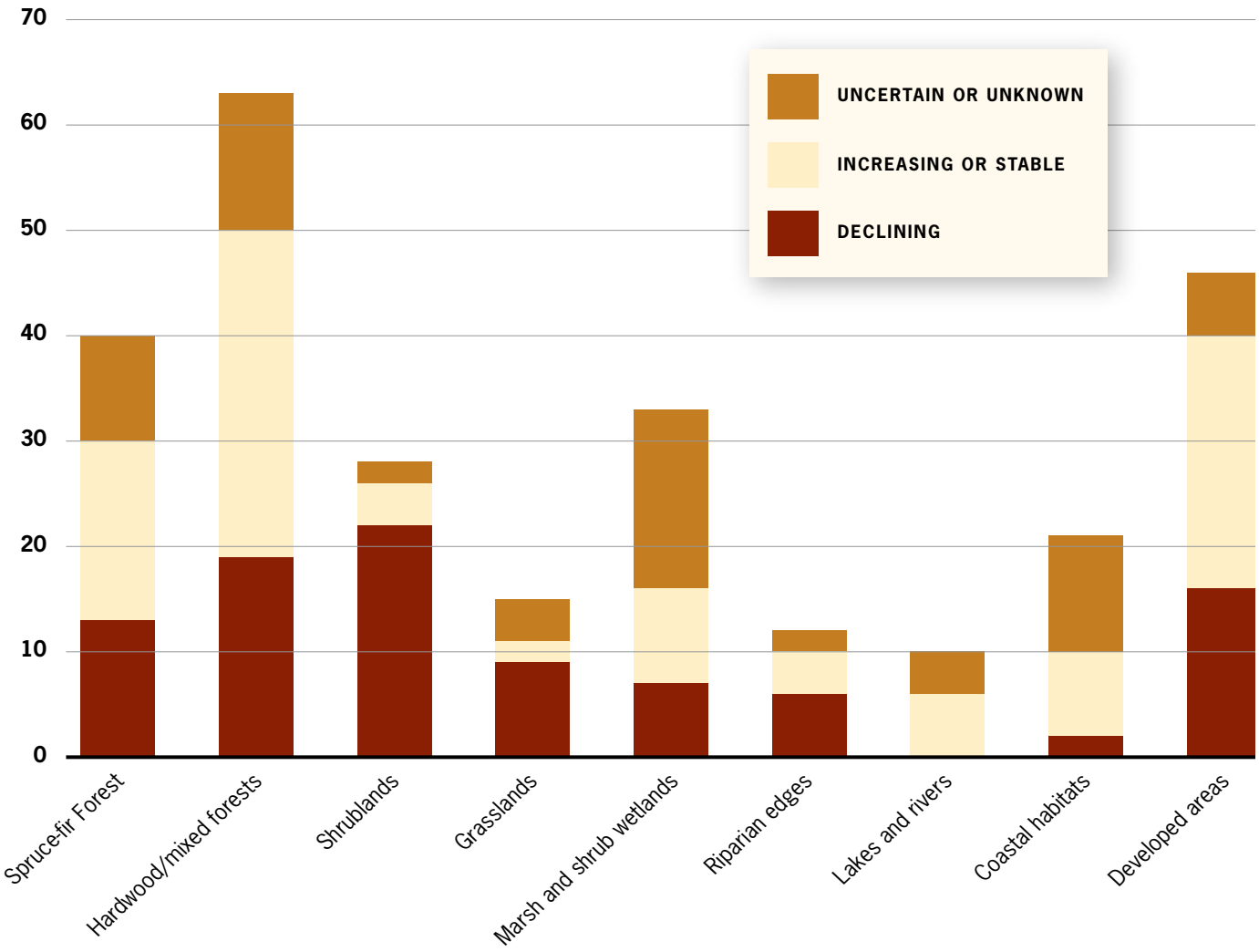


Figure 2. Comparison of bird population trends among nine New Hampshire habitats. In this and in Figure 3, the five trend categories from Figure 1 have been lumped into three categories for easier interpretation. This allows the comparison of trends within a habitat and among habitats.

Other Factors

Breeding habitat is just one of many factors that affect population trends. Striking declines are also evident among many migratory birds (including some that migrate only as far as the southern United States), and among certain species that share a common food supply (Figure 3).

1. **Migrants are in decline.** Some 80 percent of our breeding birds migrate, 34 percent to Central and South America and 47 percent to the southern United States. More than half of the long-distance migrants for which we have enough information to assess trends are in decline. Birds face many natural challenges during migration (exacerbated as migration corridors and stopover sites are developed), and once on wintering grounds may be challenged by conditions there.
2. **Aerial insectivores are in decline.** Aerial insectivores, as the name implies, feed primarily on insects they capture in flight. Some 19 species in New Hampshire fit into this category, more than half of which are in decline. We don't know why, but because these birds use a wide range of habitats, habitat per se isn't likely to be a primary reason. Widespread use of pesticides, both here and in wintering grounds, may factor in the explanation. For further discussion, see page 25.
3. **Fish-eating birds have benefited from conservation.** In contrast to aerial insectivores, the majority of fish-eating birds are stable or increasing. This group includes several species, such as Bald Eagle, Common Loon, and terns, which have benefited from targeted conservation actions over many years. Notably, even species that were not the focus of conservation efforts, such as herons and Black Guillemots, are increasing in numbers, quite possibly having benefited from the conservation efforts aimed at other species. Although this group is not specifically treated in the sections that follow, it offers another example of how to look at trends for a group of species. As with the aerial insectivores, the fish-eating birds occupy several different habitats. What links them is their common food source.

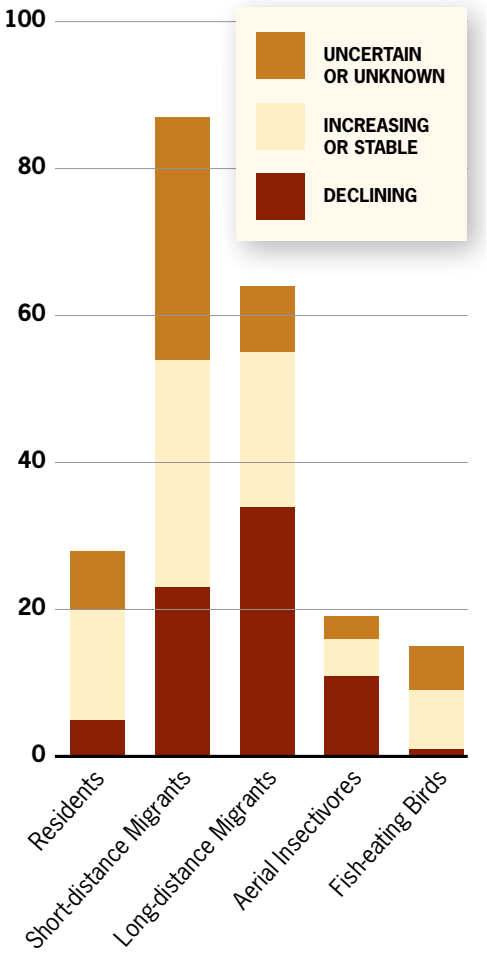


*Figure 3. Comparison of bird population trends by migratory strategy and in two foraging **guilds**.*

Findings and Recommendations by Habitat

The following pages summarize bird trends by habitat. Bird population trends were examined by habitat because it plays such a key role in breeding success. The habitat classifications are based on the State's *Wildlife Action Plan*, prepared by the NH Fish and Game Department in collaboration with conservation partners (see www. wildlife.state.nh.us/Wildlife/wildlife_plan.htm). There are nine habitat classifications for New Hampshire's breeding birds. Note: A species may occur in more than one habitat. For example, Purple Finch is in the "spruce-fir forest" group and also the "hardwood/mixed forest" group.

For each habitat there is a description of its characteristics, population trends among species that breed in the habitat, habitat threats, conservation actions, and data needs. This section also includes a discussion of aerial insectivores, which share a food source, not a habitat.

INTERPRETING THE GRAPHS

In the summaries that follow, trend information is presented in two ways:

1. Pie charts showing the trends for that specific habitat, with the total number of species included in each pie chart indicated under the chart.
2. Line graphs showing population trends for selected species over the last 40 years. These graphs are based on Breeding Bird Survey (BBS) data for New Hampshire, and the lines represent an index of abundance over time. This is roughly the same as the average number of birds detected on a survey route in a given year. Note that the graphs for Bald Eagle and Common Tern are NOT based on BBS data and instead reflect actual counts of breeding pairs.

SPRUCE-FIR FOREST

PAMELA HUNT

Habitat Characteristics

Spruce and fir dominate the vast boreal forest zone that stretches from the Canadian Maritime provinces and northern New England west across Canada to the Rocky Mountains and beyond to Alaska.

In New Hampshire, most spruce-fir forests are restricted to northern and western parts of the state. Isolated pockets occur in highlands and peatlands in the southeastern third of the state.

Roughly half the birds using this habitat in New Hampshire are "spruce-fir **obligates**," meaning that they occur only in spruce-fir forests.

Representative Species

Spruce-fir **obligates** found in New Hampshire's forests include Spruce Grouse, Olive-sided Flycatcher, Boreal Chickadee, Bicknell's Thrush, Bay-breasted Warbler, and Rusty Blackbird. Familiar birds that are commonly present but also use hardwood/mixed forests include White-throated Sparrow, Yellow-bellied Sapsucker, Canada Warbler, and Purple Finch.

LEN MEDLOCK

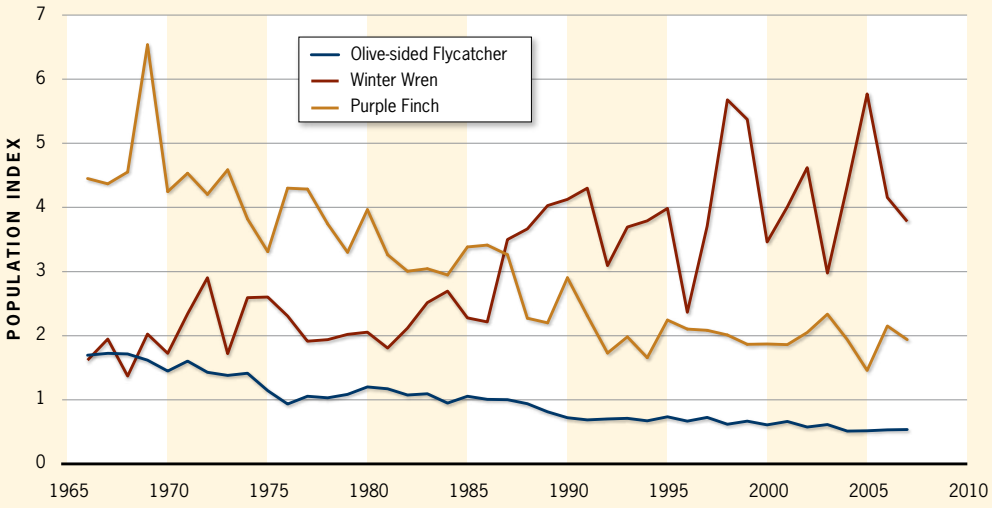
LEN MEDLOCK

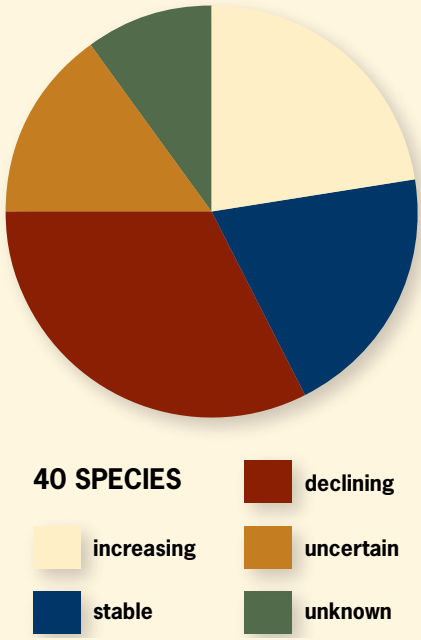
ROBERT HAMBLEY/PHOTOS.COM

LEN MEDLOCK

Clockwise from top left: Spruce Grouse, Bay-breasted Warbler, Rusty Blackbird, and White-throated Sparrow.

SPRUCE-FIR FOREST





Current Trends

Of the 40 species that use spruce-fir forests, roughly one third are declining. These include a mix of wetland and **edge** species, such as Olive-sided Flycatcher, Rusty Blackbird, and White-throated Sparrow, and forest species, like Boreal Chickadee, Bay-breasted Warbler, and Purple Finch. The birds that are increasing or stable are primarily mature forest species such as Yellow-bellied Sapsucker, Yellow-bellied Flycatcher, Northern Parula, and Winter Wren. Trend data are absent or unclear for many birds in this habitat, including secretive year-round **residents** (Spruce Grouse, Black-backed Woodpecker) and **irruptive** species, such as crossbills, which can be present in high numbers one year and absent the next.

Primary Threats

Timber harvesting practices

Clear cuts in spruce-fir forests often produce hardwood stands that are less suitable or unsuitable for spruce-fir birds. Shorter rotations between harvests reduce the amount of older, mature forest that some species require, including birds that depend on periodic outbreaks of insect pests such as bark beetles and spruce budworm, which build up only in mature forests and/or extensive forested landscapes.

Climate change

Climate change has special implications for this boreal habitat, which will be increasingly restricted to smaller and smaller areas in New Hampshire as a warming climate forces the habitat to shift northward and higher up on slopes.

Acid deposition

New Hampshire's high elevation spruce-fir forests are particularly susceptible to **acid deposition,** which has caused high red spruce mortality.

Additional Threats

Many of our spruce-fir birds winter in the tropics, where they are subject to another suite of habitat-based issues and other threats, as well as to the perils of migration.

Conservation Actions

Implement timber harvest practices that ensure a variety of different-aged trees of various sizes and density, including mature spruce-fir forests. We are fortunate to have large protected areas in the White Mountain National Forest and Coos County that can function as reserves, where careful management and natural processes can maintain appropriate habitat conditions for this group of birds.

Data Needs

Many spruce-fir forest birds are secretive, rare, or in hard to reach areas. We need more information on where they occur and in what numbers to better determine which species, in addition to Bicknell's Thrush, should be conservation priorities. There are opportunities for citizen-scientists – like you – to help fill in the information gaps; see page 28 for more information.

HARDWOOD/MIXED FORESTS

Habitat Characteristics

This habitat occurs throughout the state and represents a wide variety of forests, including oak-pine, hemlock, northern hardwood, and floodplain forests. Forests dominated by oak predominate in southern New Hampshire and northward in major river valleys, while hemlock tends to occur under cooler and moister conditions. Pines and maples are regularly found in multiple forest types within this category.

More bird species use hardwood-mixed forests than any other habitat in the state, and some are also found in both this and spruce-fir forests. Not included here are species typical of early successional stages (e.g., regenerating cuts), which are discussed under shrubland habitats.

Representative Species

Black-throated Blue Warbler, Wood Thrush, Pileated Woodpecker, Scarlet Tanager, Barred Owl, Red-eyed Vireo, and Eastern Wood-Pewee are typical of this widespread forest habitat.

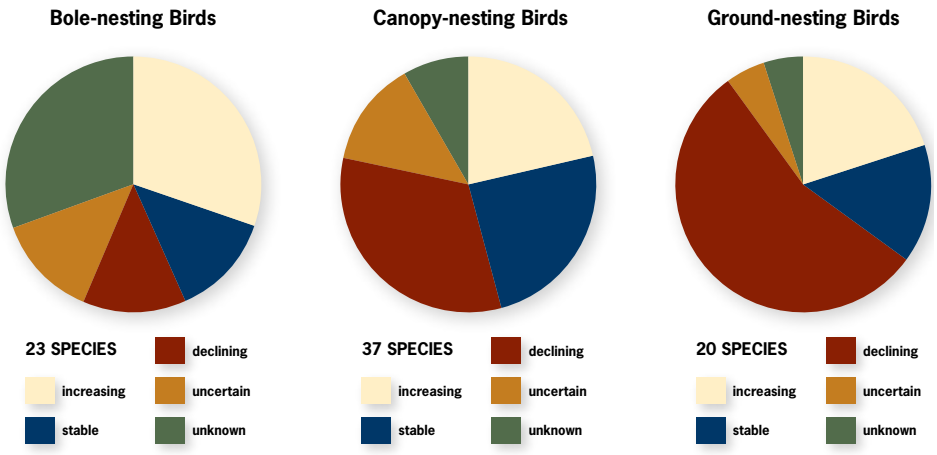
SCOTT YOUNG

LEN MEDLOCK

Scarlett Tanager.

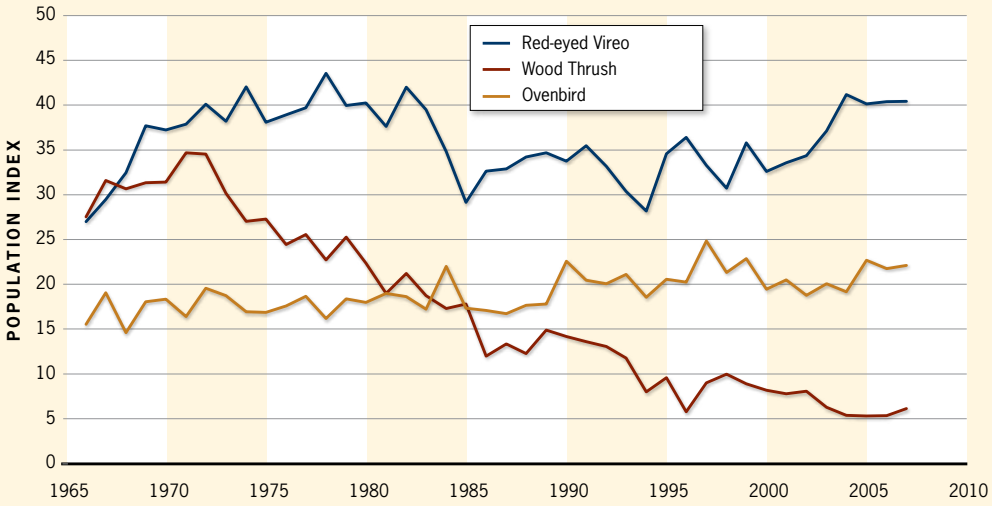
Current Trends

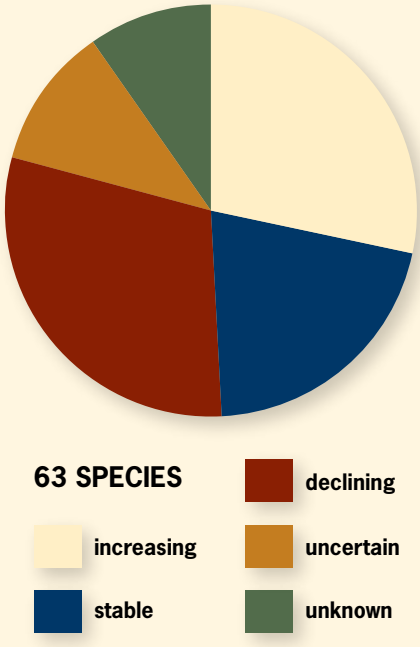
Hardwood/mixed forests support the largest number of breeding species in New Hampshire. The good news is that half the birds in hardwood/mixed forests are either stable or increasing. Most of these are familiar, year-round **residents** or short distance migrants, including such species as Wild Turkey, Downy Woodpecker, American Robin, and Chipping Sparrow. Declining species comprise a third of the total habitat group and are dominated by **long-distance migrants** such as Wood Thrush, American Redstart, Scarlet Tanager, and Baltimore Oriole. Declining species also include those that tend to require unfragmented interior forests such as Wood Thrush and Scarlet Tanager. Many forest-interior species also nest on the ground and this nesting **guild** is also declining.



Species population trends in three forest bird nesting guilds: those that nest on or near the ground, those that nest high up in the tree canopy, and those that nest primarily in tree cavities (boles).

HARDWOOD/MIXED FORESTS





Primary Threats

Development

By far the most significant threat facing this habitat group is development, which causes both direct loss of habitat and habitat fragmentation. Fragmentation reduces uninterrupted forest tracts to small and/or isolated patches of forest. It also introduces new threats caused by proximity to people and developed areas. Proximity increases risks, such as predation by cats, raccoons, skunks, and squirrels, reduced reproductive success due to brood parasites like the Brown-headed Cowbird, fatalities from encounters with windows, and exposure to herbicides and pesticides.

Forest Pests and Pathogens

Whether brought in on firewood, infected nursery stock, or other means, several pathogens and insects, like the Asian Long-horned Beetle and Hemlock Woolly Adelgid, have the potential to alter the tree species composition of our forests – with as yet unknown effects on birds.

Invasive Species

Invasive insects pose a significant threat to New Hampshire's forests, whether from species-specific insects like the Hemlock Woolly Adelgid and the Emerald Ash Borer or from more generally adapted insects like the Asian Longhorn Beetle and Gypsy Moth. In some settings, invasive plants can displace native species, which have evolved with our birds to provide them the food and shelter they need. Once in control, invasives can radically alter forest habitat by changing the vegetation, composition, and structure.

Acid deposition

There is increasing evidence that calcium depletion from forest soils – a side effect of **acid deposition** – has significant effects on avian reproductive success, and thus on overall population trends. This is new research, and more detailed results are not yet available.

Additional Threats

A significant number of birds that breed in hardwood and mixed forests migrate south of the United States for the winter, where they are subject to additional threats both en route and on their winter territories.

Conservation Actions

Conservation of hardwood forest birds should focus on preserving unfragmented blocks of forest land: the bigger the better. At the municipal level, this means pursuing both regulatory tools for maintaining intact habitats and land conservation opportunities, both within the municipality and between or among municipalities. Efforts to prevent the spread of **invasive species** need to continue and, in places, intensify.

Data Needs

The relatively few species in this habitat without good trend data are primarily birds of prey that are poorly sampled by most monitoring programs because they are dispersed and hard to detect.

SHRUBLANDS

PHIL BROWN

Habitat Characteristics

Shrublands are habitats dominated by woody shrubs with few or no trees. In New Hampshire, power line rights-of-way, shrubby old fields, **wildlife openings**, old gravel pits, and pine barrens provide shrubland habitat. Shrubland habitats require periodic disturbance (for example: fire, brush-clearing, timber harvest) to prevent them from reverting to forest.

Not included in this habitat category are birds found primarily in regenerating spruce-fir forests (see pages 8-9), shrubby wetlands, or **edge** habitats associated with residential or commercial development (see pages 22-23).

Representative Species

Typical of shrubland habitats are Eastern Towhee, Whip-poor-will, Prairie Warbler, Brown Thrasher, and American Woodcock.

LEN MEDLOCK

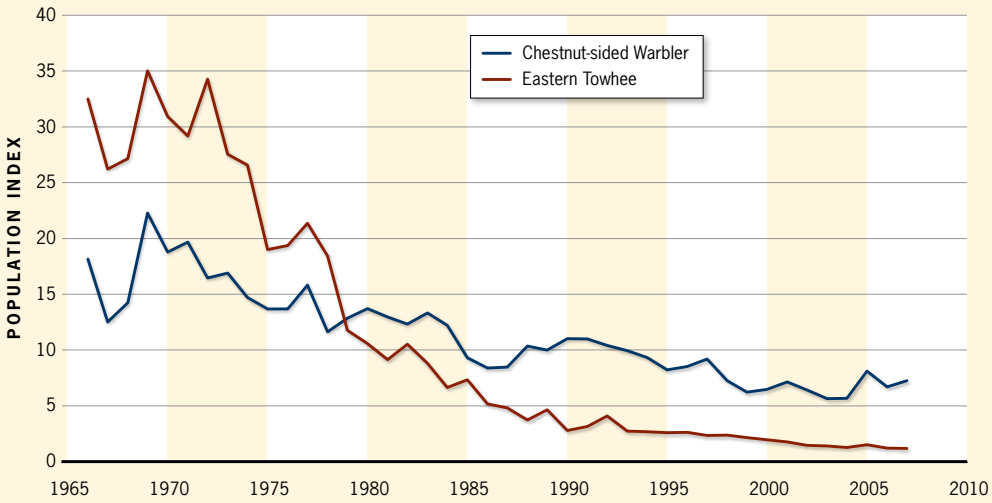
SCOTT YOUNG

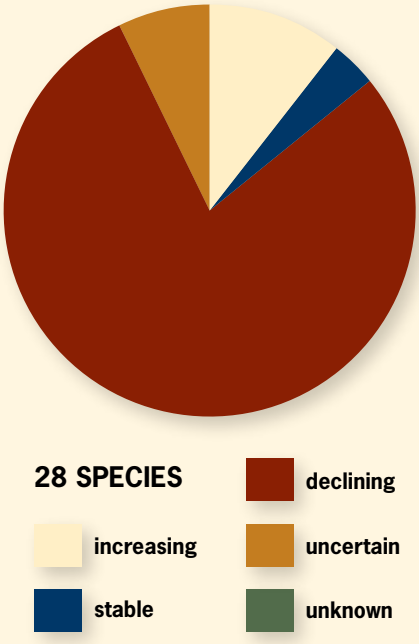
JASON LAMBERT

JOHN ANDERSON/PHOTOS.COM

Clockwise from top left: Prairie Warbler, Eastern Towhee, Brown Thrasher, and American Woodcock.

SHRUBLANDS





Current Trends

Of the 28 shrubland bird species that breed in New Hampshire, all but six are clearly in decline. The species with the most dramatic declines are Eastern Towhee and Brown Thrasher. A third species, the Golden-winged Warbler, no longer breeds in the state. Only three species are clearly increasing: Willow Flycatcher, Northern Cardinal, and American Goldfinch. The latter two species can use a range of shrublands including those in developed areas, which may be a factor in their success.

Primary Threats

Habitat Loss

BEN KIMBALL

Most declines among these birds can be attributed to habitat loss. Prior to European settlement, shrublands were relatively rare (except along the coastal plain) and dispersed in New Hampshire, created by the occasional fire, ice or wind storms, beavers, or Native Americans. Widespread clearing for agriculture in the 19th and 20th centuries gave rise to extensive grasslands (see page 14) and shrublands, creating more habitat for these early successional birds, and their numbers increased. With the loss of farms, these former open areas have either been developed or matured into forest, with a resulting decline in shrubland bird populations.

Conservation Actions

Given the extent of New Hampshire's forests and its importance to forest bird populations, it is neither feasible nor desirable to restore shrubland bird populations to their peak levels of the 19th century. Instead, conservation actions should focus on identifying areas where shrubland bird populations are still viable, or where active land management has the potential to maintain or restore such populations. When these sites are identified, they can be managed to limit forest growth.

Data Needs

Further research and monitoring are needed to evaluate different management regimes for maintaining shrubland habitat.

GRASSLANDS

PAMELA HUNT

Habitat Characteristics

Grasslands are grassy habitats, typically large agricultural fields (pastures and hayfields), airfields, capped landfills, and reclaimed gravel pits. All grasslands in New Hampshire must be maintained by mowing, grazing, or burning to prevent their reverting to shrublands and, ultimately, to forests. The birds common to this habitat are more typical of extensive grasslands found in the Midwest and Great Plains. They may have colonized New England when forests were converted to farmland in the late 18th and 19th centuries, or – if already present in small numbers – become more abundant as grassland habitat expanded in New England.

Representative Species

American Kestrel, Upland Sandpiper, Eastern Bluebird, Savannah Sparrow, Grasshopper Sparrow, Bobolink, and Eastern Meadowlark are representative of grassland habitats.

LEN MEDLOCK

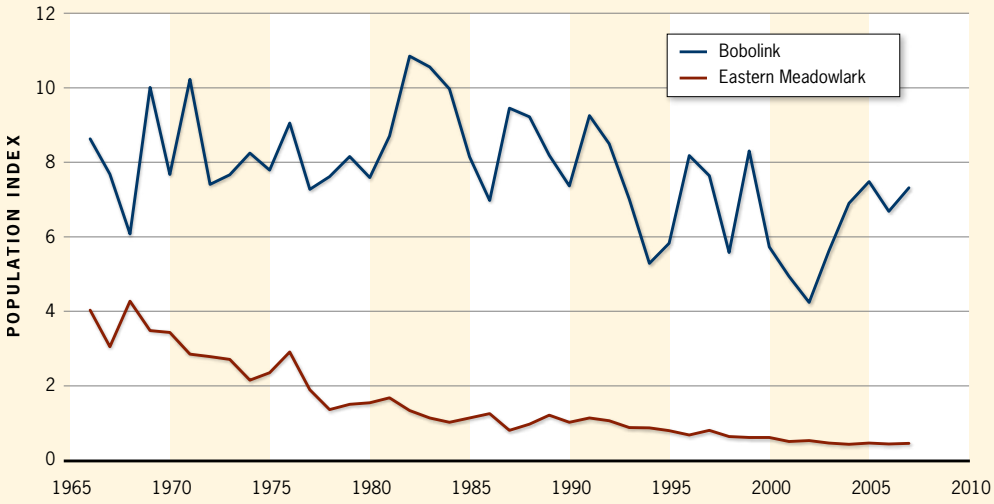
ROBERT BLANCHARD

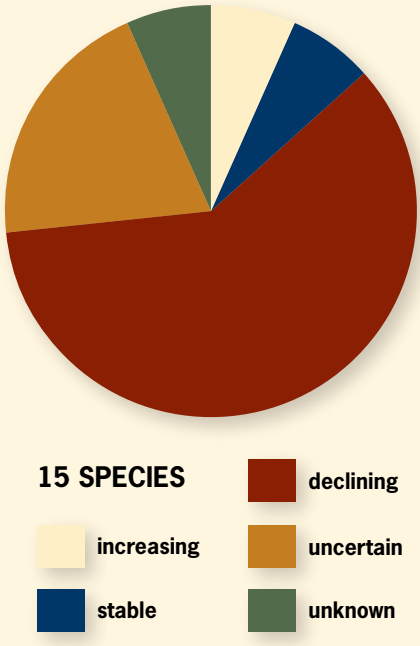
STEVE HILLEBRAND/USFWS

DONNA DEWHURST/USFWS

Clockwise from top left: Bobolink, Eastern Meadowlark, Savannah Sparrow, American Kestrel.

GRASSLANDS





Current Trends

Populations of most grassland birds are in decline. Only the Eastern Bluebird, thanks in part to nest box programs, is increasing. We know of only one population of Upland Sandpiper remaining in New Hampshire. Note that Bobolink is also in decline, although this decline is not as evident or dramatic as that of the Eastern Meadowlark. The Bobolink numbers illustrate how bird populations fluctuate naturally, for a variety of reasons (see page 3).

Primary Threats

Habitat loss

Most declines among these birds can be attributed to habitat loss. Like shrublands, large grasslands were historically rare in northern New England prior to European settlement. As a result, most of the grassland birds that currently occur in New Hampshire are relatively recent colonists, and declines are clearly tied to the continued loss of this habitat to development, succession, or conversion to less suitable agricultural crops (e.g., corn). Of the grasslands that remain, many are too small to support "**area sensitive**" species like Grasshopper Sparrow and Upland Sandpiper, which only nest in large fields and rarely use fields smaller than 30 acres.

Grassland management practices

Nests may be destroyed or young birds killed by equipment when fields are mowed too early in the season, before chicks have fledged. Early mowing also removes the grassy cover around nests, dramatically increasing nestlings' exposure to predators.

NATHAN MCCLUNE/PHOTOS.COM

Conservation Actions

Given the continued loss of New Hampshire's grasslands, a key conservation strategy is to identify those grasslands that have the greatest potential to support large populations of multiple species. At such sites, typically large fields (greater than 30 acres), the focus should be a combination of land protection and appropriate management that benefits grassland birds. Even in smaller fields, delayed (after August 1) or partial mowing will benefit local populations of Bobolinks and Savannah Sparrows, and in the process may contribute to regional populations.

Data Needs

An active survey program in the late 1990s provided sound scientific information on the distribution and abundance of grassland species in New England. Similar surveys are needed periodically to assess changes in grassland species' distribution and abundance since that time and into the future.

MARSH AND SHRUB WETLANDS

PAMELA HUNT

Habitat Characteristics

This habitat includes a wide range of plant communities with persistent standing water and wetland vegetation, whether herbaceous (e.g., cattails, sedges, and grasses), shrubby, or some combination of the two. Wetland birds can be placed in two categories, with typical "marshbirds" occupying primarily cattail and sedge wetlands and other species restricted to shrub wetlands or their edges. Some birds, like Canada Geese, use a wide variety of wetland habitats, while others, notably Wood Duck, Osprey, and Great Blue Heron, nest in trees and forage in the surrounding wetlands.

Representative Species

Typical marshbirds include American Bittern, Virginia Rail, Sora, Pied-billed Grebe, and Marsh Wren. Representatives of shrub wetland habitats include Alder Flycatcher and Yellow Warbler.

DAVE MENKE/USFWS

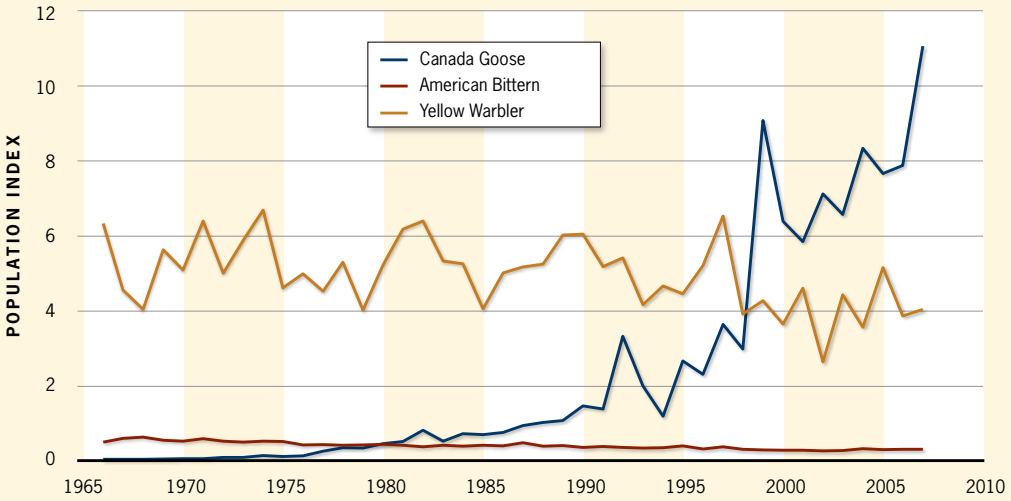
LEN MEDLOCK

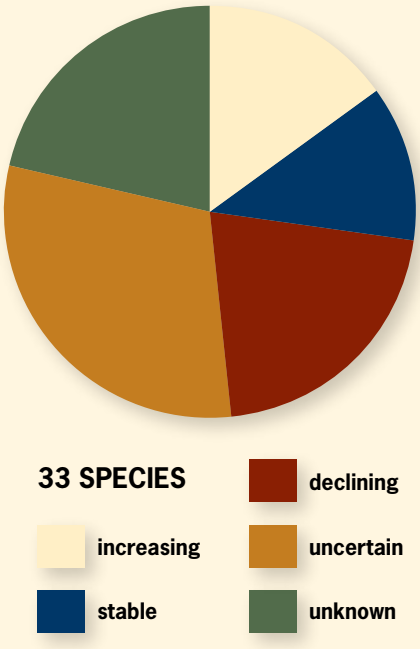
DANIEL PARENT/PHOTOS.COM

DIRK VAN DER MERWE

Clockwise from top left: Sora, American Bittern, Yellow Warbler, and Pied-billed Grebe.

MARSH AND SHRUB WETLANDS





Current Trends

Many wetland birds, particularly the marshland species, are very secretive and live in often inaccessible habitat. As a result, population trend data are insufficient or lacking. We have no information, or the trends are uncertain, for more than half the birds in this habitat. Increasing species include the Osprey and several waterfowl, including Canada Geese, which have increased to such an extent that they are becoming pests. Most of the declining species are songbirds typical of shrubby wetlands, such as Yellow Warbler.

Primary Threats

Altered wetland hydrology

Dredging, filling, damming, or otherwise changing a wetland affects what plants can grow there, the amount of water it holds during which seasons, and the insects, snails, and other fauna that are attracted to it. These changes in turn affect wildlife use of the wetland. The effects of wetland alteration are likely to be most profound among species, such as American Bittern and Pied-billed Grebe, which require larger wetlands.

Habitat destruction

Although wetland impacts due to human activities are regulated, and the regulatory goal is to minimize impacts, direct wetland loss remains a key threat facing birds in this habitat group.

Invasive species

While **invasive species** are often introduced to a wetland when it is being modified for human purposes, birds and other wildlife may be sources of seeds or fertile plant fragments as well. When invasive species such as purple loosestrife and *Phragmites* reeds replace native vegetation and dominate a wetland, the habitat no longer supports typical marsh birds. The effects of other invasive species are less well known and likely will increase in the future.

Additional Threats

A significant number of wetland-dwelling birds migrate south for the winter, where they are subject to additional threats both en route and on their winter territories, as referenced above and discussed more fully on page 27.

Conservation Actions

Direct protection of wetlands and the adjacent uplands is the most important conservation action that can benefit wetland birds. This includes both minimizing human impacts and protecting against **invasive species**. Where wetland water levels are subject to management (e.g., at impoundments), it is important to maintain appropriate water levels that avoid both flooding and drawdowns during the nesting season (May through July) to protect nests and foraging habitat.

Data Needs

Better data on many marshbirds, especially the more secretive ones such as rails and bitterns are needed to identify population trends and factors affecting their populations.

LAKES AND RIVERS

PAMELA HUNT

Habitat Characteristics

This habitat is essentially wet. Although some birds use both this habitat and riparian edges, all of the species dependent on lakes and rivers benefit directly from the aquatic environment, and most feed entirely on fish or aquatic invertebrates. They nest in a variety of habitats adjacent to foraging areas, and nest sites can include trees, tree cavities, banks, or the ground.

Representative Species

Look for Great Blue Heron, Bald Eagle, Common Merganser, Belted Kingfisher, Canada Goose, Spotted Sandpiper, and Common Loon in these watery habitats.

ROB PAVEY/PHOTOS.COM

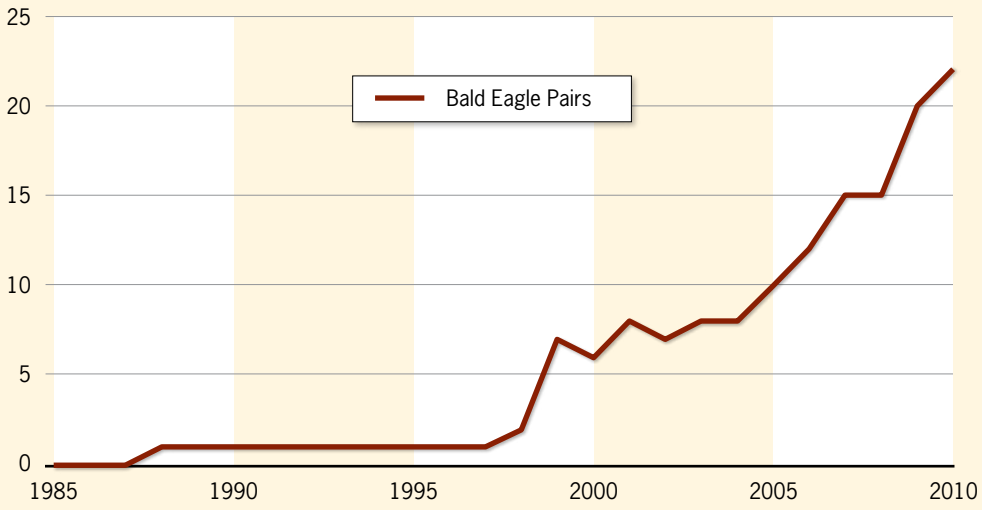
JUPITER IMAGES

DAVE MENKE/USFWS

PETER LLEWELYN/PHOTOS.COM

Clockwise from top left: Common Merganser, Great Blue Heron, Belted Kingfisher, and Spotted Sandpiper.

LAKES AND RIVERS



JASON LAMBERT

Current Trends

Birds dependent on lakes and rivers are faring well. Proportionally more species in this group are increasing than in any other. In many cases, these increases have resulted directly from targeted conservation efforts. Osprey, Bald Eagle, Common Loon, and Canada Goose populations have all benefited from restoration work throughout their ranges. No species reliant on lakes and rivers are clearly declining.

Primary Threats

Disturbance at nests

People recreating on lakes and rivers can disturb nesting birds to the point where the birds abandon their nests: the more disturbance, the more abandoned nests. Predators, such as raccoons, increase in numbers near human development and also present a significant threat to nesting birds unless measures are taken to protect nests. When development reaches a certain threshold, certain species, including loons and eagles, may actually move out.

NWR/USFWS

Common Loon on nest.

Chemical contaminants

As long-lived, top predators in the food chain, birds such as loons and eagles can **bioaccumulate** environmental toxins that get into the water from the land or from the air. Even when they are not lethal to the birds, these toxins can significantly reduce reproductive success. Despite New Hampshire's first in the nation ban on lead sinkers and jigs, lead poisoning from ingestion of lost or discarded fishing tackle remains the primary cause of mortality among New Hampshire's adult loon population. In addition to lead and mercury, potential toxins include PCBs and flame retardants.

Conservation Actions

Key conservation strategies come down to individual actions, such as protecting nest sites from disturbance and outright destruction. Improved awareness, advocacy, and regulatory changes can all help these species, since we collectively are responsible for the detrimental effects of lead poisoning from lead sinkers, jigs, and shot, for disturbing nesting areas, and for destroying sensitive shoreline habitats.

Data Needs

The data on the lethal effects of lead in loons are compelling. We need better data on the potential effects of other toxins on loons and other species.

COASTAL HABITATS

PAMELA HUNT

Habitat Characteristics

New Hampshire's coastline may be small, but it contains three habitats found nowhere else in the state: salt marsh, dunes, and coastal islands. These three habitats are grouped together in this overview because each supports a relatively small number of breeding species. Salt marsh, the most extensive of the three, occurs on the coast and inland along Great Bay, its tributary rivers, and upstream along the Salmon Falls River. It is home to three species of sparrows restricted to salt marshes. The state's tiny remnant dune system is at the Hampton/Seabrook Dunes. This is the only place in New Hampshire where endangered Piping Plovers nest. Offshore islands, particularly the Isles of Shoals, are the primary nesting sites in the state for gulls, terns, and other marine birds.

Representative Species

Salt marsh: **Obligate** species include Saltmarsh Sparrow, Seaside Sparrow, and Nelson's Sparrow. A small population of Willets occurs in New Hampshire's salt marshes, together with a number of more widespread wetland birds. Dunes: Piping Plover. Coastal Islands: Common Eider, Black Guillemot, Common Tern, Roseate Tern, and Herring Gull.

JASON LAMBERT

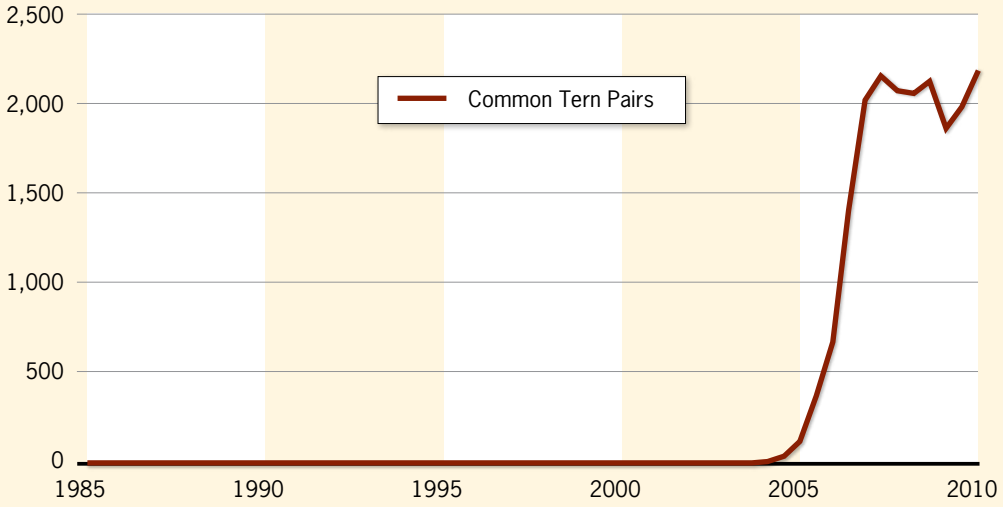
LEN MEDLOCK

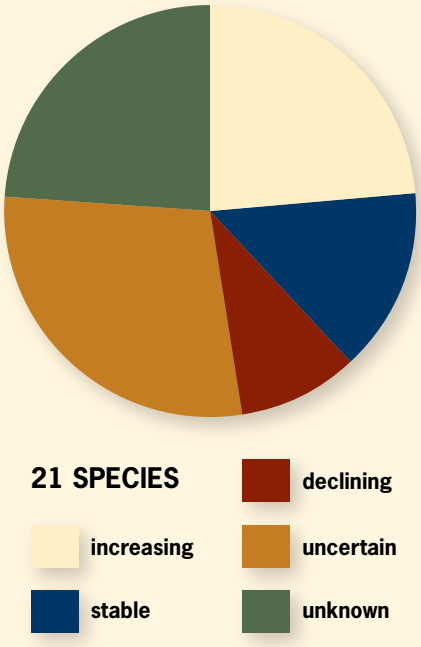
JULIE KLETT

ROBERT BLANCHARD/PHOTOS.COM

Clockwise from top left: Saltmarsh Sparrow, Willet, Piping Plover, and Common Terns.

COASTAL HABITATS





Current Trends

Because most coastal habitats occur in small patches or are not easily accessible, many of the birds that use them are poorly monitored, and population trends for more than half are either unknown or uncertain. This lack of data is particularly disconcerting because most of the poorly understood species are found only in the seacoast region, where high development pressures make them among the most vulnerable populations in the state. Many of the increasing or stable species have benefited from past conservation actions, as shown for Common Terns.

Primary Threats

Habitat destruction: New Hampshire's dunes and salt marshes have suffered significant loss to buildings, parking lots, roads, and lawns over the years.

Habitat alteration: Where habitat has not been destroyed, centuries of salt marsh alteration, through ditching, filling, and dam/road construction have degraded habitat quality. Studies in Hampton found that Saltmarsh Sparrows occupy only a tiny portion of available salt marsh, preferring the unaltered areas.

Disturbance: Beach goers and their dogs don't mix well with dune-nesting birds. Interference with incubating birds and the feeding of young causes fewer young birds to survive. Birds of less accessible salt marshes and islands are generally less susceptible to this kind of stress.

Predation: Increased predation by feral cats is a threat to dune-nesting birds, as are skunks, foxes, and other small animals. Predation, especially by gulls, is also an issue for island bird populations.

Changes in food supplies: This threat to coastal birds, especially fish-eating birds such as terns, is not well documented but relates to potential impacts from unsustainable fishing practices, climate change, pollution, or a combination of factors.

Rising sea level: Rising sea level from climate change threatens all the coastal habitats, and the potential for habitat to shift inland is limited by existing development.

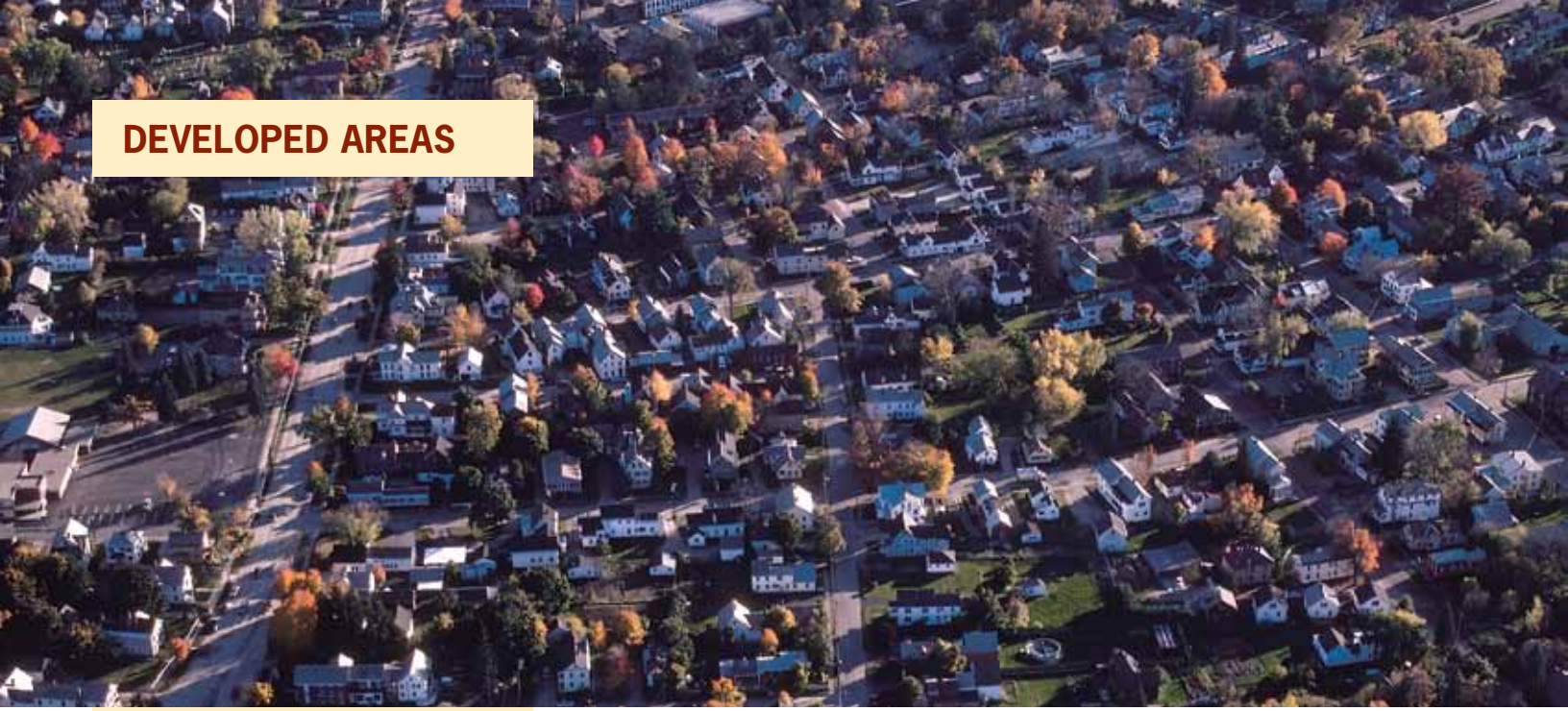
Conservation Actions

To ensure the continued presence of salt marsh birds in the state, efforts should focus on restoring degraded salt marshes and protecting those that are still intact. At the same time, we need to determine which areas of salt marsh are most likely to remain viable in the wake of projected rises in sea level induced by climate change and also identify and protect adjacent uplands that may become salt marsh with sea level rise. For dune-nesting species, key conservation actions include public education and restricted use areas to minimize human/bird interactions. Without the restricted use areas at Hampton/Seabrook, the state's population of plovers would disappear within a couple of years. Continued human intervention to discourage predators and maintain nesting habitat also will be needed to maintain the tern colony at Seavey Island.

Data Needs

Although more trend information on salt marsh birds is needed, absence of data should not preclude actions now to protect what little remaining habitat exists. More information on threats to island nesting populations is needed to identify the best protective actions.

DEVELOPED AREAS



COMSTOCK/PHOTOS.COM

Habitat Characteristics

This catch-all category captures urban and residential areas, loosely defined as sites where natural vegetation occupies no more than half of the available land. Some 46 species that have adapted well to human habitations are found with some regularity in developed areas. Some of these birds spend most of their time in developed areas, while others also use nearby forests or other unaltered habitats.

Representative Species

Look for Northern Cardinal, Blue Jay, Carolina Wren, House Sparrow, European Starling, House Finch, Black-capped Chickadee, Pine Warbler, Cooper's Hawk, and – yes – Peregrine Falcon.

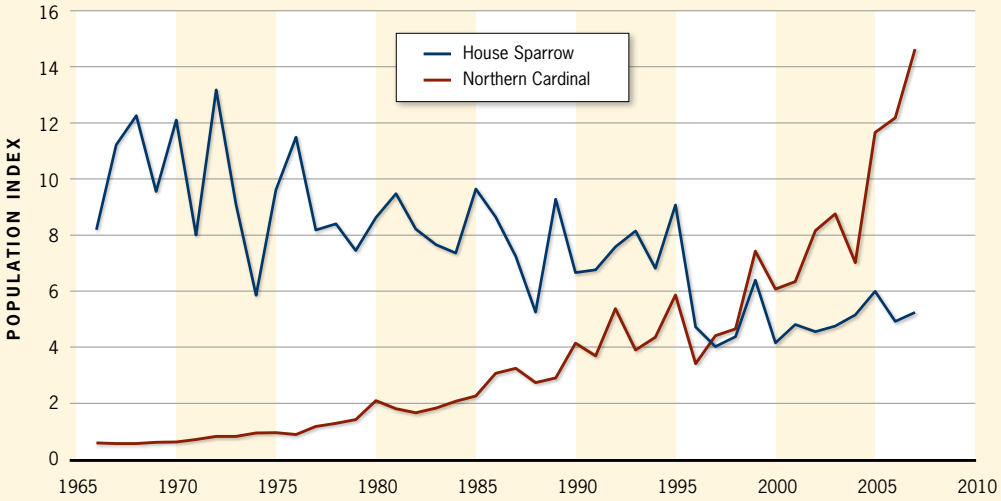
LEN MEDLOCK

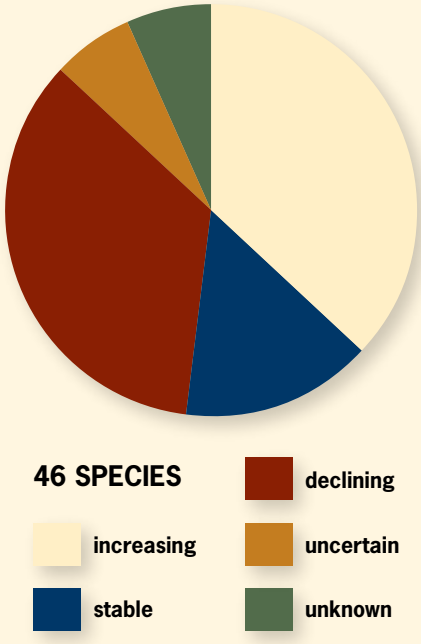
TAMMY WOLFE/PHOTOS.COM

LEN MEDLOCK

Clockwise from top left: Northern Cardinal, Cooper's Hawk, and Black-capped Chickadee.

DEVELOPED AREAS





Current Trends

Trends in this group are split evenly between declines and increases. Increases are occurring largely among non-migratory birds, many of which are expanding their ranges north into the state. Once considered more southern birds, the Northern Cardinal and Tufted Titmouse are now common year-round **residents**. More recently, Red-bellied Woodpecker and Carolina Wren are being reported from throughout southern New Hampshire. Declining species tend to be **long-distance migrants**, forest edge, and shrubland species. In many cases their declines likely are tied to factors other than their use of developed landscapes. All non-native species (e.g., European Starling, House Sparrow) are also in decline, although the reasons are not well understood.

Primary Threats

Loss of specialized nesting sites

For a small number of species, direct changes to developed habitats may be contributing to declines. Caps on chimneys cut off access for Chimney Swifts, and conversion from pea stone rooftops to other materials has reduced available nesting sites for Common Nighthawks.

The primary threats to birds in this group likely relate to impacts during migration or in wintering areas and impacts to forest edge and shrubland habitats, rather than to issues restricted to urban and suburban environments.

PAMELA HUNT

Common Nighthawk female with two chicks.

Conservation Actions

This is a newly recognized habitat about which we know relatively little. Making bird-friendly yards is certainly one supportive, generalized action (see page 29), as are protecting forest edge and shrubland habitats. Specific actions to increase or improve nesting sites include removing chimney caps, at least during breeding season (late April through early August), or building a chimney swift tower (see page 30).

Data Needs

We need to better understand the stresses on birds using developed habitats. We need more data on issues such as:

- How does predation affect productivity?
- What is the risk of mortality from windows in a standard two-story residential home?

Knowing the answers to these and other basic questions, we can prioritize conservation strategies for making developed neighborhoods bird friendly.

RIPARIAN EDGE

PAMELA HUNT

Habitat Characteristics

Riparian edge is the habitat adjacent to streams, rivers, ponds, and lakes. While the vegetation, width, topography, and elevation of riparian edges vary, riparian edges are unique because they are by water. Birds that breed and forage in riparian edges are not typically considered "wetland" birds, and many are also found in other habitats. A few nest primarily in trees right next to water. Others nest in banks along rivers.

DAVID BREZNSKI/USFWS

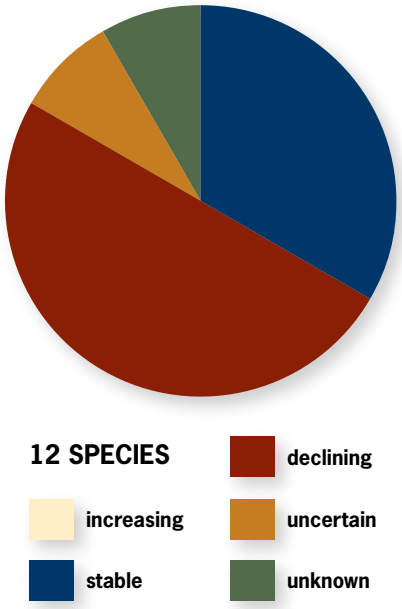
Baltimore Oriole.

Representative Species

Tree nesting species typically found near water include Eastern Kingbird, Warbling Vireo, and Baltimore Oriole. Bank nesting birds include Louisiana Waterthrush, Bank Swallow, and Northern Rough-winged Swallow.

Current Trends

Trend data reveal a striking pattern. Half the riparian edge birds are declining, such as Eastern Kingbirds and Baltimore Orioles. None are increasing, although some remain stable, such as Belted Kingfisher and Warbling Vireo.



Primary Threats

The reasons for declines are unknown, but could include stream, river, and lakeshore development and, for the insect-eaters particularly, changes to food supply due to climate change, pesticide use on breeding and/or wintering grounds, or other impacts (see discussion of aerial insectivores on page 25). Because this group includes a diverse mix of species, multiple factors are likely involved.

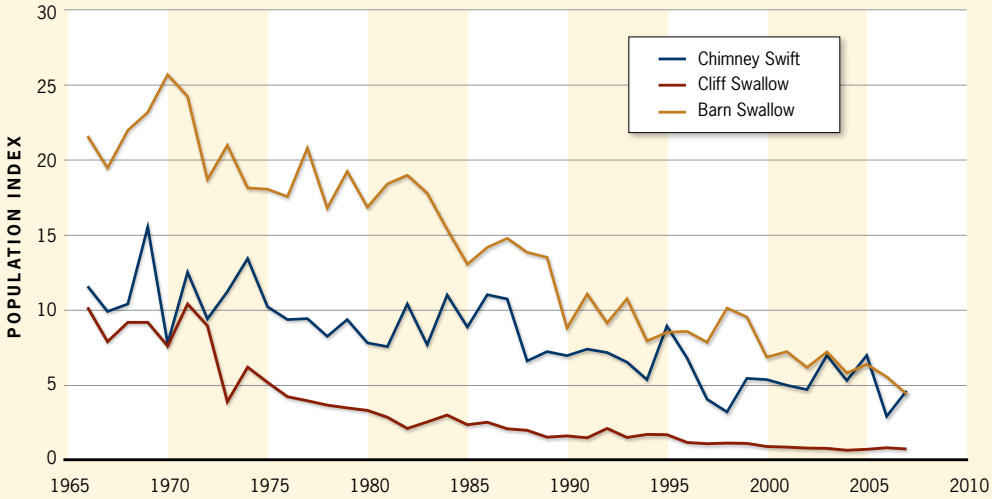
Conservation Actions

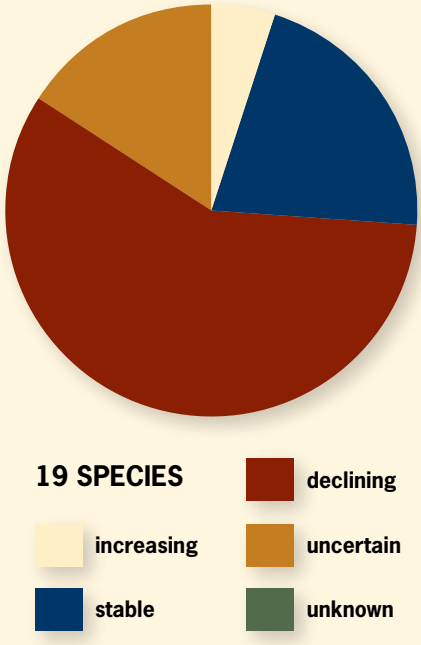
Without a better understanding of the reasons for declines, it is difficult to recommend specific conservation actions. However, riparian habitat protection efforts, including limited logging and the state's Comprehensive Shoreland Protection Act, will benefit these birds.

Data Needs

More detailed research into the ecology of several representative species is needed for a better understanding of stresses on and actions to protect these birds.

AERIAL INSECTIVORES





Characteristics

Although they do not occupy the same habitat, the birds in this group share a food source: insects which they catch on the wing. The group includes flycatchers, swallows, swifts, and nightjars. Within this group, some species capture their prey by flying out from a perch, the "salliers," and others are "hawkers," constantly in the air while foraging.

JASON LAMBERT

Bank Swallow.

Representative Species

Salliers include flycatchers, such as Eastern Kingbird and Eastern Phoebe, and Whip-poor-will. Hawkers include Chimney Swifts, all the swallows, and Common Nighthawk.

Current Trends

More than half of the 19 aerial insectivores are experiencing long-term declines. Only one (Willow Flycatcher) is increasing, and four appear to be stable. Declines are most dramatic among swifts and swallows, so much so that the Chimney Swift was listed as "threatened" in Canada in 2007.

Primary Threats

The reasons for declines of aerial insectivores, most of which winter in South America, are unknown but could include pesticide use on breeding and/or wintering grounds or in migration, effects of climate change on food supply, and habitat changes.

Conservation Actions

Without better information, it is premature to recommend conservation strategies. However, all these species are likely vulnerable to pesticides, whether from direct ingestion or reduction in food supply, and reducing or eliminating, as possible, use of pesticides can only help them.

Data Needs

A key informational need is baseline data on the size and distribution of swallow colonies in New Hampshire, currently under investigation by New Hampshire Audubon's Swallow CORE (Colony Registry) project. Also needed are a better understanding of aerial insectivores' ecologies at wintering grounds and an analysis of the relative roles pesticides, climate change, and habitat alteration play in population trends.

ADDITIONAL CONSIDERATIONS

Breeding habitat and foraging behavior are not the only factors that affect bird populations. Non-habitat threats and post-breeding events may also be influencing population trends.

PAMELA HUNT

NON-HABITAT THREATS

Although habitat loss and degradation are the key threats facing our birds during the breeding season, additional factors may be at play. These threats, some of which are also referenced with respect to specific habitat impacts, cut across habitats.

Predation

Predation is a natural phenomenon in the wild, whether on nests, young, or adult birds. Decidedly not natural are the populations of native or exotic predators associated with human development. The combined forces of feral and "outdoor" cats may be responsible for tens of millions of bird fatalities each year. Add increased levels of nest predation by the skunks and raccoons attracted to our garbage, and birds face an array of new enemies.

Disease

The effects of some diseases on bird populations are well documented. For example, though they have since recovered in New Hampshire, crows in the Northeast suffered noticeable declines in the late 1990s due to West Nile Virus. Often difficult to measure and predict, diseases are potentially important factors, especially for smaller populations.

Acid Deposition

Acid deposition can cause insidious changes to the environment, particularly in the Northeast, where airborne pollutants from states to the west are carried eastward. Here in New Hampshire, where our granitic soils are especially vulnerable to acidification, the effects are exacerbated. Acid deposition can leach calcium from forest soils, in turn reducing the availability of calcium to forest invertebrates such as snails. Birds that rely on such invertebrates in their diet may encounter fewer prey or prey with lowered calcium levels. The implications of calcium deficiency are unknown at this time but may be significant.

Toxins

Birds are sensitive to environmental toxins, such as pesticides, lead, mercury, and flame retardants. The effects from exposure or ingestion can range from lower reproductive success, neurological problems, and other biological dysfunctions to death. The harmful effects of lead and pesticides are well documented. The long-term impacts of mercury are largely unknown, but birds in salt marshes and high elevation forests have been shown to have relatively high mercury levels, presumably because mercury is more easily absorbed in these habitats.

Climate Change

Changing temperatures and precipitation patterns associated with climate change affect plants and animals. One effect of climate change already evidenced in Europe has been the decoupling of the breeding seasons of birds from those of their prey. Birds returning on their normal schedules from wintering grounds may find key insect prey populations have already come and gone. If peak prey abundance occurs at a different time from peak food needs for nestlings, fewer nestlings will survive. At present the relative importance of this threat is poorly known, as is the extent to which birds can alter the timing of their breeding.

Structures

Transmission lines, cooling towers, tall buildings, emission stacks, and other similar structures pose a threat, particularly when they are located along migration corridors (see page 27 for a more detailed discussion). The potential effect of wind turbines on birds migrating along New Hampshire ridges has yet to be fully determined. Clearly, siting decisions are key.

BEYOND OUR BORDERS: BIRDS IN THE NON-BREEDING SEASON

LEN MEDLOCK

Of the 186 species that breed regularly in New Hampshire, 63 species migrate south of the United States in winter (the **long-distance migrants**), another 87 leave the state to spend the non-breeding season in the southern United States (**short-distance migrants**), and only 28 do not migrate at all. Another eight migrate irregularly in response to availability of winter food supplies.

Notably, only four of the long distance migrants are increasing. Most are declining or stable. Of the short distance migrants (here including the eight irregular migrants), most are increasing or stable, although for some, particularly the wetland and coastal species, we have too little data to establish trends. The majority of **residents** are increasing.

Above: Shorebirds resting during migration.

Primary Threats

Habitat degradation and loss

Both degradation and loss of habitat threaten birds' wintering grounds and critical **stopover habitat** along migration routes. Where wintering habitat is changed, whether by development or agriculture, birds are often less likely to survive the winter. Survivors may be in poor physical condition and unable to complete the arduous northbound spring migration. Similarly, degraded or changed habitats along migration corridors can't provide the food needed for migrating birds to refuel, and many perish en route as a result.

PAMELA HUNT

Tropical deforestation.

Chemical use

Although the effects are still poorly understood, use of pesticides and other chemicals on the wintering grounds is known to deplete food supplies and cause direct mortality – often of thousands of birds. Pesticide impacts during migration have not been studied.

Structural hazards and windows

Migrating birds face hazards from lighted buildings and other structures that confuse them in the dark and result in fatal collisions. According to the American Bird Conservancy, an estimated 300 million to one billion birds die each year from collisions with buildings – including windows on our homes and offices. Up to 50 million die from encounters with communication towers. At least 11 million die from car strikes. Many of these fatalities occur during peak migrations in the spring and fall.

Climate change

By increasing the severity of storm events, climate change may dramatically affect bird mortality during spring and fall migrations. It may also alter weather (e.g., increased drought) or food supplies on winter territories, in turn compromising over-winter survival.

NEW HAMPSHIRE AUDUBON ARCHIVES

Above: Volunteers counting hawks on Pack Monadnock, New Hampshire.

What You Can Do to Help Conserve New Hampshire's Birds

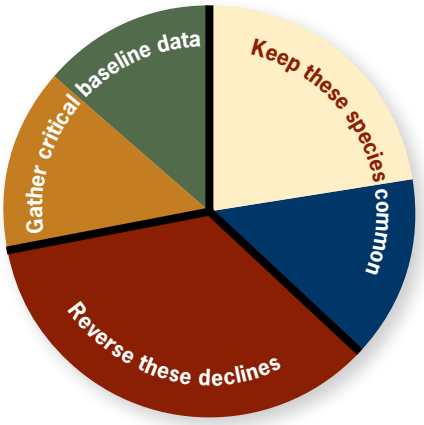
Whether you're a bird watcher, business owner, or community official, there are ways you can help New Hampshire's birds. This section highlights actions we can take as enlightened and concerned citizens to help ensure New Hampshire's breeding birds are here for generations to come.

Conservation Goals

In the context of trends and threats to New Hampshire's birds, there are three overarching conservation goals:

1. **Gather critical baseline data.**
2. **Keep common species common.**
3. **Reverse declining species.**

Each goal applies to groups of species showing similar population trends. All actions listed on the following pages contribute to these goals.



ALL 186 BREEDING SPECIES

- increasing
- declining
- stable
- uncertain
- unknown

LEN MEDLOCK

Hairy Woodpecker.

EACH INDIVIDUAL ACTION YOU TAKE TO HELP CONSERVE BIRDS CAN MAKE A DIFFERENCE.

All of us working together, for a world we share with the birds, is vitally important, for our birds and potentially, for us. The choice is ours.

As an Individual

Help close the knowledge gaps here at home

- You don't need to be an expert to become a citizen scientist. Helping gather data can be as simple as counting birds at your feeder or watching swallows nest on your barn. Sign up for New Hampshire Audubon's annual Backyard Winter Bird Survey: www.nhbirdrecords.org/bird-conservation/backyard-winter-survey.htm; report your bird sightings to NH eBird: www.ebird.org/nh; become a Swallow CORE volunteer: www.nhbirdrecords.org/bird-conservation/swallow-core.htm. Training is offered for more in-depth research and monitoring projects. Contact New Hampshire Audubon to learn more about volunteer State of the Bird opportunities.

Protect birds against predators and disturbances

- Keep your cat indoors! Domestic cats are among the greatest threats to wild birds in the United States. Even well fed cats and cats with bells will kill birds. For more information visit www.abcbirds.org/abcprograms/policy/cats/index.html.
- Obey signs posted to protect nesting birds, typically found on dunes, shorelines, and other sensitive nesting areas, and keep dogs leashed when near such areas.

Make your home, yard, and community bird friendly

- Avoid using pesticides and insecticides; if you currently have pesticides, dispose of them at a household hazardous waste collection day. See www.abcbirds.org/abcprograms/policy/toxins/index.html.
- Promote non-toxic control measures when necessary for mosquitoes in your home or community. Mosquitoes are an important food source for nighthawks, as well as bats and dragonflies, and these predators will help to keep them in check. To protect yourself from mosquitoes, use repellent, cover up, and reduce mosquito breeding opportunities around your house. For more on what you can do in your yard check: www.cdc.gov/ncidod/dvbid/westnile/qa/prevention.htm.
- Plant bird-friendly bushes and trees, with berries or mast; provide nesting spots in cavities and dense vegetation; leave leaf litter and brushy areas where birds can hide. National Wildlife Federation offers a backyard "certified wildlife habitat" program– visit www.nwf.org/Get-Outside/Outdoor-Activities/Garden-for-Wildlife.aspx. See also http://extension.unh.edu/resources/resource/427; *Integrated Landscaping: Following Nature's Lead and Landscaping at the Water's Edge: An Ecological Approach* at http://extension.unh.edu/resources/; and *The Backyard Naturalist* by Susan Story Galt, available at New Hampshire Audubon.
- Keep your yard free of invasive plants. Educate yourself and others about the common invasives so you can act effectively to eliminate them. See http://agriculture.nh.gov/divisions/plant_industry/index.htm and www.invasivespeciesinfo.gov/unitedstates/nh.shtml for a variety of resources.
- Be on the lookout for invasive pests. Learn to identify insects like the Asian Longhorned Beetle and the Hemlock Woolly Adelgid. Participate in organized surveys of vulnerable areas like those coordinated by New Hampshire Audubon. Report any sightings to the NH Department of Agriculture, Markets and Food, NH Division of Forests and Lands, or your local UNH County Cooperative Extension Forester.

LEN MEDLOCK

Piping Plover chick on Seabrook Beach, New Hampshire.

DONALD DUERR, USDA FOREST SERVICE, BUGWOOD.ORG

Asian Longhorned Beetle.

- Use local firewood. For more information, see www.na.fs.fed.us/pubs/palerts.shtm and www.nhdfl.org/forest-health/regulated-pests.aspx.
- Windows are invisible killers because birds see only plants and sky reflected in them, or the indoor plant on the other side. Millions of birds are killed annually from flying into windows, more often during migration and most often from windows in homes. Not all windows are equally hazardous. Certain situations, such as highly reflective windows and those near bird activity areas like feeders, deserve the most attention. There are a number of strategies for reducing reflections in glass. See www.abcbirds.org/abcprograms/policy/collisions/index.html. See also www.flap.org. If you are replacing windows, ask for bird-friendly glass. One design is being tested, but glass companies need to know there is a demand. Locate bird feeders and birdbaths less than two feet from any window so that birds cannot build up enough momentum to be injured if they do hit the window.

BRETT BILLINGS/USFWS

Window with anti-bird strike film (pane on right).

- Birds can be disoriented by lighted windows at night. Many migrating birds move at night and are particularly susceptible. Some cities, including Boston, have initiated "lights out" programs during peak migration. Visit www.flap.org or www.abcbirds.org/newsandreports/releases/090327.html.
- Remove chimney guards from late April through early August, or install a Chimney Swift tower. For more on Chimney Swift conservation check: www.chimneyswifts.org/ and www.sepif.org/swift/index.html.

Protect birds on wintering grounds

- Avoid produce that is grown using toxic agrochemicals; buy local and organic whenever possible; advocate for accurate food labeling. Although the effects of pesticides in use are not fully known, experience with DDT offers a cautionary tale, from which we are still learning. As recently as 1996 the pesticide monocrotophos – applied to fields in Argentina – resulted in the deaths of thousands of Swainson's Hawks, and we know that pesticides that kill insects eliminate a food source for insectivores. See www.abcbirds.org/abcprograms/policy/toxins/index.html. See also www.rachelcarson.org.
- Buy bird-friendly, shade grown coffee to help conserve wintering habitat and create a demand for this product. Shade grown coffee plantations maintain natural tree canopies similar to those of an undisturbed tropical forest and can support more than 150 species of birds – rivaling the numbers found in undisturbed tropical forests and including "our" orioles, tanagers, warblers, and thrushes. Sun coffee produces higher yields, at tremendous ecological cost. Learn about the Smithsonian Institution's "bird friendly" certification program at http://nationalzoo.si.edu/ConservationAndScience/MigratoryBirds/Coffee/default.cfm.

Support bird research and monitoring

- We lack a basic understanding of what environmental changes are affecting some of our birds here in New Hampshire. Support organizations like New Hampshire Audubon, whose staff are exploring possible causes of the population trends summarized here and identifying ways to reverse declines.
- Support research into threats facing birds on the non-breeding grounds

Support local and regional land conservation efforts and the organizations behind them.

- New Hampshire has a strong land trust community, and most cities and towns are served by a local or regional land trust. Become a land conservation advocate and a land trust member, or put your land into permanent conservation. For the land trust nearest you, see http://clca.forestsociety.org/pdf/land-trust-list.pdf.

Advocate for:

- local regulations that protect wildlife (see "Community Official" on page 31).
- reduced use of pesticides and other toxins
- conservation funding, at local, state, and federal levels
- continued state and federal funding in support of bird conservation and habitat protection
- organic farming-friendly laws and regulations
- a national ban on lead sinkers and lead jigs and lead shot
- a ban on the export of chemicals banned in the United States
- climate change control legislation
- acid rain control
- other bird friendly legislation

As the Owner or Manager of Forest Land, Farmland, or a Wetland Habitat

- If you own spruce/fir forest land, manage it for age class and structural diversity. UNH Cooperative Extension offers landowners free advice on forest management issues.
- If you own a large tract of forest land, maintain it as such.
- Consider putting it into permanent conservation with a **conservation easement**, whereby you would continue to own and manage the land.
- Create habitat for shrubland species without compromising the habitat for interior forest species. This can be done with timber cuts planned to maximize early to mid-successional habitats that still maintain a large intact forest, or by allowing natural disturbances (fire, native insects, wind) to create openings within the forest. See, for example, http://extension.unh.edu/FWT/HabBrochures.htm. Always work with a licensed forester to ensure sound woodlot forestry practices on your land, and let your forester know that creating and preserving bird habitat is important to you!
- Time logging operations to avoid the nesting season.
- If you already own shrubland habitat, consult a wildlife expert about the value of managing your habitat to prevent trees from growing in (see http://extension.unh.edu/FWT/Shrublands.htm for management guidance). Even in small patches, berry-bearing shrub habitat is valuable for birds prior to and during migration.
- If you have fields, time mowing to avoid disturbance to ground nesting species. Talk with a wildlife specialist from UNH Cooperative Extension about managing the land for grassland birds. See also the publications on Conserving Grassland Birds by Massachusetts Audubon, at www.massaudubon.org/Birds_and_Birding/grassland/.
- If you own marsh and scrub-shrub wetlands, floodplain forests, vernal pools, saltmarsh, or other special wetland habitats, learn what to do to encourage maximum wildlife use. See, for example, http://extension.unh.edu/FWT/HabBrochures.htm.

RICHARD BAETSEN/USFWS.

American Woodcock, a species that benefits from habitat management.

As a Community Official

- Ensure that your local ordinances and regulations protect wetlands and buffers along the wetlands, ponds, lakes, streams, and rivers in your community.

PAMELA HUNT

- Keep abreast of emerging technologies to control aquatic weeds without herbicides. In New Hampshire, the most serious weeds are non-native species, especially milfoil *(Myriophyllum heterophyllum)*. The most effective strategy is to keep it out of lakes and ponds to begin with. Educating boaters about this threat and carefully inspecting boats for plant fragments before launching are important preventive steps. Early removal while infestations are still small is much more successful than efforts to control extensive areas, and large infestations typically require professional intervention. The New Hampshire Exotic Aquatic Species Program at the Department of Environmental Services provides information about the latest control techniques (see http://des.nh.gov/organization/divisions/water/wmb/exoticspecies/index.htm).
- Check your regulations to make sure they discourage road construction in undeveloped areas, and they do encourage connections between and among conservation properties. Every new road and cul-de-sac potentially not only fragments the landscape but also heightens the risks to birds.

- Do an audit of your municipal regulations with respect to wildlife and natural resources protection. Download instructions at http://wildlife.state.nh.us/wildlife/Wildlife_Plan/WAP_habitat_audit.html, or contact New Hampshire Audubon for assistance.
- Advocate for proper siting and design of towers to decrease risk of bird kills. See www.fws.gov/southwest/es/oklahoma/tower.htm and www.fws.gov/habitatconservation/windpower/Wind_Turbine_Guidelines_Advisory_Committee_Recommendations_Secretary.pdf.
- Identify the large, unfragmented blocks of forest and grassland in your community, including lands that abut undeveloped land in adjacent towns. Remember: town borders are meaningless to birds!
- As conservation commission members, work with landowners, adjacent municipalities, and your local/regional land trust to help maintain these lands intact.
- As planning board members, engage developers in discussions about habitat protection. Minimize fragmentation by clustering houses and minimizing road construction in undeveloped land. In your planning work, use the publication *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* (Oct 2008), available from the NH Department of Environmental Services or your regional planning commission. It is also available online at http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm.
- As regional planners, help communities identify intermunicipal conservation opportunities for protecting and connecting natural habitats. Keep abreast of efforts to identify significant habitats within your region. Contact NH Fish and Game Department or New Hampshire Audubon for assistance.

As a Business Owner

- For landscaping your building, use native vegetation appropriate for your site. Businesses situated in special habitats, like the pine barrens in Concord, for example, could reduce habitat fragmentation by keeping native pitch pines and other local plants of sandy soils instead of planting lawns and hardwood trees that need watering and change pine barrens habitat. This would benefit birds of the pine barrens, save money, and help create a green corporate image. Seek advice from a landscaper who specializes in native plants. See chapter 3.6, "Landscaping" in *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development* at http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm. See also *Integrated Landscaping: Following Nature's Lead* available at http://extension.unh.edu/news/2008/01/integrated_landscaping_followi.html.
- Pay attention to windows and night lighting. Help create demand for bird friendly windows by asking for them in new construction or renovations. The glass industry needs to know there is a market. See above under "Make your home, yard, and community bird friendly."
- If nighthawks, cliff swallows, or other native urban nesting birds chose your business for raising young, it is often easy to co-exist with them. They usually finish raising their young in a couple of months, they very rarely approach people, and a bird such as a nighthawk creates no mess to clean up. New Hampshire Audubon can help you identify the bird (not all urban nesting birds are native or welcome) and provide information about their habits and length of stay.
- If you own a gravel pit and Bank Swallows move into an exposed bank, wait for the young to fledge before removing the gravel. They typically fledge in two months, although late nesters may linger until the end of July. These birds actually appreciate newly exposed sand and gravel banks for nesting, and may return the following year to occupy other parts of an active excavation.
- Take steps that reduce your contribution to climate change.

PAMELA HUNT

Cliff Swallows prefer to nest on buildings.

DENNIS SKILLMAN

Great Blue Herons.

Status of New Hampshire's Breeding Birds

This table lists all breeding species included in the *New Hampshire State of the Birds* analysis. It shows the general population trend for each species and which habitat groups included that species. For more details on the trends and how they were determined, see *The State of New Hampshire's Birds* technical report.

The general trend is defined as follows:

Increasing: populations show persistent increases both in New Hampshire and regionally

Stable: populations show no significant increases or decreases

Declining: populations show persistent declines both in New Hampshire and regionally

Uncertain: population trends for New Hampshire are different from those across the region (e.g., decline in New Hampshire and increase across southern New England)

Unknown: there are too few data to determine a trend.

Common Name	Spruce-Fir	Hardwoods/Mixed	Shrublands	Grasslands	Wetlands	Riparian	Lakes and Rivers	Coastal	Developed	Aerial Insectivores	General Trend
Canada Goose					x		x				increasing
Mute Swan					x						increasing
Wood Duck					x						increasing
American Black Duck					x			x			stable
Mallard					x		x	x			increasing
Green-winged Teal					x						unknown
Ring-necked Duck					x						unknown
Common Eider								x			unknown
Common Goldeneye							x				unknown
Hooded Merganser					x						unknown
Common Merganser							x				uncertain
Ruffed Grouse		x	x								declining
Spruce Grouse	x										unknown
Wild Turkey		x									increasing
Common Loon							x				increasing
Pied-billed Grebe					x						unknown
Double-crested Cormorant								x			increasing
American Bittern					x						uncertain
Least Bittern					x						unknown
Great Blue Heron					x		x				uncertain
Green Heron					x						uncertain
Turkey Vulture		x									increasing
Osprey					x		x	x			increasing
Bald Eagle							x				increasing
Northern Harrier			x	x	x						unknown
Sharp-shinned Hawk		x							x		unknown
Cooper's Hawk		x							x		increasing
Northern Goshawk		x									unknown
Red-shouldered Hawk		x									uncertain
Broad-winged Hawk		x									stable
Red-tailed Hawk		x		x							uncertain
American Kestrel				x							declining
Merlin	x	x									increasing
Peregrine Falcon									x		increasing

Common Name	Spruce-Fir	Hardwoods/Mixed	Shrublands	Grasslands	Wetlands	Riparian	Lakes and Rivers	Coastal	Developed	Aerial Insectivores	General Trend
Virginia Rail					x			x			unknown
Sora					x						uncertain
Common Moorhen					x						unknown
Piping Plover								x			increasing
Killdeer				x					x		declining
Spotted Sandpiper					x	x	x	x			uncertain
Willet								x			stable
Upland Sandpiper				x							uncertain
Wilson's Snipe					x						uncertain
American Woodcock		x	x								declining
Herring Gull								x			declining
Great Black-backed Gull								x			uncertain
Roseate Tern								x			increasing
Common Tern								x			increasing
Arctic Tern								x			declining
Black Guillemot								x			increasing
Rock Pigeon									x		uncertain
Mourning Dove									x		increasing
Yellow-billed Cuckoo			x								declining
Black-billed Cuckoo			x								declining
Eastern Screech-Owl		x							x		unknown
Great Horned Owl		x									uncertain
Barred Owl		x									unknown
Northern Saw-whet Owl	x	x									unknown
Common Nighthawk			x						x	x	declining
Whip-poor-will		x	x							x	declining
Chimney Swift		x							x	x	declining
Ruby-throated Hummingbird		x							x		increasing
Belted Kingfisher						x	x				stable
Red-bellied Woodpecker		x							x		increasing
Yellow-bellied Sapsucker	x	x									increasing
Downy Woodpecker		x							x		increasing
Hairy Woodpecker		x							x		stable
American 3-toed Woodpecker	x										unknown

Common Name	Spruce-Fir	Hardwoods/Mixed	Shrublands	Grasslands	Wetlands	Riparian	Lakes and Rivers	Coastal	Developed	Aerial Insectivores	General Trend
Black-backed Woodpecker	x										unknown
Northern Flicker		x							x		declining
Pileated Woodpecker		x									increasing
Olive-sided Flycatcher	x				x					x	declining
Eastern Wood-Pewee		x								x	declining
Yellow-bellied Flycatcher	x									x	stable
Alder Flycatcher					x					x	uncertain
Willow Flycatcher			x							x	increasing
Least Flycatcher		x								x	declining
Eastern Phoebe									x	x	stable
Great Crested Flycatcher		x							x	x	stable
Eastern Kingbird			x		x	x				x	declining
Yellow-throated Vireo		x									stable
Blue-headed Vireo	x	x									stable
Warbling Vireo						x			x		stable
Philadelphia Vireo	x										increasing
Red-eyed Vireo		x									uncertain
Gray Jay	x										stable
Blue Jay		x							x		declining
American Crow		x							x		increasing
Fish Crow		x							x		increasing
Common Raven	x	x									increasing
Horned Lark				x				x			uncertain
Purple Martin									x	x	uncertain
Tree Swallow					x			x		x	uncertain
Northern Rough-winged Swallow						x				x	stable
Bank Swallow						x				x	declining
Cliff Swallow										x	declining
Barn Swallow										x	declining
Black-capped Chickadee		x							x		uncertain
Boreal Chickadee	x										declining
Tufted Titmouse		x							x		increasing
Red-breasted Nuthatch	x	x							x		stable
White-breasted Nuthatch		x							x		increasing
Brown Creeper	x	x									uncertain
Carolina Wren									x		increasing
House Wren			x						x		declining
Winter Wren	x										increasing
Sedge Wren					x						unknown
Marsh Wren					x			x			uncertain
Golden-crowned Kinglet	x										stable
Ruby-crowned Kinglet	x										declining
Blue-gray Gnatcatcher		x									stable
Eastern Bluebird				x					x		increasing
Veery		x									declining
Bicknell's Thrush	x										declining
Swainson's Thrush	x										uncertain
Hermit Thrush	x	x									increasing
Wood Thrush		x									declining
American Robin		x							x		stable
Gray Catbird			x						x		declining
Northern Mockingbird			x						x		declining
Brown Thrasher			x								declining
European Starling									x		declining
American Pipit											unknown
Cedar Waxwing			x			x			x	x	declining
Blue-winged Warbler			x								declining
Golden-winged Warbler			x								declining
Tennessee Warbler	x										declining

Common Name	Spruce-Fir	Hardwoods/Mixed	Shrublands	Grasslands	Wetlands	Riparian	Lakes and Rivers	Coastal	Developed	Aerial Insectivores	General Trend
Nashville Warbler			x								declining
Northern Parula	x										increasing
Yellow Warbler					x	x					declining
Chestnut-sided Warbler			x								declining
Magnolia Warbler	x										stable
Cape May Warbler	x										stable
Black-throated Blue Warbler		x									stable
Yellow-rumped Warbler	x	x									increasing
Black-throated Green Warbler		x									stable
Blackburnian Warbler	x	x									stable
Pine Warbler		x							x		increasing
Prairie Warbler			x								declining
Palm Warbler	x										increasing
Bay-breasted Warbler	x										declining
Blackpoll Warbler	x										declining
Cerulean Warbler		x									unknown
Black-and-white Warbler		x									declining
American Redstart		x									declining
Ovenbird		x									stable
Northern Waterthrush		x			x						declining
Louisiana Waterthrush		x				x					stable
Mourning Warbler			x								uncertain
Common Yellowthroat			x		x						declining
Wilson's Warbler			x								declining
Canada Warbler	x	x									declining
Eastern Towhee			x								declining
Chipping Sparrow		x							x		increasing
Field Sparrow			x								declining
Vesper Sparrow				x							declining
Savannah Sparrow				x							declining
Grasshopper Sparrow				x							declining
Nelson's Sparrow								x			unknown
Saltmarsh Sparrow								x			unknown
Seaside Sparrow								x			unknown
Song Sparrow			x	x					x		declining
Lincoln's Sparrow	x										uncertain
Swamp Sparrow					x						stable
White-throated Sparrow	x	x									declining
Dark-eyed Junco	x										declining
Scarlet Tanager		x									declining
Northern Cardinal			x						x		increasing
Rose-breasted Grosbeak		x									declining
Indigo Bunting			x								stable
Bobolink				x							declining
Red-winged Blackbird				x	x				x		stable
Eastern Meadowlark				x							declining
Rusty Blackbird	x				x						declining
Common Grackle					x	x			x		declining
Brown-headed Cowbird				x					x		declining
Orchard Oriole						x			x		unknown
Baltimore Oriole		x				x			x		declining
Purple Finch	x	x							x		declining
House Finch									x		increasing
Red Crossbill	x										uncertain
White-winged Crossbill	x										uncertain
Pine Siskin	x										declining
American Goldfinch			x						x		increasing
Evening Grosbeak	x	x									uncertain
House Sparrow									x		declining

LEN MEDLOCK

Eastern Screech-Owl.

Glossary

Acid deposition: Also known as acid rain, this phenomenon is the result of the burning of certain fossil fuels. Nitrates and sulfates in coal combine with moisture in the atmosphere to create acidic particles. These particles can come to earth in rain, snow, fog, and dry particles and lower the pH (increase the acidity) of water bodies and the soil.

Area sensitive: Refers to species that require a certain minimum amount of habitat before they will settle and attempt to breed. Most commonly observed in forest and grassland birds.

Bioaccumulate: The process by which environmental toxins increase in concentration as they are passed up the food chain. This is the result of predators needing to consume multiple prey items, each of which has a dose of the toxin.

Bole-nesting: Bole-nesting species are those which nest in cavities in tree trunks. Many readily adapt to bird houses.

Conservation easement: A deed that runs with the land to permanently protect the land in an undeveloped condition for forestry, farming, habitat conservation, low-impact outdoor recreation, and similar open space uses.

Edge: The area where two different habitats meet. Edges are zones of often rapid environmental change, such as when the cooler and moister conditions of a forest interior give way to a warm and dry grassland.

Guild: The term guild refers to a group of species that all share a similar ecological characteristic, such as foraging behavior or nest site.

Invasive species: These are plants or animals that are generally not native to an area and which have been accidentally or intentionally introduced. Lacking their natural enemies, they often reproduce at high rates, outcompete native species, and result in significant changes to the habitats in which they occur.

Irruptive: Irruptive species undertake long-distance movements in some years and not in others. The timing and destination of these movements can vary significantly, and local abundance fluctuates among years as a result.

Long-distance migrants: Long-distance migrants are species which breed in the US and Canada but whose winter ranges are largely south of the United States, including the Caribbean, Mexico, and Central and South America.

Obligates: An obligate species is one that requires a certain environmental feature such as habitat, nest site, or prey item. In this report it is most often used in the habitat sense: an "obligate spruce-fir" bird does not occur outside of spruce-fir forest.

Residents: Resident species are non-migratory and spend their entire lives in New Hampshire. Some, such as Blue Jays and Chickadees, may undertake short distance movements, but the species can still be found in the state year round.

Short-distance migrants: Short-distance migrants are species which breed in the US and Canada but whose winter ranges are primarily within the United States, although usually south of New Hampshire.

Stopover habitat: This is habitat where a migrating bird stops to rest and refuel during its spring or fall migration. Stopover habitat can vary in terms of the shelter and food it provides.

Wildlife openings: Small openings in forest habitats created for the purpose of providing habitat diversity for wildlife. They are usually the result of complete or partial timber harvests and are dominated by a mix of grasses and shrubs.

For More Information

Resources

For readers interested in learning more about bird populations, threats facing them, or conservation actions that can benefit them, here are several websites that provide more information. Additional resources are listed in the original *State of New Hampshire's Birds* technical report, available at www.wildnh.com/birds.

New Hampshire Audubon
www.nhaudubon.org
Founded in 1914, New Hampshire Audubon research, monitoring, education, advocacy, and land protection programs focus on protecting New Hampshire's natural environment for wildlife and for people. Members and friends provide vital support for our conservation work.

N.H. Fish and Game Department
www.wildlife.state.nh.us/Wildlife/wildlife.htm
The Department is charged with conserving all the wildlife in the state, including both game and "non-game" species. Web site resources include the New Hampshire Wildlife Action Plan and *The State of New Hampshire's Birds* technical report.

UNH Cooperative Extension
http://extension.unh.edu/Wildlife/Wildlife.htm
Extension provides outreach and technical assistance to landowners across the state. Web site resources include habitat management recommendations and information on programs offered by Extension.

American Bird Conservancy
www.abcbirds.org
This non-profit advocates for bird conservation in the Western Hemisphere. It is active in many of the issues identified in this report, including cat predation, pesticides, and threats to birds on the winter grounds.

US State of the Birds
www.stateofthebirds.org
The national State of the Birds documents, beginning with the first in 2009.

National Bird Conservation Initiatives
These are collaboratives among agencies, non-profits, and other groups. Each is focused on a particular subgroup of birds.

- **Partners in Flight**
  www.partnersinflight.org
  Conservation planning for "landbirds," a broadly defined group that includes all species other than shorebirds, waterfowl, "waterbirds," and resident game birds.
- **The Shorebird Group**
  www.fws.gov/shorebirdplan
  North American shorebird conservation through research, monitoring, and conservation planning.
- **The Waterbird Group**
  www.fws.gov/birds/waterbirds/MANEM
  Wetland and marine birds including colonial waterbirds (e.g., herons and terns), marshbirds (e.g., rails and bitterns), and other solitary species such as loons.
- **The North American Waterfowl Management Plan**
  www.fws.gov/birdhabitat/NAWMP/index.shtm
  Conservation of ducks, geese, and swans.

Data Sources

Without the resources listed below (among others) it would be far more difficult to assess the health of bird populations both in New Hampshire and across North America.

Breeding Bird Survey (BBS)
www.mbr-pwrc.usgs.gov/bbs/bbs.html
The BBS is a nationwide bird monitoring system established in 1966. It includes over 4,000 25-mile roadside routes that are surveyed annually during the breeding season. The website provides trends for any species or region and bird conservation information.

Christmas Bird Count
www.audubon.org/bird/cbc/index.html
This annual winter bird count began in 1900 and is the oldest survey of its kind. It is conducted by volunteers and coordinated by the National Audubon Society.

***New Hampshire Bird Records* (NHBR)**
www.nhbirdrecords.org
NHBR is a statewide database of bird sightings in New Hampshire in partnership with eBird, and a source of data on the distribution and abundance of the state's birds. The database (and associated quarterly publication) is managed by New Hampshire Audubon.

A NOTE ON DATA SOURCES

Despite all the gaps in our knowledge, birds arguably are the best-monitored group of organisms in North America. Extensive data sets from continent-wide sources and more targeted surveys for state and federally endangered species and species of concern inform our understanding. New Hampshire data from the Breeding Bird Survey (BBS, U.S. Geological Survey program extant since 1966) were used most extensively for this report, supplemented by regional BBS information when state sample sizes were too small to produce an accurate or reliable trend. Christmas Bird Count data, monitoring programs for special species, Breeding Bird Atlases, Backyard Winter Bird Survey, and raptor migration counts also factored into trend analyses when appropriate. They were especially useful for setting New Hampshire trends in a regional context. *The State of New Hampshire's Birds* technical report explains these data sources, methods and results in more detail; it is available at www.wildnh.com/birds.

New Hampshire Audubon

Our mission is to protect New Hampshire's natural environment for wildlife and for people.

Conservation

We protect wildlife through research, monitoring, management, and education.

MADELINE MCELANEY

New Hampshire Audubon has played a key role in Peregrine Falcon recovery efforts in New Hampshire since 1981.

Sanctuaries

New Hampshire Audubon owns and manages thousands of acres of habitat in wildlife sanctuaries throughout the state.

PAM HUNT

Ponemah Bog Wildlife Sanctuary.

Education

Teaching people about the natural world is at the core of environmental protection.

SARAH WALL

At our camps, centers, sanctuaries, raptor observatories, and schools, New Hampshire Audubon educators connect people with nature.

Centers

New Hampshire Audubon operates centers in Auburn, Concord, Manchester, and Hebron. Member-driven chapters around the state offer additional bird watching and program opportunities.

JULIE KLETT

Massabesic Audubon Center

Advocacy

Staff biologists inform public policy positions and work for environmental protection at local, state, and federal levels.

JULIE KLETT

New Hampshire State House, Concord, New Hampshire.

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www.facebook.com/nh.audubon

Each individual action you take to help conserve birds can make a difference. All of us working together, for a world we share with the birds, is vitally important, for our birds and potentially, for us. The choice is ours.

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