Appendix A: Birds

Appendix A: Birds

Northern Goshawk

Accipiter gentilis

Photo by Tomas Sereda, dreamstime.com

Federal Listing	N/A
State Listing	
Global Rank	G5
State Rank	S3
Regional Status	Very High

Justification (Reason for Concern in NH)

Northern Goshawk is generally considered an SGCN because of its association with large tracts of forest. Rapid population growth in New Hampshire has resulted in extensive losses of forest, particularly in the southern portion of the state. Development and changes in ownership divide forest into smaller parcels, compromising goshawks by reducing the availability of nest sites and prey species. Fragmented landscapes may also increase competition with other raptors such as Great Horned Owls and Red-tailed Hawks, which are better adapted to foraging and nesting in these areas (Crocker-Bedford 1990).

Distribution

The Northern Goshawk breeds across northern and western North America, including the mountains of western Mexico (Squires and Reynolds 1997). It also occurs throughout Europe and in Asia north of the Himalayas. Most individuals winter within the breeding range, although some occur in areas immediately to the south. In some areas, goshawk populations track those of prey species (e.g., Snowshoe Hares), and in irruption years may occur in larger than usual numbers south of breeding areas. The species nests throughout New Hampshire (Foss 1994), although it is rare near the coast, and data on population dynamics are lacking.

Habitat

Northern Goshawk breeding home range consists of nesting areas, post-fledgling family areas, and foraging areas (Reynolds et al. 1992). All goshawk breeding activity, from courtship to fledging, centers around the nesting area, which includes the nest tree and surrounding stands that contain prey handling areas, perches, and roosts. In New Hampshire, white pine (*Pinus strobus*), paper birch (*Betula papyrifera*), yellow birch (*Betula alleghaniensis*), Big-toothed aspen (*Populus grandidentata*), and red maple (*Acer rubrum*) are common nesting trees. Among nest trees evaluated from southern Maine and New Hampshire, 48% were white pines (n=56) (Karedes 2012). These stands tend to be mature, containing some large diameter trees, and have relatively dense canopies and open understories. Most have been somewhat disturbed. Nest sites are generally situated close to the bottom of gentle slopes, most below 1,500 ft. In New Hampshire breeding Northern Goshawks appear to have an affinity for sites with pine cover in core areas (162 hectares centered on nest trees), yet appear to avoid grasslands in core areas (Karedes 2012)

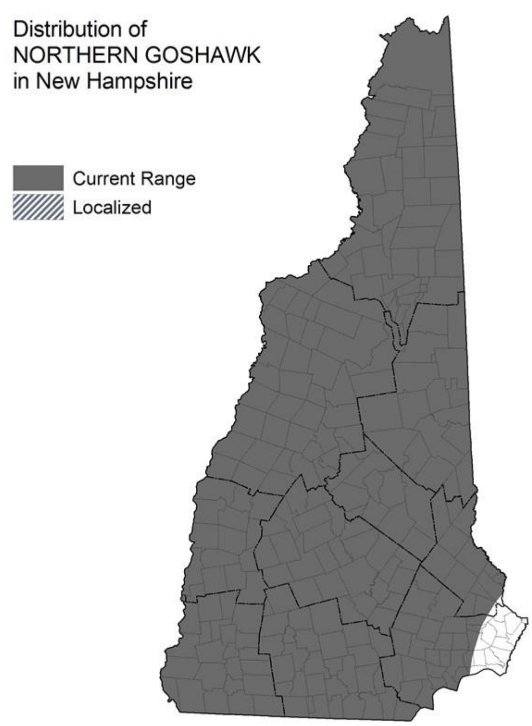
Nests are constructed in large trees with dominant and co-dominant positions in the canopy, but are not necessarily the largest trees in the stand. A nest tree must contain a branching structure suitable for holding a large bulky stick nest. Goshawks will often maintain 1 to 8 alternate nests within their nesting areas (Yamasaki and Costello, unpublished data, Speiser and Bosakowski 1987, Reynolds et al. 1994). Nest trees are often situated close to some type of forest opening (e.g., small breaks in the canopy, trails, forest roads, and upland openings).

The post-fledgling-family area is the area surrounding the nest site used by both adults and juveniles after fledging and until juvenile independence (Reynolds et al. 1992). This area is similar to nesting habitat and is believed to be critical in providing extra cover and abundant prey for unskilled juveniles. Research from the western United States suggests that the post-fledgling-family area varies in size from 121 to 243 hectares (300 to 600 acres), probably due to variation in food availability (Reynolds et al. 1992, Kennedy et al. 1994, Daw and DeStefano 2001).

Goshawk foraging areas consist of large tracts of forestland containing a variety of forest age classes and openings that can support the diverse habitat requirements of important goshawk prey species (Reynolds et al. 1992). These species include ground and tree squirrels, game birds, medium to large-sized songbirds, corvids, rabbits, and hares (Reynolds et al. 1992, Bosakowski et al. 1992, Boal and Mannan 1994, Doyle and Smith 1994). Much research suggests that goshawks forage in closed canopy forests with open understories where prey is accessible, but that younger stands and openings are important for prey production. Karedes's (2012) analysis of landcover data revealed a significantly greater presence of birch/aspen stands within Northern Goshawk breeding areas compared to available habitat. Critical winter goshawk habitat in eastern North America is unknown.

NH Wildlife Action Plan Habitats

- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Lowland Spruce-Fir Forest
- Northern Hardwood-Conifer Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

Karedes (2012) provides the most comprehensive evaluation of known nest sites for Northern Goshawk in New Hampshire. The study focused on nests sites in and around the White Mountain National Forest but included additional sites throughout the state.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown.

Habitat Protection Status

Karedes (2012) analyzed the location of 44 nest locations in New Hampshire and determined that 70.5% (n=31) were on conservation lands (private and public) and 29.5% (n=13) were locate on private land without conservation protection.

Habitat Management Status

Habitat is not specifically managed for this species in NH.

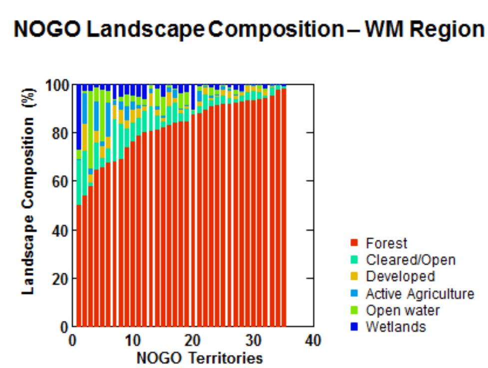
Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Development reduces the number and distribution of available nest sites and foraging habitat. Additionally, these activities can increase populations of goshawk predators such as raccoons and Great Horned Owls.

Analysis of landscape composition in New Hampshire's White Mountain Region demonstrates that Northern Goshawk territories are found in areas domintated by forest cover (table provided by Yamasaki in 2015 email correspondence).



List of Lower Ranking Threats:

Disturbance from recreational activity

Habitat degradation from forestry practices

Actions to benefit this Species or Habitat in NH

Develop and collect occurrence, habitat, and distribution data

Primary Threat Addressed: Habitat conversion due to development

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:
Census surveys in likely habitat will provide more information on a poorly understood species and will allow testing of habitat alteration hypotheses. Ecological studies will help determine the urgency of threats to the goshawk.

General Strategy:
State-wide surveys will provide distribution and habitat survey data upon which population analyses can be conducted. Statewide surveys can be followed by closer investigation of hemlock-hardwood-pine, northern hard-wood-conifer, Appalachian oak-pine, and lowland spruce-fir types. Investigations that increase knowledge of goshawk demographics and habitat availability (or degradation) will allow for better management

Continuing support for ongoing goshawk population and habitat work in the White Mountains region and expanding these efforts state-wide would allow the direct testing of the habitat alteration hypothesis. Such surveys and habitat assessments are needed to better describe the status of goshawk and the characteristics of those habitats where goshawk occurs (e.g., associated vegetative communities, habitat condition indicators, any positive or negative forest management and recreational threats to habitat).

Political Location:
Statewide

Watershed Location:
Statewide

Research a range of factors that may impact goshawk populations in NH

Objective:
Develop survey methods or use existing surveys to further understand winter abundance and distribution of goshawks, and initiate research of impacts to goshawks in NH.

General Strategy:
Develop a survey method or make use of existing surveys (e.g., Christmas Bird Counts, Feeder Watches) to obtain an index of winter abundance and distribution in the state. Determine home range sizes and characterize breeding and foraging habitat at landscape, stand, and within-stand scales this was done. Determine how changes in forest structure and landscape patterns affect reproductive success, survival rates, territory fidelity, juvenile dispersal, and breeding dispersal. Determine important prey species of goshawk in this region and determine how the abundance and

availability of prey is influenced by forest structure, management practices, landscape patterns, and natural cycles. Determine migratory status of goshawks breeding in New Hampshire and winter survival rates of adults and juveniles. Determine if West Nile Virus is affecting goshawk populations

New Hampshire. Identify effects of various forest management practices on goshawk habitat, nest site fidelity, productivity, and prey availability.

Political Location:
Statewide

Watershed Location:
Statewide

Use different methods of evaluating goshawk populations and characterizing habitat use

Objective:
Develop a statewide broadcast monitoring program and test a rapid assessment process to collect data on distribution.

General Strategy:
Develop a statewide broadcast monitoring program for goshawk that will be regionally viable. Although time consuming and labor intensive, broadcast surveys are the best method available and can be used to monitor areas for occupancy, changes in distribution and abundance, and nest location. Data on distribution are most essential in areas expected to experience the most severe habitat loss.

Characterize goshawk winter habitat.

Political Location:

Watershed Location:

References, Data Sources and Authors

Data Sources
Information on goshawk habitat, population distribution, and status was compiled from unpublished data from on-going research, scientific literature, limited agency data, surveillance of the New Hampshire bird list-serve, as well as from direct searches.
There are no statewide or regional data upon which to assess the condition of goshawk.

Data Quality
There are no systematic goshawk sampling efforts in New Hampshire. Breeding bird surveys, hawk watches, and Christmas bird counts do not adequately survey for the seasonal and elusive goshawk. The objectives of current research efforts focused in the White Mountain region by the Northeastern Research Station are to locate breeding territories and describe nesting habitat and do not address demographics. Minimal funding results in inconsistent surveying and monitoring.
There are no data available to make this assessment.

2015 Authors:
Pamela Hunt, NHA, John Kanter, NHFG

2005 Authors:
Mariko Yamasaki, USFS; Christine Costello, USFS

Literature

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Saltmarsh Sparrow

Ammodramus caudacutus

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Birds that breed in salt marsh are widely recognized as conservation priorities by virtue of their specialized habitat needs, in combination with known high threats to salt marsh habitat. The Saltmarsh Sparrow in particular is restricted in range to the northeastern U.S. (Virginia to Maine), and is considered Vulnerable by the IUCN

Distribution

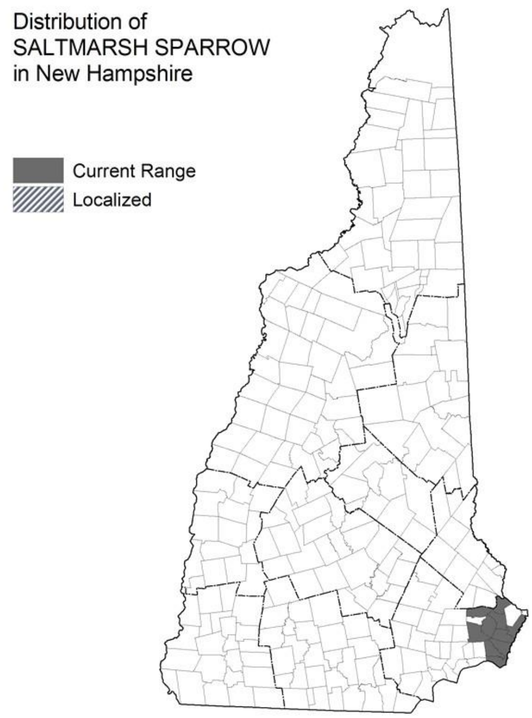
The Saltmarsh Sparrow breeds from Chesapeake Bay north to southern Maine, and winters from the southern edge of the breeding range south through the Gulf of Mexico. In New Hampshire it occurs in all salt marshes of sufficient size on Great Bay and along the immediate coast, but is rare or absent in the smaller marshes in the Little Bay/Salmon Falls River drainages.

Habitat

Saltmarsh Sparrows breed and winter exclusively in salt marshes, particularly in high marsh in areas of pools and pans (Greenlaw and Rising 1994). This and other salt marsh obligates appear to be area sensitive (Benoit and Askins 2002, Schriver et al. 2004), with Saltmarsh Sparrows only occupying marshes larger than ten hectares in Connecticut (Benoit and Askins 2002).

NH Wildlife Action Plan Habitats

- Salt Marshes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Based on surveys conducted in the 2000s, there are an estimated 1000 Saltmarsh Sparrows in New Hampshire (M. Correll, pers. comm.). This estimate is comparable of that of 300 pairs in the Hampton-Seabrook Estuary in 2007 (McKinley and Hunt 2008). There is no evidence for significant population change for this species in New Hampshire, but range-wide it is declining at 9%/year since 1998. Declines appear strongest on marshes with tidal restrictions. Annual reproductive success at Great Bay averages 0.64 broods/female, which is roughly half that of the co-occurring Nelson's Sparrow.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES
- Migratory Bird Treaty Act (1918)

Quality of Habitat

There is extensive variation across salt marshes in NH their suitability for salt marsh birds. Most coastal marshes have been subject to tidal restrictions and/or extensive ditching, both of which appear to reduce habitat quality. There are limited data with which to evaluate habitat quality in NH for Saltmarsh Sparrows. See also salt marsh habitat profile

Habitat Protection Status

The remaining salt marshes in NH are largely protected from development by wetlands regulations, and some parcels are additionally under conservation ownership by public and private entities.

Habitat Management Status

Habitat is not specifically managed for this species, although broader salt marsh restoration efforts would potentially benefit it, depending on project size and landscape context. See the salt marsh habitat profile for further detail.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to sea level rise (Threat Rank: High)

Rising sea levels will flood salt marshes and convert them to more open water habitats. In some cases, marsh will migrate inland, although rates and locations for such migration are poorly known. It is likely that existing human infrastructure will limit the extent to which marshes will migrate, resulting in a net loss of this already limited habitat in coastal New Hampshire. Species that nest in salt marsh will thus have less available habitat, and that which remains may be degraded and/or more vulnerable to flooding (see flooding threat) or other disturbance. See the salt marsh habitat profile for more information.

Disturbance from increased nest flooding (Threat Rank: High)

Birds nesting in salt marsh, particularly Saltmarsh Sparrows, are vulnerable to nest flooding during extreme high tides (Gjerdrum et al. 2008). To the extent that habitat alteration, human response to sea level rise, and increased storm frequency may affect tidal heights, this species should be considered additionally vulnerable to reduced reproductive success in addition to overall habitat loss.

Habitat impacts from tidal restriction (Threat Rank: High)

Dams and channelized streams alter the normal flows of tides in salt marsh habitats, often resulting in conversion to freshwater marshes (e.g., above dams), invasion by non-native plants, or altered sedimentation patterns. The resulting habitat changes generally reduce an area's suitability for nesting salt marsh birds. However, in a study of restored marshes in Connecticut, Elphick et al. (2015) found Saltmarsh Sparrows generally absent from restored sites, presumably because these sites tended to have characteristics of low marsh. See the salt marsh habitat profile for more information.

Habitat degradation from mosquito ditching (Threat Rank: High)

Historic ditching in salt marshes was used in attempts to control mosquito populations, and generally resulted in significant impacts to habitat conditions and salt marsh function. In a study of breeding birds in the Hampton-Seabrook Estuary, McKinley and Hunt (2008) documented significantly higher populations of Saltmarsh Sparrows in the least-ditched portion of marsh, a pattern also seen elsewhere in the Northeast (Reinert et al. 1981). See the salt marsh habitat profile for more information.

Disturbance from mercury toxicity (Threat Rank: Medium)

Relatively high levels of methylmercury have been documented in salt marsh sparrows (Schriver et al. 2006, Lane et al. 2011), which are believed the result of the high proportion of spiders in this species' diet. Mercury is known to interfere with neurological function and may ultimately reduce reproductive success, although there have been no studies to date on its effects in salt marsh birds.

Habitat impacts from insecticide use (mosquito treatment) (Threat Rank: Medium)

Insecticide spraying to control disease-bearing mosquito occurs regularly in coastal New Hampshire. To date there are no specific data on the effects of this spraying on non-target organisms, including birds. While direct toxic effects are unlikely, there are no data on whether reduced mosquito populations can have bottom-up effects on sparrow prey availability and thus reproductive success.

List of Lower Ranking Threats:

Habitat degradation and species disturbance from oil spills

Habitat degradation from acid deposition

Habitat degradation from introduced or invasive plants

Disturbance from noise associated with recreational activity

Disturbance from legal and illegal OHRV activity

Habitat impacts from road fragmentation

Species disturbance from salt hay mowing

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Salt Marsh Bird Monitoring

Objective:

Collect more detailed data on population trend to evaluate species status, and information on habitat use, to help prioritize conservation actions.

General Strategy:

More detailed data on population trend will allow for better evaluation of this species' current status (and recent trends) and perhaps serve as an indicator of the effects of ongoing stressors such as sea level rise. More detailed information on habitat use – in the context of current condition and future sea level rise – are needed to better prioritize conservation actions. Continue monitoring locations surveyed by SHARP in 2010-14 into the future and contribute these data to a regional data set. See the Salt Marsh habitat profile for additional actions that may benefit this species.

Political Location:

Rockingham County

Watershed Location:

Coastal Watershed

References, Data Sources and Authors

Data Sources

NHBR/NH eBird

Data Quality

Until recently data on this species' status in NH were limited to largely anecdotal reports from birders, which were complicated by the similarly to (and recent split from) Nelson's Sparrow. Extensive hybridization between Nelson's and Saltmarsh Sparrows in coastal New Hampshire (e.g., Walsh et al. 2015) also complicates accurate assessment of abundance and distribution of both species. More in-depth surveys in 2004 (McIlroy and Babbit, unpubl. data), 2007 (McKinley and Hunt 2008), and from 2010 onward (SHARP) have yielded a significant amount of new data on distribution and trend. Ongoing research at UNH and regionally, continues to provide data on hybridization, demography, and habitat use.

Because salt marsh birds live in habitats that are difficult to access, there is little in the way of long term data than could be used to assess trends. That problem has been solved through the implementation of a regional monitoring program (SHARP). SHARP has also provided data on smaller peripheral populations within the state, although some historic sites may still not have been surveyed recently.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Megan McElroy, UNH; Kimberly Babbitt, UNH

Literature

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Seaside Sparrow

Ammodramus maritimus

Federal Listing	N/A
State Listing	SC
Global Rank	
State Rank	S1
Regional Status	Very High

Justification (Reason for Concern in NH)

Birds that breed in salt marsh are widely recognized as conservation priorities by virtue of their specialized habitat needs, in combination with known high threats to salt marsh habitat.

Distribution

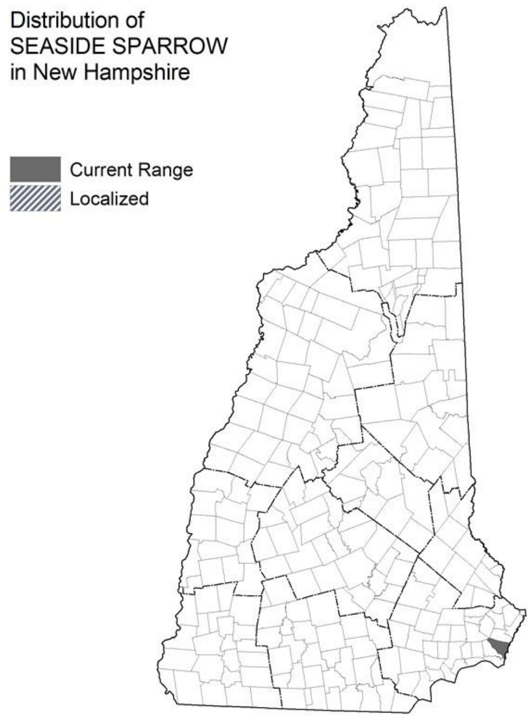
Seaside Sparrows breed from southern New England (uncommon in southern Gulf of Maine south and west along the coast to central Texas. They winter within the breeding range largely south of Virginia (Post et al. 2009). The species is extremely rare in New Hampshire, and is not recorded annually. Almost all recent records have been from the extensive non-ditched marsh at the northeast corner of the Hampton-Seabrook Estuary.

Habitat

The Seaside Sparrow is restricted to salt marshes, where it tends to occur more commonly in the high marsh zone dominated by *Spartina patens* and the short form of *Spartina alterniflora* (Post et al 2009). Like most other salt marsh obligates in the Northeast, it appears area sensitive (Shriver et al. 2004), and in Connecticut only occupied marshes over 60 hectares in size (Benoit and Askins 2002).

NH Wildlife Action Plan Habitats

- Salt Marshes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Populations of Seaside Sparrows in the northeastern U.S. appear stable (M. Correll, pers. comm.). In New Hampshire, a breeding population of 6-8 pairs occurred at Hampton in 1985 (Gavutis, in Foss 1994), but that level of abundance has not been recorded in subsequent years. In the breeding seasons from 1986 to 2001, few Seaside Sparrows were reported, and from 2002 to 2004 only 1 individual was reported each breeding season. In 2004, a complete survey of all potential breeding sites in New Hampshire revealed no evidence of breeding activity, although one individual was observed during at the historic location (McElroy and Babbitt, WAP 2005). The species was not detected during subsequent surveys in 2007 (McKinley and Hunt 2008), and since then there are single records for 2009 and 2010 (eBird).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES
- Marsh and shrub wetlands
- Migratory Bird Treaty Act (1918)

Quality of Habitat

The area of salt marsh where Seaside Sparrows have been recorded is one of the highest quality patches in the state, as it lacks extensive ditching (Eberhardt and Burdick. 2009). See salt marsh habitat profile for more information.

Habitat Protection Status

The remaining salt marshes in NH are largely protected from development by wetlands regulations, and some parcels are additionally under conservation ownership by public and private entities.

Habitat Management Status

Habitat is not specifically managed for this species, although broader salt marsh restoration efforts would potentially benefit it, depending on project size and landscape context. See the salt marsh habitat profile for further detail.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to sea level rise (Threat Rank: High)

Rising sea levels will flood salt marshes and convert them to more open water habitats. In some cases, marsh will migrate inland, although rates and locations for such migration are poorly known. It is likely that existing human infrastructure will limit the extent to which marshes will migrate, resulting in a net loss of this already limited habitat in coastal New Hampshire. Species that nest in salt marsh will this have less available habitat, and that which remains may be degraded and/or more vulnerable to flooding (see flooding threat) or other disturbance. See the salt marsh habitat profile for more information.

Habitat impacts from tidal restriction (Threat Rank: High)

Dams and channelized streams alter the normal flow of tides in salt marsh habitats, often resulting in conversion to freshwater marshes (e.g., above dams), invasion by non-native plants, or altered sedimentation patterns. The resulting habitat changes generally reduce an area's suitability for nesting salt marsh birds. See the salt marsh habitat profile for more information.

Habitat degradation from mosquito ditching (Threat Rank: High)

Historic ditching in salt marshes was used in attempts to control mosquito populations, and generally resulted in significant impacts to habitat conditions and salt marsh function. A study of breeding birds in the Hampton-Seabrook Estuary, McKinley and Hunt (2008) documented significantly higher populations of Saltmarsh Sparrows in the least-ditched portion of marsh, the same area historically used by Seaside Sparrows. See the salt marsh habitat profile for more information.

Disturbance from increased nest flooding (Threat Rank: Medium)

Birds nesting in salt marsh are vulnerable to nest flooding during extreme high tides (e.g., Gjerdrum et al. 2008). To the extent that habitat alteration, human response to sea level rise, and increased storm

frequency may affect tidal heights, this species should be considered additionally vulnerable to reduced reproductive success in addition to overall habitat loss.

Disturbance from mercury toxicity (Threat Rank: Medium)

Relatively high levels of methylmercury have been documented in salt marsh sparrows (Schriver et al. 2006, Lane et al. 2011), which are believed the result of the high proportion of spiders in this species' diet. Mercury is known to interfere with neurological function and may ultimately reduce reproductive success, although there have been no studies to date on its effects in salt marsh birds.

Habitat impacts from insecticide use (mosquito treatment) (Threat Rank: Medium)

Insecticide spraying to control disease-bearing mosquito occurs regularly in coastal New Hampshire. To date there are no specific data on the effects of this spraying on non-target organisms, including birds. While direct toxic effects are unlikely, there are no data on whether reduced mosquito populations can have bottom-up effects on sparrow prey availability and thus reproductive success.

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat degradation due to invasive or introduced plants

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

See actions for Saltmarshes.

Primary Threat Addressed: Habitat conversion due to development

Specific Threat (IUCN Threat Levels): Residential & commercial development

References, Data Sources and Authors

Data Sources

NHBR/NH eBird

Occurrence data are largely limited to reports submitted by birders (NHBR/eBird), and supplemented by statewide marshbird surveys in 2004 (McIlroy and Babbit, unpub. data) and 2007 (McKinley and Hunt 2008). More recent surveys conducted regionally (SHARP) have not included the area of Hampton where Seaside Sparrows typically occur.

Data Quality

Occurrence data are largely limited to reports submitted by birders (NHBR/eBird), and supplemented by statewide marshbird surveys in 2004 (McIlroy and Babbit, unpub. Data) and 2007 (McKinley and Hunt 2008). More recent surveys conducted regionally (SHARP) have not included the area of

Hampton where Seaside Sparrows typically occur.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:
Megan McElroy, UNH; Kimberly Babbitt, UNH

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Nelson's Sparrow

Ammodramus nelsoni

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	

Photo by Scott Young

Justification (Reason for Concern in NH)

Birds that breed in salt marsh are widely recognized as conservation priorities by virtue of their specialized habitat needs, in combination with known high threats to salt marsh habitat.

Distribution

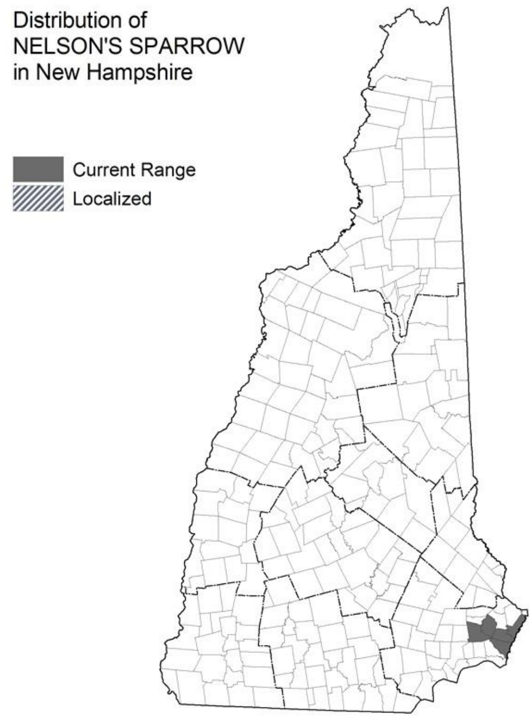
The Nelson's Sparrow breeds in three disjunct areas of North America (Greenlaw and Rising 1994). The most extensive portion of its range consists of prairies from the southern Northwest Territories to North Dakota and Minnesota. A second area includes the southwestern shore of Hudson and James Bays in Canada. Finally, the third segment ranges from the St. Lawrence River around the Canadian Maritimes and south to NH and extreme northeastern Massachusetts. In New Hampshire it occurs primarily in the fringing salt marshes of Great Bay, although smaller numbers are found regularly in marshes along the immediate coast. It appears least common in the Hampton/Seabrook estuary where the closely-related Saltmarsh Sparrow predominates (McKinley and Hunt 2007). The species winters in coastal marshes from Chesapeake Bay south and west to Texas.

Habitat

Nelson's Sparrows breeding in the northeastern United States (see Distribution) occur exclusively in salt marshes, although they sometimes use marshes with more freshwater influence than Saltmarsh Sparrows (Greenlaw and Rising 1994, pers. obs.). Farther north in southeastern Canada the species uses freshwater marshes more regularly, particularly along the St. Lawrence River. Inland populations use freshwater habitats exclusively (Greenlaw and Rising 1994). Unlike other salt marsh obligates, the Nelson's Sparrow does not appear to be area sensitive in coastal New England (Schriver et al. 2004).

NH Wildlife Action Plan Habitats

● Salt Marshes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Based on surveys conducted in the 2000s, there are an estimated 200 Nelson's Sparrows in New Hampshire (M. Correll, pers. comm.), with most of these probably around Great Bay. Although there are insufficient data to measure population trend within the state, the regional trend (NH and Maine) is -4.2%/year since 1998. Annual reproductive success at Great Bay averages 1.4 broods/female.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Fill and Dredge in Wetlands - NHDES
● Migratory Bird Treaty Act (1918)

Quality of Habitat

There is extensive variation across salt marshes in NH their suitability for salt marsh birds. Most coastal marshes have been subject to tidal restrictions and/or extensive ditching, both of which appear to reduce habitat quality. There are limited data with which to evaluate habitat quality in NH for Nelson's Sparrows. See also salt marsh habitat profile.

Habitat Protection Status

The remaining salt marshes in NH are largely protected from development by wetlands regulations, and some parcels are additionally under conservation ownership by public and private entities.

Habitat Management Status

Habitat is not specifically managed for this species, although broader salt marsh restoration efforts would potentially benefit it, depending on project size and landscape context. See the salt marsh habitat profile for further detail.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to sea level rise (Threat Rank: High)

Rising sea levels will flood salt marshes and convert them to more open water habitats. In some cases, marsh will migrate inland, although rates and locations for such migration are poorly known. It is likely that existing human infrastructure will limit the extent to which marshes will migrate, resulting in a net loss of this already limited habitat in coastal New Hampshire. Species that nest in salt marsh will this have less available habitat, and that which remains may be degraded and/or more vulnerable to flooding (see flooding threat) or other disturbance. See the salt marsh habitat profile for more information.

Disturbance from increased nest flooding (Threat Rank: High)

Birds nesting in salt marsh are vulnerable to nest flooding during extreme high tides (e.g., Gjerdrum et al. 2008). To the extent that habitat alteration, human response to sea level rise, and increased storm frequency may affect tidal heights, this species should be considered additionally vulnerable to reduced reproductive success in addition to overall habitat loss.

Habitat degradation from mosquito ditching (Threat Rank: High)

Historic ditching in salt marshes was used in attempts to control mosquito populations, and generally resulted in significant impacts to habitat conditions and salt marsh function. In a study of breeding birds in the Hampton-Seabrook Estuary, McKinley and Hunt (2008) documented significantly higher populations of Saltmarsh Sparrows in the least-ditched portion of marsh, although similar data are largely lacking for Nelson's Sparrow. See the salt marsh habitat profile for more information.

Habitat impacts from tidal restriction (Threat Rank: Medium)

Dams and channelized streams alter the normal flows of tides in salt marsh habitats, often resulting in conversion to freshwater marshes (e.g., above dams), invasion by non-native plants, or altered sedimentation patterns. The resulting habitat changes generally reduce an area's suitability for nesting salt marsh birds, although data are lacking on specific effects on Nelson's Sparrow. See the salt marsh habitat profile for more information.

Disturbance from mercury toxicity (Threat Rank: Medium)

Relatively high levels of methylmercury have been documented in salt marsh sparrows (Schriver et al. 2006, Lane et al. 2011), which are believed the result of the high proportion of spiders in this species' diet. Mercury is known to interfere with neurological function and may ultimately reduce reproductive success, although there have been no studies to date on its effects in salt marsh birds.

Habitat impacts from insecticide use (mosquito treatment) (Threat Rank: Medium)

Insecticide spraying to control disease-bearing mosquito occurs regularly in coastal New Hampshire. To date there are no specific data on the effects of this spraying on non-target organisms, including birds. While direct toxic effects are unlikely, there are no data on whether reduced mosquito populations can have bottom-up effects on sparrow prey availability and thus reproductive success.

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat degradation due to invasive or introduced plants

Habitat impacts from road fragmentation

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Salt Marsh Bird Monitoring

Objective:
Collect more detailed data on population trend to evaluate species status, and information on habitat use, to help prioritize conservation actions.

General Strategy:
More detailed data on population trend will allow for better evaluation of this species' current status (and recent trends) and perhaps serve as an indicator of the effects of ongoing stressors such as sea level rise. More detailed information on habitat use – in the context of current condition and future sea level rise – are needed to better prioritize conservation actions. Continue monitoring locations surveyed by SHARP in 2010-14 into the future and contribute these data to a regional data set. See the Salt Marsh habitat profile for additional actions that may benefit this species.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

References, Data Sources and Authors

Data Sources
NHBR/NH eBird

Data Quality

Because salt marsh birds live in habitats that are difficult to access, there is little in the way of long term data than could be used to assess trends. That problem has been solved through the implementation of a regional monitoring program (SHARP). SHARP has also provided data on smaller peripheral populations within the state, although some historic sites may still not have been surveyed recently.

2015 Authors:

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2005 Authors:

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Shriver, G.W., T.P. Hodgman, J.P. Gibbs, and P.D. Vickery. 2004. Landscape context influences salt marsh bird diversity and area requirements in New England. Biological Conservation 119: 545–553.

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Grasshopper Sparrow

Ammodramus savannarum

Federal Listing	N/A
State Listing	T
Global Rank	G5
State Rank	S2
Regional Status	Very High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Populations of most grassland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Grasshopper Sparrow populations in the Northeast have declined at 4.26% annually since 1966 (-3.4%/year from 2003-2013). Because of the species' overall rarity, BBS data on smaller scales (e.g., NH) are less accurate, although the species also shows a significant annual decline of 3.64% in BCR 30. There have also been declines of 15-75% based on repeated Breeding Bird Atlases in the northeast (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014). Grasshopper Sparrows were never common in New Hampshire, but have declined since the 1960s and are now found primarily at 5-6 sites in the southern part of the state.

Distribution

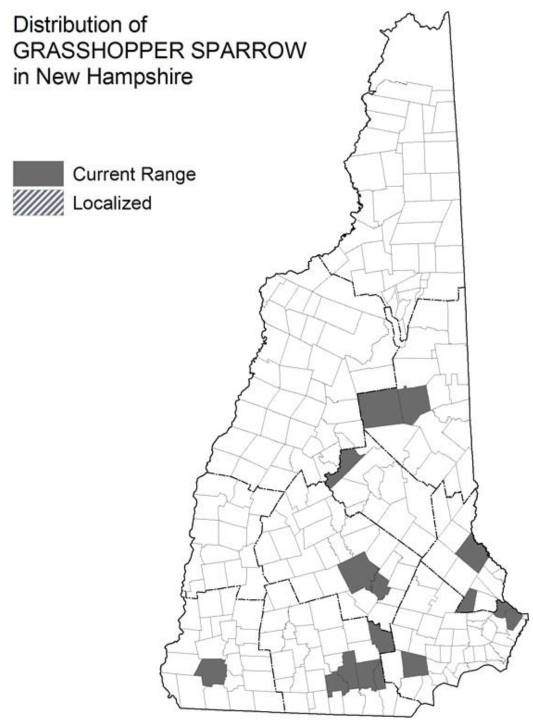
Grasshopper Sparrows breed across the United States and extreme southern Canada, although this distribution is more disjunct west of the Great Plains (Vickery 1996). Most of this population winters in Mexico and the southeastern United States. There are also isolated resident populations in Central America, the Greater Antilles, and extreme northwestern South America. In New Hampshire, the species has historically occurred south of the White Mountains, with most records in the Connecticut and Merrimack Valleys and near the seacoast (Foss 1994). Known current sites include the Keene, Concord, and Pease airports, and "Cemetery Fields" in Amherst. Other recent sites include the old Manchester landfill and the Manchester Airport, but neither has been checked since the mid-2000s (Hunt .

Habitat

In the eastern United States, Grasshopper Sparrows use dry fields with sparse grasses (usually bunch grasses) and weeds, few shrubs, and patches of bare ground. Although areas with more than 35% shrub cover are rarely used, a few scattered shrubs or other tall plants provide important song perches. Airports, abandoned agricultural fields, blueberry barrens, capped landfills, and sandplain grasslands provide suitable habitat (Vickery 1996). The Grasshopper Sparrow prefers large fields over 40 ha (100 ac), although the species will use sites as small as 12 ha (30 ac). However, not all large grasslands may be used. In Maine, sparrows occupied only 50% of suitable sites over 100 ha (250 ac; Vickery et al. 1994), and in Massachusetts only 1% of hayfields and 8% of barrens over 64 ha (160 ac) were occupied (Vickery et al. 1994). In the Midwest and Great Plains, Grasshopper Sparrows use smaller fields more regularly, but this may vary across regions (Helzner and Jelinski 1999, Heckert 1994, Davis 2004). Davis (2004) also determined that sparrows were less likely to occur in patches with a perimeter-area ratio less than 0.018 m/m2. This result is corroborated by work in Minnesota where sparrow nests were more likely to be located at least 45 m from a forest edge (Johnson and Temple 1986). Habitat in New Hampshire is generally of the sparse dry grassland type described above, and almost exclusively at airports.

NH Wildlife Action Plan Habitats

● Grasslands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Most Grasshopper Sparrow populations have not been sufficiently monitored to determine how they vary in size or productivity. Five sites (Keene, Concord, Pease, Amherst, and Merrimack) monitored during the early 2000s seemed to maintain fairly constant populations, although sparrows disappeared from the latter two sites around 2005. Sparrows reappeared at Amherst in 2012. Species is declining overall (see Justification)

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Endangered Species Conservation Act (RSA 212-A)
● Migratory Bird Treaty Act (1918)

Quality of Habitat

Of the sites currently occupied by Grasshopper Sparrows, those at the Concord, Keene, and Pease airports are considered high quality. All contain extensive acreage of suitable grassland or grassy heath. Habitat management is already in place at Pease to benefit Upland Sandpipers, and the mowing schedule should benefit sparrows. Mowing at the Concord airport does not currently occur during the sparrows' breeding season, and historically didn't occur at the most important sparrow areas at the Keene airport (but recent information is lacking). Smaller sites (Manchester landfill, Amherst) are also not subject to mowing that would interfere with sparrow breeding activity.

Habitat Protection Status

None of the active sites for Grasshopper Sparrow are protected in the conventional sense. Grassland habitat protected by Great Bay National Wildlife Refuge is adjacent to that at the Pease Airfield, but grasshopper sparrows have not been documented there. Management agreements or memoranda of understanding are in place at the Concord and Pease airports and at Cemetery Fields.

Habitat Management Status

Most of the sites currently known to support Grasshopper Sparrow populations are managed in either a beneficial or neutral manner. Such activities include late mowing (Concord Airport, parts of Keene Airport) and partial mowing timed to benefit Upland Sandpipers (Pease Tradeport). At Cemetery Fields in Amherst, there is a Memorandum of Agreement between the Town of Amherst Cemetery Trustees and NHFG that allows the latter to manage the site in a manner beneficial to Grasshopper Sparrows. Specifically, each half of the site will be mowed on alternate years and mowing will not occur between 15 May and 7 August. The management agreement for the Concord Airport (Fuller et al. 2003) stipulates that safety areas at the airport not be mowed until after 1 October, and that adjacent areas be mowed every 3 years. At Pease, mowing of safety zones is initiated before 1 May, but all remaining areas are not mowed until August or later. At the smaller sites such as capped landfills and old gravel pits, mowing is not currently done in a manner compatible with maintaining Grasshopper Sparrow populations, although at least one land manager (Manchester landfill) is amenable to implementing such management. Although areas of the Keene Airport that support the majority of its sparrow population are not mowed until late in the season, sparrows do use areas that are mowed more regularly. Implementation of a mowing protocol similar to that at Pease may ultimately benefit birds at Keene without detracting from the airport's need to comply with safety regulations.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and impacts from airport construction (Threat Rank: High)

Expansion of runways or addition of new infrastructure (e.g., hangers) has the potential to remove suitable grassland habitat at the more important sites for this species in the state.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: Medium)

Although a threat to area-sensitive species like the Grasshopper Sparrow (Heckert 1994), development is not a significant threat in New Hampshire because all known sites are either airports or otherwise very unlikely to be developed. Thus, although historic sites have been lost in this manner, development should actually be considered a low-ranking threat for this species.

Mortality and nest disturbance resulting from frequency and timing of mowing (Threat Rank: Medium)

Mowing is generally considered the greatest threat to grassland birds because it either destroys nests outright or exposes them to greater predation risk. Frequency of mowing varies with location and land use. With respect to Grasshopper Sparrows, it is most frequent at airports, which are required to mow areas adjacent to runways and taxiways for safety reasons. At other sites, mowing is used primarily as a management tool to prevent succession (e.g., at landfills) or to maintain the open character of the site. Mowing for economic reasons (i.e., hay harvest) is not a significant threat at any of the sites currently used by Grasshopper Sparrows in New Hampshire.

Habitat degradation and disturbance from airport runway maintenance (Threat Rank: Medium)

This threat is separate from both mowing and construction, and pertains to human activity associated with existing infrastructure. Such activity includes paving, light installation, and other things that might result in vehicles and other equipment being parked off-runway in potential sparrow habitat.

Habitat degradation and conversion from a lack of field maintenance and associated succession (Threat Rank: Medium)

In the absence of periodic mowing, grassland sites revert to shrublands and eventually to forest. However, since most sites for Grasshopper Sparrows in New Hampshire are at airports, this is not in reality a significant threat to the species.

List of Lower Ranking Threats:

Habitat impacts and mortality from insecticide use

Habitat impacts from introduced or invasive plants

Disturbance to nest sites from recreational activity (walkers, dog walkers)

Actions to benefit this Species or Habitat in NH

Grassland management

Primary Threat Addressed: Mortality and nest disturbance resulting from frequency and timing of mowing

Specific Threat (IUCN Threat Levels): Agriculture & aquaculture

Objective:
Implement mowing practices beneficial to Grasshopper Sparrows at the sites where they occur

General Strategy:
Airports are the primary sites for Grasshopper Sparrows in New Hampshire, and where possible these should be approached about possible changes to management that would benefit this species. Potential specific actions could include: 1) modify mowing regimes (location and timing) as allowable under FAA guidelines and 2) install flushing bars on mowing equipment.

Political Location:
Cheshire County, Hillsborough County, Merrimack County, Rockingham County

Watershed Location:
Watershed Location: Lower CT Watershed, Merrimack Watershed, Coastal Watershed

Grassland bird monitoring

Objective:
Monitor trends for rare grassland birds in NH

General Strategy:
Periodic surveys of key areas for grassland birds (e.g., focal areas, see grasslands habitat profile) are needed to assess trends in distribution and abundance because broad-scale surveys like the BBS fail to capture these species in sufficient numbers. Surveys need not be annual, but should employ consistent methodology among years. With specific reference to Grasshopper Sparrow, detailed surveys should continue at the Concord Airport and Cemetery Fields and be reinstated at the Keene Airport and Manchester landfill. Encourage technicians working with Upland Sandpipers at Pease to record and report locations of Grasshopper Sparrows at that site. See also the grassland habitat profile for more detail on broad actions that may benefit Grasshopper Sparrow.

Political Location:
Statewide

Watershed Location:
Statewide

Location Description:
For key areas see grasslands habitat profile

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality
Current data on overall population status are limited because most of the important airport sites have not been regularly visited since the early 2000s.

2015 Authors:
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2005 Authors:
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Literature

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American Black Duck

Anas rubripes [B,W]

Federal Listing	N/A
State Listing	SGCN
Global Rank	G5
State Rank	S4
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

In the past 20 years, mid-winter black duck surveys indicated that populations were declining from 1995-2005, but have somewhat stabilized during 2006-2015. Wintering black duck numbers have declined dramatically both in total and in the Atlantic Flyway from population numbers observed in the 1950s (USFWS 2015). The American Black Duck was ranked as the highest conservation concern (HH) for both Bird Conservation Regions (BCR) 14 and 30 and ranked high Regional priority (rank = 3). The black duck is the most important harvested duck in Canada and is considered a trophy species in the United States. The black duck was once the most common duck in New Hampshire (Lacaillade 1975), though since 2001 is has been only the third most abundant puddle duck harvested (NHFG duck harvest unpublished data).

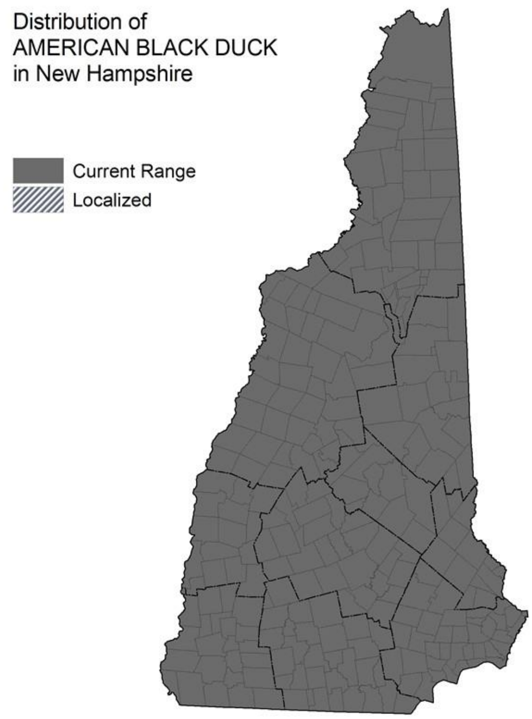
Distribution

Black ducks primary breeding range is in Eastern Canada, the Maritime Provinces, and south to northern New England. Wintering populations are found primarily along the Atlantic Coast from New England south to the Carolinas and inland locations extending to the Mississippi River and its tributaries (Baldassarre, G. A. 2014). In New Hampshire, black ducks are found throughout the state and are the third most common duck species harvested (Northeast Breeding Plot Survey 2015, unpublished data). Black ducks winter primarily in coastal salt marshes and on Great Bay and are the most common winter dabbling duck in coastal marshes (MWS 2015, unpublished data). During spring and fall migration, black ducks are observed statewide but are most common in coastal areas.

Habitat

American Black Duck breeding habitat includes a variety of coastal and freshwater habitats, including brackish marshes, estuaries, rivers, lakes, and pond edges, forested swamps, bogs, beaver ponds, emergent wetlands, and open boreal and mixed hardwood forests. Nests are usually laid on the ground and may be a mile from water. Wintering habitat includes brackish marshes bordering bay, estuaries, and open water areas on freshwater rivers and ponds (DeGraaf and Yamasaki 2001).
The black duck diet varies greatly with habitat. In marine habitats, black ducks feed primarily on mollusks, and in fresh water they feed mostly on aquatic plants. Ducklings and egg-laying females consume significant quantities of protein. Other foods include seeds, acorns, berries, waste corn, crustaceans, and amphibians.

NH Wildlife Action Plan Habitats



Distribution Map

Current Species and Habitat Condition in New Hampshire

Between 1950 and 1980, black ducks declined more than 50% which triggered increased research and management (Baldassarre 2014). The American Black Duck population in North America and in New Hampshire is now considered stable but below desired abundance levels. In response to concerns about the population, flyway harvest restrictions were instituted in the United States in 1983 and in Canada in 1984, and reduced harvest by over 40%. Mid-winter waterfowl survey data indicate that population sizes have remained generally stable during the period of harvest restrictions, and breeding surveys in Canada have shown increases (Kehoe 1990).
Black ducks are the fourth most common breeding waterfowl species in the State (average of 3,503 breeding pairs) and breed in highest numbers in northern areas (NHFG Waterfowl Plot Surveys 1993-2015, unpublished data). Great Bay and coastal salt marshes winter an average of 1,385 black ducks annually (NHFG Mid-winter surveys [MWS] 1952-2005, unpublished data). A small number of black ducks, 390 per year on average, winter at inland sites in rivers below dams (NHFG Inland Winter Survey 1988-2015, unpublished data).

Population Management Status

The USFWS and the Canadian Wildlife Service (CWS) have jurisdiction over harvest regulations in their respective countries. In the Atlantic Flyway, provinces, federal agencies, and all states cooperatively fund and conduct population monitoring surveys that inform annual North American hunting regulations for the American Black Duck. State and provincial wildlife agencies establish annual hunting regulations according to frameworks established by the USFWS and CWS within the context of the Flyway system of waterfowl management.

Regulatory Protection (for explanations, see Appendix I)

- Harvest permit - season/take regulations
- Migratory Bird Treaty Act (1918)
- USFWS Federal Trust Species - 50 CFR Part 20

Quality of Habitat

See Marsh and Shrub Wetlands and Salt Marsh Habitat Profiles.

Habitat Protection Status

The North American Waterfowl Management Plan (NAWMP) and the subsequent ACJV plan were established to conserve the most important habitats for waterfowl (breeding, migration, and wintering). Each state was asked to identify the most important areas for future protection work. In New Hampshire, three waterfowl focus areas were established to protect habitat for black ducks: Lake Umbagog National Wildlife Refuge (for breeding), Connecticut River Silvio O. Conte National Wildlife Refuge (for migration), and Great Bay National Wildlife Refuge (for wintering). In all three areas, state, federal, and private partnerships provide tens of millions of dollars to protect thousands of acres of waterfowl habitat. In all wetland protection efforts, a minimum 91m (300 ft) wide upland buffer area is also protected to provide nesting habitat for waterfowl.

It is anticipated that significant acquisition of waterfowl habitat will continue in each area. It is also anticipated that the Merrimack River Corridor will be designated as a planning area in a future NAWMP update. The NHFG has protected habitat along the Merrimack River Corridor, and partnerships are being established to conserve thousands of acres of wildlife habitat along the river. The Merrimack River is a significant migration corridor for black ducks and is worthy of a “Planning Status” under the NAWMP. Future efforts will focus on establishing that designation.

Habitat Management Status

Habitat management and protection in New Hampshire began in the late 1940s. NHFG, in coordination with the Atlantic Flyway Council, began acquiring wetland habitat and constructing low-head water control structures to create and maintain habitat for native waterfowl species, including the American black duck. From the late 1940s through 1983, protection and management of these habitats was made possible by donated property value used to match Federal Aid Pitman-Robertson and Dingell-Johnson monies. In 1983, State legislation was passed which established a State Duck Stamp. Revenues from the sale of $4.00 stamps and associated artwork are placed in a dedicated account for waterfowl management in the state. Today, NHFG owns or manages 49 State Waterfowl Management Areas, which include over 3,557 ha (8,790 ac) of habitat. Thirty of the Department’s Wildlife Management Areas include water control structures that allow water level manipulations to stimulate the growth of desirable aquatic plants.

Most waterfowl habitat in New Hampshire is in private ownership and is created and managed primarily by beaver (Castor canadensis). A healthy beaver population provides the majority of waterfowl habitat in the state for all life stages, with the exception of wintering habitat, which is primarily salt marsh. Historically, salt marsh habitat was degraded by ditching and draining salt marshes for hay production and mosquito control. Today, Ducks Unlimited, along with the other partners in the Great Bay Resource Protection Partnership (NHA, Great Bay National Estuarine Research Reserve, NHFG, TNC, Society for the Protection of New Hampshire Forests, USEPA, USFWS, and the NRCS) have conducted open water marsh management in a number of salt marsh locations to restore various drainage situations to improve black duck habitat.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Species impacts from increased precipitation in spring leading to poor reproductive success (Threat Rank: Medium)

Numerous aspects of climate change will affect wetlands and the waterfowl that use them. An increase in carbon dioxide (CO2) will trap heat in the atmosphere causing a rise in air, water, and soil temperature including in wetlands, lakes, streams, rivers, estuaries, and oceans, which will produce challenges to wetland plants and animals (Kusler 2006).

Depending on the rate and scale, climate change may only intensify preexisting limiting factors of black ducks. Urbanization and rising sea levels along the Atlantic coast will result in an accelerated loss of winter habitat and a decline in winter carrying capacity. Black ducks could also experience new limiting factors such as new diseases introduced to eastern North America as a result of warmer and wetter conditions (Devers and Collins 2011). Changes in precipitation and more intense weather events will also impact wetland systems through heavy rainfall and erosion. Sea level rise resulting from thermal expansion of the oceans and freshwater input was 4.7 - 8.6 inches for the 20th century (IPCC 2007). The amount of sea-level rise in coastal NH is of concern as black ducks rely on the marshes year-round.

Species impacts from hybridization (with mallards) (Threat Rank: Medium)

Black ducks and Mallards readily hybridize throughout the black duck breeding range. As Mallards continue to occupy traditional black duck range in eastern Canada and northern New England, the opportunity for hybridization also increases. There is still significant disagreement among waterfowl experts about the extent and seriousness of hybridization by Mallards and black ducks. Where Mallards occupy black duck habitat, they tend to do so permanently. Mallards are generally significantly more tolerant of people and their associated disturbances and more tolerant of agricultural practices. It is anticipated that as residential development and agricultural operations expand, the Mallard will continue to replace the black duck in breeding habitats.

It has been hypothesized that the cause of decline in black ducks was due to inter-specific competition with Mallards based on the trends of increasing Mallards and decreasing black ducks (Barclay 1970, Ankney et al. 1987, Belanger and Lehoux 1994, Merendino and Ankney 1994). In New Hampshire, Mallards over the last 30 years have replaced the black duck as the most common breeding and harvest species. In New Hampshire, during the 1999 to 2002 hunting seasons, 4.3% of the total number of Mallards and black ducks shot by hunters were classified as hybrids (Serie and Raftovich 2003).

Competition between Mallards and black ducks during the winter is considered minimal in New Hampshire. Black ducks winter primarily in coastal habitats where they often outnumber mallards (MWS 2015, unpublished data). Mallards winter in larger numbers on open fresh water sites where they outnumber the black duck. Between 1988 and 2015, an average of 4,198 Mallards per year wintered at inland sites, compared to only 390 black ducks (NHFG Inland Winter Survey, unpublished data). It is unclear if the increase in the Mallard population has caused the decline of black ducks or if it is a coincidence (Devers and Collins 2011).

List of Lower Ranking Threats:

Habitat degradation and species impacts from declining water quality

Mortality from subsidized or introduced predators

Habitat degradation from sea level rise

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Habitat protection and management

Primary Threat Addressed: Habitat conversion due to development

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:
Protect and manage marsh and shrub wetlands and saltmarsh habitat for American black duck populations.

General Strategy:
The NHFG has protected habitat along the Merrimack River Corridor, and partnerships are being established to conserve thousands of acres of wildlife habitat along the river. The Merrimack River is a significant migration corridor for black ducks and is worthy of a "Planning Status" under the NAWMP. Future efforts will focus on establishing that designation. See 'Habitat Management Status' for further details. For other habitat-based actions, see Marsh and Shrub Wetlands and Salt Marshes habitat profiles.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources
Information on American Black Ducks was collected from the North American Waterfowl Management Plan (NAWMP), The Atlantic Coast Joint Venture (ACJV) Plan, Long-term Eastern Waterfowl Survey, the federally coordinated Mid-Winter Waterfowl Survey, the Atlas of Breeding Birds in New Hampshire, NHFG survey data, Waterfowl and Their Management in New Hampshire, Atlantic Flyway Waterfowl Harvest and Population Survey data, The American Black Duck Symposium publication.

Data Quality
North American waterfowl population and harvest surveys were initiated in 1952. The database pertaining to North American waterfowl species, including the American Black Duck, is one of the most reliable and extensive wildlife data sets in the world.

2015 Authors:
Jessica Carloni, NHFG

2005 Authors:

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American Pipit

Anthus rubescens

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S2
Regional Status	

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Widespread in northern and western North America, American Pipits also occur on a handful of isolated mountaintops in the Northeast (1-2 in Quebec, one each in NH and ME). These isolated small populations are considered vulnerable to stochastic events and possibly climate change.

Distribution

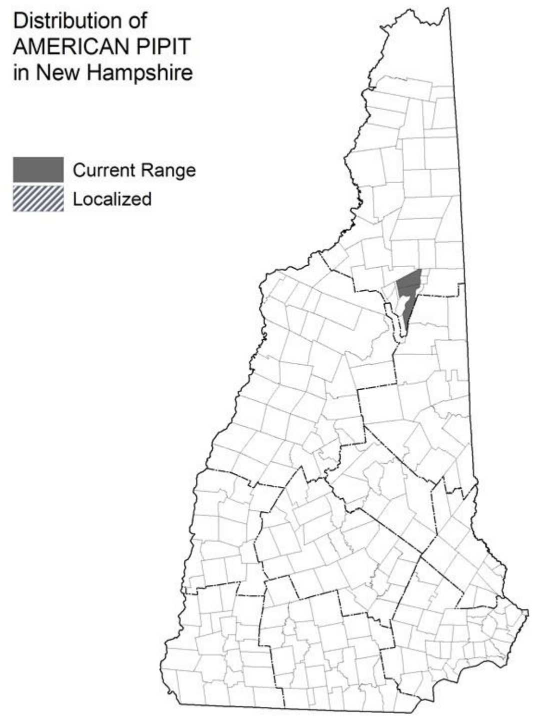
The American Pipit breeds across arctic North America from Alaska to Newfoundland, and south in the Rocky Mountains to Colorado. It also occurs on isolated mountains west of the Rockies (e.g., in the Cascades and Great Basin) and on 3-4 sites in the Northeast: Mt. Washington (NH), Mt. Katahdin (ME), and the Gaspe Peninsula (Quebec). The non-breeding range occupies a large area of coastal and low-latitude North America from Washington and Virginia south to Guatemala (Hendricks and Verbeek 2012).

Habitat

American Pipits breed on arctic and alpine tundra. On Mount Washington they use alpine sedge meadow communities dominated by *Carex*, dwarf *Salix*, and *Deschampsia*, and fell fields associated with cushion plants such as *Silene*, *Trifolium*, *Phlox*, and *Arenaria* (Hendricks and Verbeek 2012). Eroded turf, tussocks, or tilted rocks are necessary features of nesting habitat, as they provide snow-free nest sites early in the season (DeGraaf and Yamasaki 2001). During migration and winter, pipits can be found on a wide variety of open habitats, including agricultural fields, dunes, mudflats, and open grassy areas.

NH Wildlife Action Plan Habitats

- Alpine
- Grasslands
- Dunes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Periodic surveys of the Mt. Washington population suggest that the population there is relatively stable at 10-20 pairs.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information (see alpine habitat profile).

Habitat Protection Status

The habitat on Mount Washington is protected within the White Mountain National Forest.

Habitat Management Status

Habitat management has not been implemented for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

There were no threats ranked high or medium for this species.

List of Lower Ranking Threats:

Disturbance from agricultural contaminants

Disturbance by hikers

Habitat degradation from the retraction of alpine zone in response to climate change

Actions to benefit this Species or Habitat in NH

TBD

References, Data Sources and Authors

Data Sources
NHBR/NH eBird, Len Reitsma (Plymouth State University)

Data Quality
There have been limited surveys of the pipit population on Mount Washington, although when conducted they have been relatively thorough due to the small are of habitat to be searched.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:
Celine Goulet, NHFG; Steven Fuller, NHFG

Literature

Hendricks, P. and N. A. Verbeek. 2012. American Pipit (*Anthus rubescens*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/095 doi:10.2173/bna.95

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Eastern Whip-poor-will

Antrostomus vociferus

Photo by Pamela Hunt

Federal Listing	N/A
State Listing	SC
Global Rank	
State Rank	S3
Regional Status	Very High

Justification (Reason for Concern in NH)

Eastern Whip-poor-wills have been exhibiting a rangewide decline, including range retraction, since the mid-1900s. Evidence for this decline comes from the Breeding Bird Survey, Breeding Bird Atlases, and multiple anecdotal accounts. Although BBS data are generally poor for this species, they indicate annual declines of ~6% in NH, 3% in BCR 14, and 4% in BCR 30 from 1966 to 2013 (Sauer et al. 2014) Repeated Breeding Bird Atlases have documented declines in occupancy of approximately 50% (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, Massachusetts Audubon Society 2014). Whip-poor-wills are considered an SGCN in most states where they occur (all states in the Northeast), and were identified as a Regional SGCN in USFWS Region 5. Loss of habitat and potentially changes in food supply have both been identified as major threats to populations of this species.

Distribution

Occurs from northeastern Texas and north Georgia north to southeast Manitoba, southern Quebec, and parts of New Brunswick and Nova Scotia (Cink 2002). At the northern edge of this range it is sparsely distributed and may be limited by habitat.

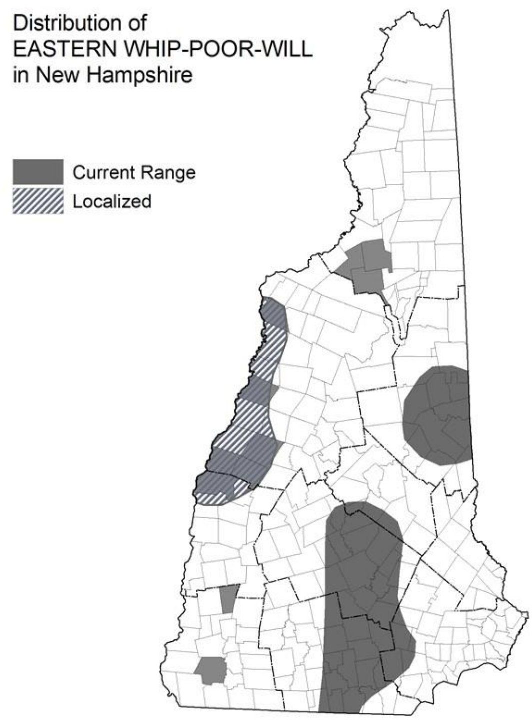
In New Hampshire, the species occurs statewide but was historically most common south of the White Mountains (Foss 1994). While this general range has not changed, there is evidence of retraction from the north, western highlands, and coastal plain. Concentrations exist in central Carroll County (Ossipee pine barrens and vicinity) and southeastern Merrimack County and adjacent towns.

Habitat

Eastern Whip-poor-wills inhabit areas of dry soils and open understory, especially in pine and oak woodlands (Cink 2002). They prefer to forage in open areas, such as fields, clearings, regenerating clear cuts, recent burns, and power line rights-of-way (Wilson 2003, Hunt 2013). Dry soil, which contributes to the sparse understory that whip-poor-wills prefer, may also allow for better drainage of the leaf litter where the birds lay their eggs, although definitive data are lacking. In New Hampshire, whip-poor-will records during the Breeding Bird Atlas were all from areas below 1200' elevation (Foss 1994). During a study in the Piscataquog River watershed in 2003, whip-poor-will records were concentrated in the northeastern quarter of the watershed. A preliminary analysis of habitat at points where whip-poor-wills were detected suggests that birds were more likely to occur in areas identified by aerial photography as "dry pine forest," "gravel pit," or "disturbed" (Hunt 2006).

NH Wildlife Action Plan Habitats

- Hemlock Hardwood Pine Forest
- Appalachian Oak Pine Forest
- Northern Hardwood-Conifer Forest
- Pine Barrens
- Shrublands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Based on the available data, statewide whip-poor-will populations are declining. Data from current strongholds (Ossipee, Merrimack valley) suggest that the species remains common in these areas, although there are no comparable baseline data on abundance prior to 2003, when current surveys began. See also Justification.

Population Management Status

Whip-poor-will populations are not currently managed in New Hampshire.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Limited information. Within whip-poor-will concentration areas, local abundance can be quite variable, suggesting high intra-regional variability in habitat quality. In the absence of management (harvest and/or fire), habitat suitability is likely to decline over time even in these areas. See also pine barrens habitat profile.

Habitat Protection Status

Highly variable, although there is considerable protection of suitable habitat in the vicinity of the two concentration areas in Carroll and Merrimack Counties

Habitat Management Status

Habitat management has not been implemented for this species, although BMPs have been developed (Hunt 2013). Ongoing efforts to restore fire to the Ossipee pine barrens will likely be beneficial to this species in the long term.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by whip-poor-wills are in river valleys and/or on well-drained soils, they may be more vulnerable to this threat.

Species impacts from declines in prey abundance (Threat Rank: Medium)

There is anecdotal evidence that populations of large moths (e.g., Saturnidae, Sphingidae) are lower now than in past decades (c.f. Schweitzer 2004). Because whip-poor-wills consume large numbers of these insects (also beetles), one hypothesis for their decline is a decline in prey populations. There is limited empirical evidence for this, although in Ontario a recent study indicate some tendency for insect populations (moths or beetles) to be higher near locations where whip-poor-wills were more frequently detected (P. English, pers. comm.). At present, mechanisms behind possible insect declines are poorly known, but likely include historical and current pesticide use and possibly biological control agents (e.g., *Compsilura concinnata*) introduced to combat Gypsy Moths (*Lymantria dispar*) (Schweitzer 2004, Elkinton and Boettner 2004).

Habitat degradation and conversion from a lack of management resulting in succession (Threat Rank: Medium)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used (Hunt 2013). See also forest and shrublands profiles.

Habitat degradation due to fire suppression and associated succession (Threat Rank: Medium)

In the absence of fire, pine barrens have fewer open areas and develop a more dense understory of oaks or other plants. Whip-poor-wills tend not to occur in such areas (Hunt 2013). See also pine barrens profile.

Disturbance and mortality from subsidized or introduced predators (Threat Rank: Medium)

Because whip-poor-wills nest on the ground, they are vulnerable to a broad suite of predators. To the extent that many such predators (e.g., skunks, raccoons, feral cats) occur in higher densities in developed landscapes, whip-poor-will populations in such areas may be at higher risk.

List of Lower Ranking Threats:

Disturbance to nest sites from recreational activity

Actions to benefit this Species or Habitat in NH

Investigate habitat use in peripheral populations

Specific Threat (IUCN Threat Levels): None

Specific Action: Research, survey or monitoring - fish and wildlife populations

Objective:
Determine if habitat use in smaller peripheral populations is similar to that in core populations

General Strategy:
Using methods developed for whip-poor-will focal areas, collect data on species' distribution elsewhere in NH and determine the habitat features selected by the birds in these smaller populations

Political Location:
Statewide

Watershed Location:

Whip-poor-will habitat management

Primary Threat Addressed: Habitat degradation and conversion from a lack of management resulting in succession

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Increase availability and suitability of habitat for Eastern Whip-poor-wills

General Strategy:
In areas where whip-poor-wills occur in reasonable numbers, enhance local habitat through a combination of burning, timber harvest, and other vegetation management.

Political Location:
Carroll County, Merrimack County

Watershed Location:
Androscoggin-Saco Watershed, Merrimack Watershed

Prey Availability Research

Specific Threat (IUCN Threat Levels): None

Objective:
Determine if prey populations are potentially limiting

General Strategy:
Assess relative abundance of prey items (especially large moths) in areas used by whip-poor-wills and compare these data to unoccupied sites with apparently suitable habitat.

Political Location:
Statewide

Watershed Location:

References, Data Sources and Authors

Data Sources

Trends from published Breeding Bird Atlases, BBS, and unpublished NH data. Habitat information from the literature and NH-specific studies. Distribution data from Atlases, literature, and NHBR/NH eBird.

Data Quality

Although whip-poor-wills are nocturnal, and thus not well-covered by programs such as the BBS, there are generally good regional data on distribution changes based on Breeding Bird Atlases. A standardized protocol now in use in several states shows promise to yield better trend data in the future.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Golden Eagle

Aquila chrysaetos

Federal Listing	N/A
State Listing	E
Global Rank	G5
State Rank	SH
Regional Status	High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Golden Eagle populations are generally in decline across North America (Katzner et al. 2012). The species historically bred in small numbers in the northeastern United States and southeastern Canada, but was largely extirpated by the late 20th Century. In the post-DDT era, populations in this latter area have apparently started to increase, although breeding has not been confirmed in the eastern U.S. since 1996, or in New Hampshire since the 1950s. As a large, wide-ranging predator, Golden Eagles can serve as an umbrella species for intact ecosystems in the Northeast.

Distribution

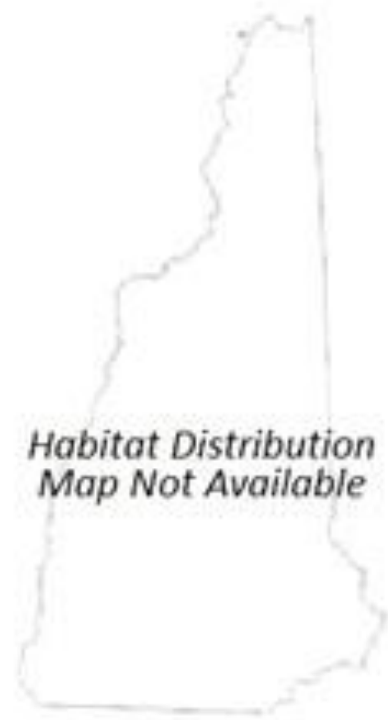
The Golden Eagle is a Holarctic species, breeding throughout northern and western North America, and also across Eurasia and North Africa. In eastern North America the bulk of the population breeds in northern Quebec and Labrador, with smaller numbers in northern Ontario and around the mouth of the St. Lawrence River (Kochert et al. 2002). Historically nested in NY, VT, NH, ME, and MA (Katzner et al. 2012) with unconfirmed reports south in the Appalachians to Georgia. Last confirmed nesting in New Hampshire was in 1956, although a home range was occupied through 1982 (Keith and Fox 2013). In Maine, nesting continued through 1996 (Katzner et al. 2012). The species winters at low densities throughout the eastern U.S., particularly in the north-central Appalachians (Katzner et al. 2012), and some birds are known to maintain winter home ranges in NH and neighboring states. In addition, significant numbers migrate along the Appalachian Mountains, including through New Hampshire.

Habitat

Golden Eagles use a wide variety of habitats. The breeding population in northern Ontario, Quebec, and Labrador nests at the edges of forest and tundra, while birds farther south (including historic records from the northeastern U.S.) nest on cliffs in forested areas (Spofford 1971, Katzner et al. 2012). Home ranges can be quite large: in the Gaspe region of Quebec they ranged from 515 to 2,132 km2 (fide Katzner et al. 2012). In Maine, eight of 12 historical nest sites had a heronry within 20 km; a heronry was located within 35 km of the remaining sites (Weik 1987). During the non-breeding season, Golden Eagles use a variety of habitats, including forests, for roosting and foraging.

NH Wildlife Action Plan Habitats

- Appalachian Oak Pine Forest
- Rocky Ridge, Cliff, and Talus
- Hemlock Hardwood Pine Forest
- High Elevation Spruce-Fir Forest
- Lowland Spruce-Fir Forest
- Northern Hardwood-Conifer Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

Breeding Bird Atlas indicate an increase as a breeding species in southern Quebec (Quebec Breeding Bird Atlas). Hawk migration data indicate that populations in the east are stable, or perhaps slightly increasing (Brandes et al. 2013), although this species is rare enough that such data should be interpreted with caution.

Population Management Status

Not managed

Regulatory Protection (for explanations, see Appendix I)

- Bald and Golden Eagle Protection Act
- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Unknown

Habitat Management Status

Habitat is not specifically managed for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality and disturbance from lead toxicity from ingesting ammunition and tackle (Threat Rank: High)

Golden Eagles ingest lead as a result of scavenging of lead-poisoned prey (Katzner et al. 2012).

Mortality related to intentional or unintentional shooting and trapping (Threat Rank: Medium)

Golden Eagle mortalities at traps have been documented in several states plus Quebec (Katzner et al. 2012). Illegal shooting was likely a major factor in the species' historical decline, and probably still occurs at low levels.

Mortality and disturbance due to secondary poisoning from consumption of baits or poisoned target organisms (Threat Rank: Medium)

Poisoned baits (e.g., carcasses) put out for Coyotes or other "nuisance" predators can be consumed by eagles, and this usually results in mortality.

Disturbance from persistent organic compounds (Threat Rank: Medium)

An emerging concern is presence of increasing levels of flame-retardant bromines in raptors and their prey, as demonstrated in 114 Peregrine Falcon eggs collected at New England nest sites from 1990-2006 (Chen et al. 2008). It is still unclear whether there is any reduction in productivity associated with increased levels of organic contaminants in prey species.

List of Lower Ranking Threats:

Disturbance from mercury toxicity

Mortality from wind tower and turbine development

Actions to benefit this Species or Habitat in NH

No actions identified for this species.

References, Data Sources and Authors

Data Sources

There are limited data on the status of Golden Eagle in New Hampshire, and most information on distribution and trend in this profile was taken from regional sources. This species' similarity to immature Bald Eagles may result in some misidentifications in either direction, and data have been treated conservatively as a result.

Data Quality

2015 Authors:
Pamela Hunt, NHA

2005 Authors:
Carol Foss, NHA

Literature

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Ruddy Turnstone

Arenaria interpres [M,W]

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	SNR
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of several migratory shorebirds are in steep decline (Andres 2009, Winn et al. 2013). Based largely on these declines, several species were proposed as RSGCN for the Northeast, and those that occur regularly in NH are included in the 2015 NH Wildlife Action Plan.

Distribution

Ruddy Turnstones breed across the arctic from Alaska to Siberia, and have an extensive wintering range along south temperate and tropical coastlines worldwide (Nettleship 2000). In New Hampshire the species is relatively uncommon, and limited to the immediate coast and Isles of Shoals. Most occur during migration in August and September, with lesser numbers in May. There are also a few winter records, but the species is quite rare between November and April.

Habitat

During the non-breeding season, turnstones forage primarily on rocky shorelines, although they will occasionally use beaches and mudflats.

NH Wildlife Action Plan Habitats

- Coastal Islands
- Estuarine
- Dunes

Distribution Map

Current Species and Habitat Condition in New Hampshire

Populations of many long-distance migrant shorebirds are believed to be in steep decline, and for this reason several species are considered priorities for future conservation. Although data for Ruddy Turnstone is somewhat equivocal, most recent assessments suggest its populations in North America are stable or increasing (Morrison et al. 1994, Morrison et al. 2006, Andres 2009)

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

unknown

Habitat Protection Status

Variable. Some of New Hampshire's coastal beaches and salt marsh areas are protected from development, but such protection does not preclude recreation use that may constitute an important threat to migrating shorebirds.

Habitat Management Status

Habitat is not specifically managed for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and degradation due to sea level rise (Threat Rank: Medium)

Much of the original beach/dune/estuary system along the New Hampshire coast has been permanently altered by human infrastructure (roads, buildings, parking lots) and coastal engineering (salt marsh ditching, tidal restrictions, seawalls), with a net loss in habitats available for migrating shorebirds. Projected rises in sea level of even a few inches will further reduce available habitats (estuarine mudflats and rocky intertidal sites) that shorebirds need for roosting and feeding (Galbraith et al. 2014).

Disturbance from human activities (walking, running dogs, shellfish harvest) (Threat Rank: Medium)

Disturbance results from recreational use of beaches or other habitats that shorebirds need for roosting and feeding during migration. People, pets, or vehicles using these habitats regularly flush birds, causing them to both expend energy in avoidance flights and reduce energy intake via foraging.

Studies of shorebird behavior combined with physiological models suggest that repeated disturbance can reduce individual birds' chances of successfully completing migration (Harrington and Drilling 1996, Burger et al. 2007).

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat conversion and degradation from human climate change response

Habitat degradation from dredging and the dumping of spoils

Mortality from unregulated hunting in the Caribbean

Species impacts from the harvest of important prey items (Horseshoe Crabs)

Habitat conversion and degradation from storm-altered deposition patterns

Disturbance from phenology shifts

Species impacts from siltation, acidification, fresh-water inputs, and increased temperatures

Actions to benefit this Species or Habitat in NH

Incorporate shorebird needs into coastal climate change planning.

Primary Threat Addressed: Habitat conversion and degradation due to sea level rise

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:
Ensure that human activities in response to climate change do not negatively affect important shorebird habitats or stopover sites.

General Strategy:
Provide information on shorebird habitat and important sites to local and regional planning authorities in the seacoast area. Work with these entities to ensure that the needs of migratory shorebirds are considered in climate adaptation and response plans.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Manage human activity relative to shorebird stopover

Primary Threat Addressed: Disturbance from human activities (walking, running dogs, shellfish harvest)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Minimize disturbance of migrating shorebirds

General Strategy:
Manage human disturbance through beach closures, dog restraints, outreach, volunteer "wardens,"

and other means as identified. This would only need to occur during peak migration periods and primarily at key sites identified through shorebird monitoring.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Shorebird stopover monitoring

Objective:
Obtain data on distribution and abundance of shorebirds that can inform trends and prioritize conservation actions.

General Strategy:
Migratory shorebirds are best monitored at staging areas during migration along the Atlantic Coast, with lesser efforts directed at breeding sites and wintering areas. Because New Hampshire has such a small coast and limited shorebird habitat, it is recommended that the State rely on regional and/or national monitoring efforts to inform conservation planning. There may be specific research needs that relate to site-specific activities, in which case more targeted research or monitoring may be warranted.

Political Location:
Northeast

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources
Most data on shorebird use of the Hampton-Seabrook estuary come from a study by NH Audubon in 2006-07 (McKinley and Hunt 2008), while general data on distribution and abundance of all species are available in the New Hampshire Bird Records and eBird databases.

Data Quality
Although data on the numbers of birds that pass through New Hampshire on migration is limited, there are good data on which areas are preferred by shorebirds and the number of individuals using these at a given point in time.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

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Upland Sandpiper

Bartramia longicauda

Federal Listing	N/A
State Listing	E
Global Rank	G5
State Rank	S1
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

The Upland Sandpiper probably did not occur in the state until the 1800s, after forest clearing allowed it to expand eastward from the Midwest (Silver 1957). It was primarily limited to major river valleys and coastal plain, where it occasionally reached high densities. Population declines in New Hampshire began as early as 1900 (Foss 1994), although detailed data are lacking. As recently as the early 1980s, Upland Sandpipers still bred in at least 5 locations (Foss 1994). Since 1990, breeding has only been confirmed at the Pease Airfield in Portsmouth and Newington (with at least one confirmed breeding event just off the airfield at the Great Bay National Wildlife Refuge), although sightings from Dover, Manchester, and southern Coos County in the last decade imply that birds are still visiting appropriate habitat elsewhere in the state. The Upland Sandpiper is of conservation concern throughout the Northeast. Many historic habitats in New England were on large dairy farms, and these have been gradually disappearing (A. Jones, personal communication). Over the range as a whole, Breeding Bird Survey data indicate an insignificant increase of 0.8% per year from 1966, but a 1.2% annual decline since 1980. In the Northeast, the corresponding values are both declines: 0.4% since 1966 and 1.7% since 1980 (Sauer et al. 2004). The steeper declines since 1980 coincide with the period of greatest decrease in the New Hampshire breeding population.

Distribution

From the 1960s onward, most of New Hampshire's Upland Sandpipers have occurred in 3 areas of the state: 1) the upper Connecticut River Valley (Haverhill through Northumberland), 2) the Merrimack Valley from Plymouth southward, and 3) the seacoast.

Only a small proportion of the continental Upland Sandpiper population occurs in New England, which supports roughly 250 breeding pairs. The majority of these (150 pairs) breed in eastern Maine, with another 50 to 60 pairs at Westover Air Force Base in western Massachusetts (Jones et al. 2001). New Hampshire's share of the regional population is thus extremely small. Currently Pease is the only confirmed location of breeding Upland Sandpiper in NH.

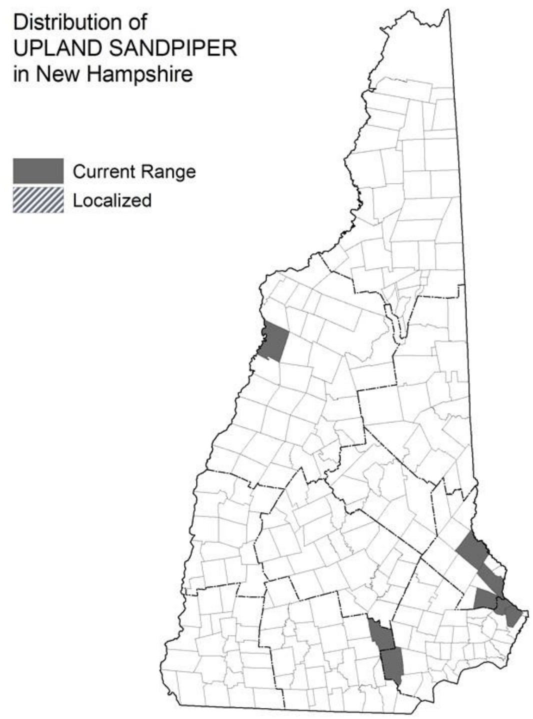
Habitat

Upland Sandpipers occupy a wide range of grassland habitats. In the East, these include airfields, blueberry barrens (Maine), and mixed agricultural areas. The species needs a mix of short (less than 20 cm) and tall (up to 60 cm) grasses for foraging and nesting, respectively. Taller structures—such as fence posts, runway lights or signs, and taller forbs such as mullein—are needed for singing perches. Upland sandpipers avoid grasslands with high densities of legumes or with a dense litter layer (Carter 1992, Houston and Bowen 2001).

Upland Sandpipers require large areas of grassland for breeding. Ideally, such fields should be over 60 ha (150 acres), and even fields as large as 120 ha (300 ac) may not necessarily support the species (Carter 1992, Vickery et al. 1994). Territories average 8 to 12 ha (20 to 30 ac), and the species is often loosely colonial where it reaches higher densities (Carter 1992). Sites used by sandpipers in New Hampshire include large airfields (Pease, Manchester, Nashua) and large agricultural mosaics (Dover, Rochester, Haverhill).

NH Wildlife Action Plan Habitats

- Grasslands



Distribution Map

Current Species and Habitat Condition in New Hampshire

The only population in New Hampshire occurs at the Pease Airfield in Portsmouth and Newington. Since 2005 yearly monitoring has continued at Pease Tradeport. This population has been monitored regularly since 1989 and has averaged 8 to 12 pairs during the period. A more extensive survey was done in 2011 of Pease Tradeport and the surrounding seacoast area. No sandpipers were found except for at the Tradeport (Kanter et al. 2013). It would appear that the number of pairs is declining slightly. However, this is likely due to surveys in 2013 and 2014 being less intensive. This population has produced a minimum of 10 to 15 chicks in most breeding seasons, although surveys have not always been comprehensive. 12 and 11 chicks were seen at the end of the 2013 and 2014 season so productivity seems to be remaining stable. Since 1990, single birds or pairs have appeared in nearby areas of Newington), suggesting that dispersing individuals occasionally settle in suitable habitat away from the airfield. Populations that once consistently occupied sites in Haverhill and Manchester were last recorded in 1984 and 1985, respectively, although the species was reported at the Manchester Airport in 1999. Since 1985, only 5 sites other than Pease have supported Upland Sandpipers for more than a year, and even in those cases there was little evidence of breeding activity. The 2013 surveys in Haverhill did not detect any sandpipers (Sydoriak, J.L. 2014). The repeat of the 1990's statewide grassland surveys in 2014-15 also did not detect any upland sandpipers (Massachusetts Audubon, unpubl. Data).

Population Management Status

No management specific to this species—other than periodic monitoring—is currently occurring in New Hampshire. See Habitat Management Status for details on habitat management at the only occupied site.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

The 4 potential places where Upland Sandpipers might occur, Pease Tradeport and vicinity, agricultural lands in southern Strafford County, Lower Merrimack River Valley (especially Manchester Airport) and Upper Connecticut River Valley (Haverhill to Lancaster), vary in type of land use, development pressures, and habitat management. At the Pease Airfield, sandpipers are being managed. Sandpipers are not being managed in adjacent areas of Newington, where occupancy is irregular. Strafford County agricultural lands are at greater threat from development, and because they are closer to the species' core range, they probably represent better potential habitat. The Manchester Airport has an extensive area of suitable habitat, but security and safety concerns have so far made it impossible even to determine the extent of sandpiper use at this site, much less implement management beneficial to the species. Finally, the northern agricultural areas are at somewhat lower risk from habitat conversion than those near the seacoast. In all areas, any assessment of habitat quality will need to consider both the composition (i.e., mix of grass heights) and size of available fields.

Habitat Protection Status

With the exception of the Weapons Storage Area at the Great Bay National Wildlife Refuge, none of the breeding areas identified above are protected. A memorandum of understanding is in place at the Pease Airfield.

Habitat Management Status

Starting in the 1990s, several entities cooperated to manage Upland Sandpiper habitat at the Pease Airfield. The resulting mowing regime meets airport safety regulations and protects sandpipers during vulnerable early stages of nesting (incubation and pre-flight chick). Mowing of safety areas begins by 1 May to discourage nesting attempts, and the infield areas are mowed after nest searching has taken place. The infield areas are no longer left until after July 31 because of Wildlife Services safety recommendations to keep grass height between 6 and 12 inches. Airport personnel are regularly informed of active nesting areas (when monitoring is being done) so that disturbance is minimized. Although a fence surrounding the habitat discourages large mammals from approaching the runway, sightings of fox and Coyote have increased (De Luca 2002). Given that these species pose a predation risk to sandpipers, there may be need to reconsider predator control at this site. Nests were originally left with a buffer around them however these areas seemed to become targets for predators. In response, nests were carefully mowed over to create a uniform grass height that would be less likely to invoke a predator response.
The Great Bay National Wildlife Refuge is managing its grassland areas, including the weapons storage

area where sandpipers have recently bred. Management includes mowing and burning to maintain grassland, and such activities are not done until after the breeding season.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality from premature mowing (Threat Rank: High)

Mowing during the nesting season may result in mortality due to collision with tractor tires.

Although more Upland Sandpipers may be found in mowed vegetation than unmowed (Milroy 2007), loss of nests has been detected during annual mowing at the Pease Airport.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

The small number of nesting birds at Pease Airport is vulnerable to higher rate of predators that are present in the developed landscape of Newington.

As development and agriculture increase in the landscape the number of raccoons and canid predators was observed to be higher (Litvaitis and Oehler 1996).

List of Lower Ranking Threats:

Disturbance from airport-related work activity

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Monitor Upland Sandpiper nesting

Objective:
To locate and monitor the success of Upland Sandpiper nests at Pease Tradeport

General Strategy:
Nest searching by rope dragging is done before mowing takes place. Located Upland Sandpiper nests are marked and monitored for success or failure and for easy identification by mower operators. If possible in the future banding of birds would help provide information on population health.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Provide technical assistance to Pease Airport personnel

Primary Threat Addressed: Mortality from premature mowing

Specific Threat (IUCN Threat Levels): Transportation & service corridors

Objective:

New Hampshire Fish and Game personnel will attend quarterly meetings regarding natural resource management a Portsmouth International Airport at Pease with other stakeholders including USFWS, USDA Wildlife Services and the Air National Guard.

General Strategy:

Attend scheduled meetings to provide technical assistance for conflicts with airport safety and Upland Sandpiper.

Political Location: **Watershed Location:**

References, Data Sources and Authors

Data Sources

Basic natural history information in this profile was largely gathered from the literature cited. Data on Upland Sandpiper distribution in New Hampshire were compiled from NHBR and reports on breeding surveys at the Pease Airfield.

Summaries of population health were based on data from NHBR and reports of Upland Sandpiper monitoring produced by NHA and NHFG. Details of management practices at the Pease Tradeport were taken from the management agreement there.

Data Quality

The combination of an active amateur birder population and systematic grassland bird surveys over the last decade makes it unlikely that breeding sandpipers would have been overlooked in southern New Hampshire. Currently NHFG is only monitoring the population at Pease Tradeport. In 2013 large parts of Haverill, NH were surveyed (Sydoriak, J.L. 2014). In 2014-15 a repeat of the 1990's survey was conducted by Massachusetts Audubon.

With the exception of Pease Airfield, data are largely lacking for all areas of the state. Even there, current monitoring intensity may not be sufficient to detect productivity or to determine what factors may be responsible for recent population declines.

2015 Authors:

Brett Ferry, NHFG

2005 Authors:

Pamela Hunt, NHA; Diane De Luca, NHA

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Ruffed Grouse

Bonsai umbrellas

Federal Listing	N/A
State Listing	SGCN
Global Rank	G5
State Rank	S5
Regional Status	High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Ruffed Grouse are found throughout much of the eastern United States, yet are common only where extensive tracts of forest dominate the landscape (Dessecker and McAuley 2001). The decline, fragmentation, and isolation of early successional forest habitats may be limiting Ruffed Grouse recruitment and therefore population densities (Dessecker and McAuley 2001).

Distribution

The Ruffed Grouse is a year-round resident in New England. They are more common inland than along the seacoast (DeGraaf and Yamasaki 2001), generally at elevations below 3,000 ft. Development poses a significant threat to grouse habitat in the lower third of the state, but pockets of grouse habitat should persist there for the foreseeable future. The Western Highlands and northern two- thirds of the state continue to provide extensive grouse habitat. Continual harvesting of mature forests of the industrial timberlands of northern New Hampshire produce quality grouse habitat (Robinson 1994).

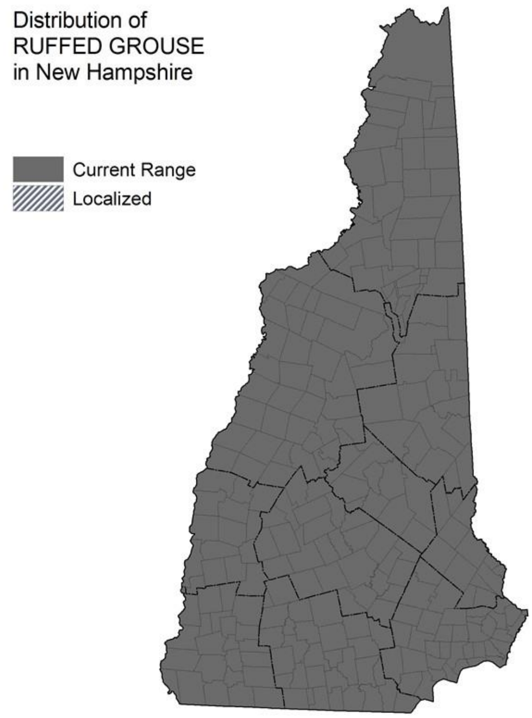
Habitat

The Ruffed Grouse uses deciduous and coniferous forests in both upland and wetland settings (DeGraaf et al. 1989). Ruffed Grouse are early successional forest specialists. Grouse require four different cover types for drumming, brood rearing, nesting, and wintering. In general, they inhabit brushy, mixed-age woodlands, early successional to mature hardwood and mixed forests, often with aspen and birch as a component. Optimal habitat for Ruffed Grouse include young (6 to 15-year-old), even-age deciduous stands typically supporting 20-25,000 woody stems/ha (Gullion 1984). These habitats are available to grouse for approximately one decade because stem densities decrease rapidly through natural thinning as succession proceeds (Dessecker and McAuley 2001). Although commonly identified as an “edge” species, Ruffed Grouse association with habitat edges largely reflects their use of various interspersed forest habitats at different times of the year and their use of marginal habitats where quality habitat is lacking. They typically avoid hard-contrast edges (Dessecker and McAuley 2001).

Old orchards are an ideal fall habitat in New England (DeGraaf and Yamasaki 2001). Catkin-bearing trees are also an indicator of grouse habitat. They use logs or stone walls for drumming sites and dense cover for protection (Brooks and Birch 1988). Hens and broods prefer areas with a dense understory and fairly open herbaceous ground cover. Grouse nest and feed in hardwood stands and dust themselves in sunny openings. Ruffed Grouse use mature woodlands, especially coniferous forests, during winter. When snow is deep and soft, birds will roost in the snow. Otherwise they will roost on the ground or in trees.

NH Wildlife Action Plan Habitats

- Hemlock Hardwood Pine Forest
- Northern Hardwood-Conifer Forest
- Appalachian Oak Pine Forest
- Grasslands
- Lowland Spruce-Fir Forest
- Marsh and Shrub Wetlands
- Shrublands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Ruffed Grouse populations naturally experience irregularly cyclical booms and crashes (Robinson 1994). Cyclical patterns aside, it is difficult to ascertain trends in the state's grouse population since drumming surveys just started in 1999. However, declines in early successional forest habitats and the isolation of these habitats in some landscapes may be limiting Ruffed Grouse recruitment and therefore population densities in some regions of the state (Dessecker and McAuley, 2001).
Forests in the northeastern Unites States were historically subject to several sources of disturbance (DeGraaf and Yamasaki 2003). Fire, wind, beaver (*Castor canadensis*), flooding, and Native American activity continually produced early successional forests (DeGraaf and Yamasaki 2003). Largely in response to forest maturation, young forest habitats have now become critically uncommon in much of the eastern United States and especially the Northeast (Brooks and Birch 1988, Trani et al., 2001). Abandonment of agricultural lands reached a peak in New England in the late 1800s to mid-1900s and a wave of early successional habitats followed (Dessecker and McAuley 2001). Today, such habitats are less common than they were in pre-settlement times in several regions of the northeastern United States (Dessecker and McAuley 2001). On the other hand, the proportion of early successional habitat in northern industrial forests is currently several times that which occurred in pre-settlement times (Dessecker and McAuley 2001).

Population Management Status

Ruffed Grouse are managed by hunting regulations. Season length and daily bag are determined on a bi-yearly basis.

Regulatory Protection (for explanations, see Appendix I)

- Harvest permit - season/take regulations

Quality of Habitat

Because no young forest habitat map was created, it is difficult to assess habitat quality at the patch scale (see Shrubland Habitat Profile).

Habitat Protection Status

Since no habitat map was generated, the habitat patch protection status of grouse habitat in New Hampshire is unknown. However, given the ephemeral nature of young forest habitats, tree harvesting and other vegetation manipulation techniques will need to be employed to generate suitable habitat for Ruffed Grouse. This can occur on both public and private land.

Habitat Management Status

Refer to the Shrubland Habitat Profile for information on habitat management programs that assist with managing shrubland and other early-successional habitats.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Direct loss of shrubland habitat occurs through the conversion of these lands for residential, industrial, and commercial purposes. Development patterns lead to fragmentation of remaining undeveloped habitats, creating smaller patches that may not sustain wildlife populations and promoting generalist predators that prey on shrubland-dependent wildlife (Barbour and Litvaitis 1993, Litvaitis 2005).

Young forest habitats are important to a large suite of animals, including Ruffed Grouse (DeGraaf et al. 2005). Wildlife that utilizes young forest habitat conditions benefited from the wave of early successional habitats that followed the peak of farm abandonment in the late 1800s. As forests matured the amount of early successional habitats declined, leading to declines in associated wildlife species. In parts of New Hampshire, especially the southern tier, the amount of young forest habitat of functional quality for wildlife may now be falling below historic levels as current landscape conditions are strikingly different than in pre-settlement times (Brooks 2003, Litvaitis 2003, DeGraaf et al. 2005). Remaining patches of forest are broken up or fragmented into isolated patches. Species with small home ranges (such as Ruffed Grouse) may be able to occupy the remaining habitat patches. However, even these animals may be hampered by the consequences of human land uses that surround small patches of habitat. Increases in generalist predators may reduce or even eliminate small populations of prey species (Barbour and Litvaitis 1993, Oehler and Litvaitis 1996). Over time, these small patches may contain fewer species than similarly sized patches that are surrounded by extensive forests (Litvaitis 2005).

Habitat degradation from forest maturation due to lack of management (Threat Rank: Medium)

Shrubland-dependent vertebrate wildlife species require dense understory cover; their occurrence is influenced more by the height and density of vegetation than by specific plant communities (Litvaitis 2003). Ruffed Grouse colonize a site after a woody understory is well developed (approximately 10 years post disturbance) and disappear from the site approximately 20 years post disturbance as the stand matures (DeGraaf et al. 2005). Hence populations of Ruffed Grouse and other young forest species shift in space and time in response to natural disturbances and human land uses (Litvaitis 2005). As more open land is converted to development there is less overall space for young forest-dependent species to shift into when natural forest succession or lack of active management makes their current habitat patch unsuitable. Proactive habitat management practices must be implemented at regular intervals to ensure a continuous supply of quality grouse habitat on the landscape.

The New England landscape has gone through dramatic changes over the last 350 years. In the mid 1800s, 75% of the arable land in central and southern New England was in pasture and farm crops. One hundred years later, New England was once again forested – a result of farm abandonment after richer farm fields opened up in the Midwest (DeGraaf et al. 2005). Today, about 80% of New Hampshire is forested again. However, the second growth forests lack the structural diversity including the range of seral stages present in pre-settlement forests (DeGraaf et al. 2005). The forests have matured, while natural disturbance processes, such as fire, have been disrupted, reducing the amount of early successional conditions (Litvaitis 2003, DeGraaf et al. 2005). The conversion of young forests to residential and commercial development combined with forest maturation (i.e., lack of disturbance) is reducing early successional habitat to levels at or below historical levels (Brooks 2003). Based on current trends and predictive models, New Hampshire's forested lands will continue to decline. Forest loss linked to population growth indicates the conversion of another 225,000 acres in the years out to 2030, dropping New Hampshire forest land to 78.5% of total land area (Sunquist 2010).

List of Lower Ranking Threats:

Species impacts from changing precipitation patterns and increased temperatures

Actions to benefit this Species or Habitat in NH

Map and maintain suitable young forest habitat for ruffed grouse

Primary Threat Addressed: Habitat degradation from forest maturation due to lack of management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Find ways to create an adequate habitat map that allows prioritization of areas to field check for suitable young forest habitat.

General Strategy:
A better means of mapping grouse habitat is needed. It is difficult to assess the amount and condition of young forest habitats without an adequate habitat map to prioritize areas to field check. Partners should explore ways to create accurate maps, and use this as a basis to prioritize creation and maintenance of young forest habitat throughout New Hampshire. Sufficient young forest habitat for grouse should include areas with overhead canopy cover that provide downed logs, stonewalls, or

large rocks for drumming. An effort should be made to increase participation in the Small Game Survey to get better information on the abundance and distribution of grouse throughout the state. Since Ruffed Grouse use Shrublands and Grasslands frequently, please see these lists of actions for additional measures that can benefit ruffed grouse populations in New Hampshire.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

Two small game surveys are implemented annually. Small game sighting data are solicited from small game hunters and successful deer bow hunters, and these observations are used as an index of New Hampshire's small game species distribution and abundance. Ruffed Grouse drumming routes have been run each spring since 1999. Two routes were established in each Wildlife Management Unit. These surveys are efficient at generating useful population data. Over time, survey results will provide invaluable trend data for management decision-making. Sources of information include journal articles, websites, GIS data, and white papers.

Data Quality

Ruffed Grouse have been studied and monitored since colonial times. With the implementation of these surveys in 1999, quality data exist on the relative abundance of these species. It is difficult to assess the amount and condition of young forest habitats without an adequate habitat map to prioritize areas to field check.

2015 Authors:
Karen Bordeau, NHFG

2005 Authors:
Julie Robinson, NHFG; Jim Oehler, NHFG; Ellen Snyder, NHFG

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Sanderling

Calidris alba

Photo by Pamela Hunt

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	SNR
Regional Status	High

Justification (Reason for Concern in NH)

Populations of several migratory shorebirds are in steep decline (Andres 2009, Winn et al. 2013). Based largely on these declines, several species were proposed as RSGCN for the Northeast, and those that occur regularly in NH are included in the 2015 NH Wildlife Action Plan.

Distribution

Sanderlings breed in the high arctic, including parts of northern Canada, Greenland, and Siberia (Macwhirter et al. 2002). The highest densities of migrating shorebirds in NH generally occur in the Hampton-Seabrook estuary and adjacent areas of beach and dunes. Smaller numbers of birds occur regularly at coastal beaches and salt pannes north through Rye.

From a seasonal perspective, New Hampshire is far more important to shorebirds during their southbound fall migration than in spring, when most species move north farther to the west. Spring migration is also more contracted, with the majority of birds passing through in the second half of May. In fall, the first southbound birds appear in July, and some can still be found into October (McKinley and Hunt 2008). Sanderlings also winter in variable numbers.

Habitat

Although migratory shorebirds of some species occur inland in NH, the species treated in the 2015 Wildlife Action Plan are almost entirely coastal in distribution, occurring primarily along the immediate coast, Great Bay (rarely), and at the Isles of Shoals. Specific habitats used for foraging include intertidal mudflats, rocky shores, and sandy beaches; and roosting habitats include rocky shores above the high tide line, salt pannes, dunes, and elevated areas of salt marsh. Sanderlings are most common on coastal beaches, but also forage regularly on mudflats or rocky shores.

NH Wildlife Action Plan Habitats

- Salt Marshes
- Estuarine
- Coastal Islands
- Dunes

Distribution Map

Current Species and Habitat Condition in New Hampshire

Populations of many long-distance migrant shorebirds are believed to be in steep decline (Morrison et al. 2006, Andres 2009), and for this reason several species are considered priorities for future conservation. Data on Sanderling populations are limited, but the species is believed to be in decline.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Variable. Some of New Hampshire's coastal beaches and salt marsh areas are protected from development, but such protection does not preclude recreation use that may constitute an important threat to migrating shorebirds.

Habitat Management Status

Habitat is not specifically managed for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and degradation due to sea level rise (Threat Rank: Medium)

Much of the original beach/dune/estuary system along the New Hampshire coast has been permanently altered by human infrastructure (roads, buildings, parking lots) and coastal engineering (salt marsh ditching, tidal restrictions, seawalls), with a net loss in habitats available for migrating shorebirds. Projected rises in sea level of even a few inches will further reduce available habitats (estuarine mudflats and rocky intertidal sites) that shorebirds need for roosting and feeding (Galbraith et al. 2014).

Disturbance from human activities (walking, running dogs, shellfish harvest) (Threat Rank: Medium)

Disturbance results from recreational use of beaches or other habitats that shorebirds need for roosting and feeding during migration. People, pets, or vehicles using these habitats regularly flush birds, causing them to both expend energy in avoidance flights and reduce energy intake via foraging. Studies of shorebird behavior combined with physiological models suggest that repeated disturbance can reduce individual birds' chances of successfully completing migration (Harrington and Drilling 1996, Burger et al. 2007).

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat conversion and degradation from human climate change response

Habitat degradation from dredging and the dumping of spoils

Mortality from unregulated hunting in the Caribbean

Species impacts from the harvest of important prey items (Horseshoe Crabs)

Habitat conversion and degradation from storm-altered deposition patterns

Disturbance from phenology shifts

Species impacts from siltation, acidification, fresh-water inputs, and increased temperatures

Actions to benefit this Species or Habitat in NH

Incorporate shorebird needs into coastal climate change planning.

Primary Threat Addressed: Habitat conversion and degradation due to sea level rise

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:

Ensure that human activities in response to climate change do not negatively affect important shorebird habitats or stopover sites.

General Strategy:

Provide information on shorebird habitat and important sites to local and regional planning authorities in the seacoast area. Work with these entities to ensure that the needs of migratory shorebirds are considered in climate adaptation and response plans.

Political Location:	Watershed Location:
Rockingham County	Coastal Watershed

Manage human activity relative to shorebird stopover

Primary Threat Addressed: Disturbance from human activities (walking, running dogs, shellfish harvest)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:

Minimize disturbance of migrating shorebirds

General Strategy:

Manage human disturbance through beach closures, dog restraints, outreach, volunteer "wardens," and other means as identified. This would only need to occur during peak migration periods and primarily at key sites identified through shorebird monitoring.

Political Location:	Watershed Location:
Rockingham County	Coastal Watershed

Shorebird stopover monitoring

Objective:

Obtain data on distribution and abundance of shorebirds that can inform trends and prioritize conservation actions.

General Strategy:

Migratory shorebirds are best monitored at staging areas during migration along the Atlantic Coast, with lesser efforts directed at breeding sites and wintering areas. Because New Hampshire has such a small coast and limited shorebird habitat, it is recommended that the State rely on regional and/or national monitoring efforts to inform conservation planning. There may be specific research needs that relate to site-specific activities, in which case more targeted research or monitoring may be warranted.

Political Location:	Watershed Location:
Northeast	Statewide

References, Data Sources and Authors

Data Sources

Most data on shorebird use of the Hampton-Seabrook estuary come from a study by NH Audubon in 2006-07 (McKinley and Hunt 2008), while general data on distribution and abundance of all species are available in the New Hampshire Bird Records and eBird databases.

Data Quality

Although data on the numbers of birds that pass through New Hampshire on migration is limited, there are good data on which areas are preferred by shorebirds and the number of individuals using these at a given point in time.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

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Red Knot

Calidris canutus

Federal Listing	T
State Listing	N/A
Global Rank	G4
State Rank	SNR
Regional Status	Very High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Populations of several migratory shorebirds are in steep decline (Morrison et al. 2006, Andres 2009). Based largely on these declines, several species were proposed as RSGCN for the Northeast, and those that occur regularly in NH are included in the 2015 NH Wildlife Action Plan. Declines in the *rufa* subspecies of Red Knot have been significant enough to result in it being listed as Threatened under the ESA (U.S. Fish and Wildlife Service 2014).

Distribution

Red Knots of the *rufa* subspecies breed in high arctic Canada and winter along the coast of South America (Baker et al. 2013). Their spring migration relies heavily on a handful of stopover sites, including Delaware Bay and nearby areas in the mid-Atlantic states. This species is relatively rare in New Hampshire, and while it occurs annually it is rarely reported in numbers above single digits.

Habitat

Although migratory shorebirds of some species occur inland in NH, the species treated in the 2015 Wildlife Action Plan are almost entirely coastal in distribution, occurring primarily along the immediate coast, Great Bay (rarely), and at the Isles of Shoals. In New Hampshire, Red Knots are primarily found on beaches or tidal mudflats, but will use all coastal habitats. They do not occur on Great Bay.

NH Wildlife Action Plan Habitats

- Salt Marshes
- Estuarine
- Coastal Islands
- Dunes

Distribution Map

Current Species and Habitat Condition in New Hampshire

Populations of Red Knots are wintering and migration staging areas appear to have declined significantly starting around 2000, and numbers in Argentina (winter) and Delaware Bay (spring) are roughly 70-75% lower than when baseline surveys were conducted in the 1980s (U.S. Fish and Wildlife Service 2014).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Federal Endangered Species Act
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Variable. Some of New Hampshire’s coastal beaches and salt marsh areas are protected from development, but such protection does not preclude recreation use that may constitute an important threat to migrating shorebirds.

Habitat Management Status

Habitat is not specifically managed for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and degradation due to sea level rise (Threat Rank: Medium)

Much of the original beach/dune/estuary system along the New Hampshire coast has been permanently altered by human infrastructure (roads, buildings, parking lots) and coastal engineering (salt marsh ditching, tidal restrictions, seawalls), with a net loss in habitats available for migrating shorebirds. Projected rises in sea level of even a few inches will further reduce available habitats (estuarine mudflats and rocky intertidal sites) that shorebirds need for roosting and feeding (Galbraith et al. 2014).

Species impacts from the harvest of important prey items (Horseshoe Crabs) (Threat Rank: Medium)

Harvest of Horseshoe Crabs in the mid-Atlantic states has been proposed as a significant factor behind in Red Knot populations (Baker et al. 2013). While not a significant threat locally in New Hampshire, regional efforts may be needed to reduce this harvest.

Disturbance from human activities (walking, running dogs, shellfish harvest) (Threat Rank: Medium)

Disturbance results from recreational use of beaches or other habitats that shorebirds need for roosting and feeding during migration. People, pets, or vehicles using these habitats regularly flush birds, causing them to both expend energy in avoidance flights and reduce energy intake via foraging. Studies of shorebird behavior combined with physiological models suggest that repeated disturbance can reduce individual birds' chances of successfully completing migration (Harrington and Drilling 1996, Burger et al. 2007).

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat conversion and degradation from human climate change response

Habitat degradation from dredging and the dumping of spoils

Mortality from unregulated hunting in the Caribbean

Habitat conversion and degradation from storm-altered deposition patterns

Disturbance from phenology shifts

Species impacts from siltation, acidification, fresh-water inputs, and increased temperatures

Actions to benefit this Species or Habitat in NH

Incorporate shorebird needs into coastal climate change planning.

Primary Threat Addressed: Habitat conversion and degradation due to sea level rise

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:
Ensure that human activities in response to climate change do not negatively affect important shorebird habitats or stopover sites.

General Strategy:
Provide information on shorebird habitat and important sites to local and regional planning authorities in the seacoast area. Work with these entities to ensure that the needs of migratory shorebirds are considered in climate adaptation and response plans.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Manage human activity relative to shorebird stopover

Primary Threat Addressed: Disturbance from human activities (walking, running dogs, shellfish harvest)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Minimize disturbance of migrating shorebirds

General Strategy:
Manage human disturbance through beach closures, dog restraints, outreach, volunteer “wardens,” and other means as identified. This would only need to occur during peak migration periods and primarily at key sites identified through shorebird monitoring.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Shorebird stopover monitoring

Objective:
Obtain data on distribution and abundance of shorebirds that can inform trends and prioritize conservation actions.

General Strategy:
Migratory shorebirds are best monitored at staging areas during migration along the Atlantic Coast, with lesser efforts directed at breeding sites and wintering areas. Because New Hampshire has such a

small coast and limited shorebird habitat, it is recommended that the State rely on regional and/or national monitoring efforts to inform conservation planning. There may be specific research needs that relate to site-specific activities, in which case more targeted research or monitoring may be warranted.

Political Location:
Northeast

Watershed Location:

References, Data Sources and Authors

Data Sources
Most data on shorebird use of the Hampton-Seabrook estuary come from a study by NH Audubon in 2006-07 (McKinley and Hunt 2008), while general data on distribution and abundance of all species are available in the New Hampshire Bird Records and eBird databases.

Data Quality
Although data on the numbers of birds that pass through New Hampshire on migration is limited, there are good data on which areas are preferred by shorebirds and the number of individuals using these at a given point in time.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

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Galbraith, H., DesRochers, DW., Brown, S., and J.M. Reed. 2014. Predicting vulnerabilities of North American shorebirds to climate change. PLoS ONE 9(9):1-13

Harrington, B., and N. Drilling. 1996. Investigations of effects of disturbance to migratory shorebirds at migration stopover sites on the U.S. Atlantic coast. Report to U.S. Fish and Wildlife Service. Manomet Observatory, Manomet, MA.

Morrison, R.I.G., B.J. McCaffery, R.E. Gill, S.K. Skagen, S.L. Jones, G.W. Page, C.L. Gratto-Trevor, and B.A. Anfres. 2006. Population estimates of North American Shorebirds, 2006. Wader Study Group Bulletin 111: 67-85.

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Purple Sandpiper

Calidris maritima

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	SNR
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of several migratory shorebirds are in steep decline (Andres 2009, Winn et al. 2013). Based largely on these declines, several species were proposed as RSGCN for the Northeast, and those that occur regularly in NH are included in the 2015 NH Wildlife Action Plan.

Distribution

Purple Sandpipers breed in arctic Canada, Greenland, Iceland, Scandinavia, and Russia and winter in the northern Atlantic (eastern North America and western Europe, Payne and Pierce 2002). In New Hampshire the species occurs as a migrant and winterer, and is found from November through May. Highest densities appear to occur on the Isles of Shoals, although consistent data are limited.

Habitat

Although migratory shorebirds of some species occur inland in NH, the species treated in the 2015 Wildlife Action Plan are primarily coastal in distribution. The Purple Sandpiper is the most closely associated with marine habitats, and occurs entirely along the immediate coast, where it frequents rocky shores (including jetties and offshore islands).

NH Wildlife Action Plan Habitats

- Coastal Islands

Distribution Map

Current Species and Habitat Condition in New Hampshire

Populations of many long-distance migrant shorebirds are believed to be in steep decline (Morrison et al. 2006, Andres 2009), and for this reason several species are considered priorities for future conservation. Data for Purple Sandpiper are limited, but some suggest declines (c.f., Mittelhauser et al. 2013).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Variable. Some of New Hampshire's coastal islands and rocky shores areas are protected from development, but such protection does not preclude sea level rise that may constitute an important threat to this species.

Habitat Management Status

Habitat is not specifically managed for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and degradation due to sea level rise (Threat Rank: Medium)

Much of the original beach/dune/estuary system along the New Hampshire coast has been permanently altered by human infrastructure (roads, buildings, parking lots) and coastal engineering (salt marsh ditching, tidal restrictions, seawalls), with a net loss in habitats available for migrating shorebirds. Projected rises in sea level of even a few inches will further reduce available habitats (estuarine mudflats and rocky intertidal sites) that shorebirds need for roosting and feeding (Galbraith et al. 2014).

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat conversion and degradation from human climate change response

Disturbance from human activities (walking, running dogs, shellfish harvest)

Disturbance from phenology shifts

Actions to benefit this Species or Habitat in NH

Incorporate shorebird needs into coastal climate change planning.

Primary Threat Addressed: Habitat conversion and degradation due to sea level rise

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:
Ensure that human activities in response to climate change do not negatively affect important shorebird habitats or stopover sites.

General Strategy:
Provide information on shorebird habitat and important sites to local and regional planning authorities in the seacoast area. Work with these entities to ensure that the needs of migratory shorebirds are considered in climate adaptation and response plans.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Shorebird stopover monitoring

Objective:
Obtain data on distribution and abundance of shorebirds that can inform trends and prioritize conservation actions.

General Strategy:
Migratory shorebirds are best monitored at staging areas during migration along the Atlantic Coast, with lesser efforts directed at breeding sites and wintering areas. Because New Hampshire has such a small coast and limited shorebird habitat, it is recommended that the State rely on regional and/or national monitoring efforts to inform conservation planning. There may be specific research needs that relate to site-specific activities, in which case more targeted research or monitoring may be warranted. This may be particularly true for Purple Sandpiper, which is generally not well-monitored by other shorebird surveys due to temporal and habitat differences (Mittelhauser et al. 2013).

Political Location:
Northeast

Watershed Location:

References, Data Sources and Authors

Data Sources
General data on distribution and abundance of shorebirds are available in the New Hampshire Bird Records and eBird databases.

Data Quality
Although data on the numbers of birds that pass through New Hampshire on migration is limited, there are good data on which areas are preferred by shorebirds and the number of individuals using these at a given point in time.

Appendix A: Birds

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

Andres, B.A. 2009. Analysis of shorebird population trend datasets. USFWS, 23 Jan 2009.

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Semipalmated Sandpiper

Calidris pusilla

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	SNR
Regional Status	High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of several migratory shorebirds are in steep decline (Andres 2009, Winn et al. 2013). Based largely on these declines, several species were proposed as RSGCN for the Northeast, and those that occur regularly in NH are included in the 2015 NH Wildlife Action Plan.

Distribution

Semipalmated Sandpipers breed across arctic Alaska and Canada, and winter primarily in the Caribbean and South America (Hicklin and Gratto-Trevor 2010). The highest densities of migrating shorebirds in NH generally occur in the Hampton-Seabrook estuary and adjacent areas of beach and dunes. Smaller numbers of birds occur regularly at coastal beaches and salt pannes north through Rye. Great Bay, while regularly hosting migrant shorebirds, only supports one focal species – the Semipalmated Sandpiper – with any regularity. Most data on shorebird use of the Hampton-Seabrook estuary come from a study by NH Audubon in 2006-07 (McKinley and Hunt 2008).

From a seasonal perspective, New Hampshire is far more important to shorebirds during their southbound fall migration than in spring, when most species move north farther to the west. Spring migration is also more contracted, with the majority of birds passing through in the second half of May. In fall, the first southbound birds appear in July, and some can still be found into October (McKinley and Hunt 2008).

Habitat

Although migratory shorebirds of some species occur inland in NH, the species treated in the 2015 Wildlife Action Plan are almost entirely coastal in distribution, occurring primarily along the immediate coast, Great Bay (rarely), and at the Isles of Shoals. Specific habitats used for foraging include intertidal mudflats, rocky shores, and sandy beaches; and roosting habitats include rocky shores above the high tide line, salt pannes, dunes, and elevated areas of salt marsh. Semipalmated Sandpipers use all these habitats regularly.

NH Wildlife Action Plan Habitats

- Salt Marshes
- Estuarine
- Coastal Islands
- Dunes

Distribution Map

Current Species and Habitat Condition in New Hampshire

Populations of many long-distance migrant shorebirds are believed to be in steep decline (Morrison et al. 2006, Andres 2009), and for this reason several species are considered priorities for future conservation. Although sometimes difficult to interpret, available data on Semipalmated Sandpipers suggest that the population breeding in eastern Canada (and which is the source of migrants found in New Hampshire) is in long-term decline, although possibly stabilizing (Jehl 2007, Andres et al. 2012).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Variable. Some of New Hampshire’s coastal beaches and salt marsh areas are protected from development, but such protection does not preclude recreation use that may constitute an important threat to migrating shorebirds.

Habitat Management Status

Habitat is not specifically managed for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and degradation due to sea level rise (Threat Rank: Medium)

Much of the original beach/dune/estuary system along the New Hampshire coast has been permanently altered by human infrastructure (roads, buildings, parking lots) and coastal engineering (salt marsh ditching, tidal restrictions, seawalls), with a net loss in habitats available for migrating shorebirds. Projected rises in sea level of even a few inches will further reduce available habitats (estuarine mudflats and rocky intertidal sites) that shorebirds need for roosting and feeding (Galbraith et al. 2014).

Disturbance from human activities (walking, running dogs, shellfish harvest) (Threat Rank: Medium)

Disturbance results from recreational use of beaches or other habitats that shorebirds need for roosting and feeding during migration. People, pets, or vehicles using these habitats regularly flush birds, causing them to both expend energy in avoidance flights and reduce energy intake via foraging. Studies of shorebird behavior combined with physiological models suggest that repeated disturbance can reduce individual birds' chances of successfully completing migration (Harrington and Drilling 1996, Burger et al. 2007).

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat conversion and degradation from human climate change response

Habitat degradation from dredging and the dumping of spoils

Mortality from unregulated hunting in the Caribbean

Species impacts from the harvest of important prey items (Horseshoe Crabs)

Habitat conversion and degradation from storm-altered deposition patterns

Disturbance from phenology shifts

Species impacts from siltation, acidification, fresh-water inputs, and increased temperatures

Actions to benefit this Species or Habitat in NH

Incorporate shorebird needs into coastal climate change planning.

Primary Threat Addressed: Habitat conversion and degradation due to sea level rise

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:

Ensure that human activities in response to climate change do not negatively affect important shorebird habitats or stopover sites.

General Strategy:

Provide information on shorebird habitat and important sites to local and regional planning authorities in the seacoast area. Work with these entities to ensure that the needs of migratory shorebirds are considered in climate adaptation and response plans.

Political Location:

Rockingham County

Watershed Location:

Coastal Watershed

Manage human activity relative to shorebird stopover

Primary Threat Addressed: Disturbance from human activities (walking, running dogs, shellfish harvest)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:

Minimize disturbance of migrating shorebirds

General Strategy:

Manage human disturbance through beach closures, dog restraints, outreach, volunteer "wardens," and other means as identified. This would only need to occur during peak migration periods and primarily at key sites identified through shorebird monitoring.

Political Location:

Rockingham County

Watershed Location:

Coastal Watershed

Shorebird stopover monitoring

Objective:

Obtain data on distribution and abundance of shorebirds that can inform trends and prioritize conservation actions.

General Strategy:

Migratory shorebirds are best monitored at staging areas during migration along the Atlantic Coast, with lesser efforts directed at breeding sites and wintering areas. Because New Hampshire has such a small coast and limited shorebird habitat, it is recommended that the State rely on regional and/or national monitoring efforts to inform conservation planning. There may be specific research needs that relate to site-specific activities, in which case more targeted research or monitoring may be warranted.

Political Location:

Northeast

Watershed Location:

References, Data Sources and Authors

Data Sources

Most data on shorebird use of the Hampton-Seabrook estuary come from a study by NH Audubon in 2006-07 (McKinley and Hunt 2008), while general data on distribution and abundance of all species are available in the New Hampshire Bird Records and eBird databases.

Data Quality

Although data on the numbers of birds that pass through New Hampshire on migration is limited, there are good data on which areas are preferred by shorebirds and the number of individuals using these at a given point in time.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

NHFG

Literature

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Canada Warbler

Cardellina canadensis

Photo by Jason Lambert

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S5
Regional Status	Very High

Justification (Reason for Concern in NH)

The Canada Warbler is one of several still-common forest birds that are experiencing significant population declines across much of their ranges, and as a result is considered a Regional SGCN in the Northeastern United States (USFWS Region 5). It is also on the Partners in Flight Watch List and the focus of a working group dedicated to range-wide and full life cycle conservation of the species. Populations in New Hampshire have declined at 5.34%/year since 1966, and 5.42%/year since 2003. Long term trends are similar in BCR 14 (-4.09%/year) and BCR 30 (--6.50%/year). There have also been declines of 20-30% based on repeated Breeding Bird Atlases in the northeast (McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014).

Distribution

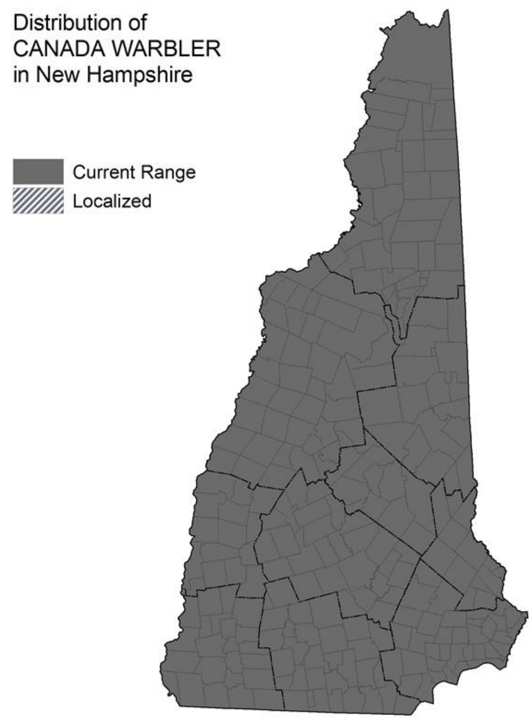
The Canada Warbler breeds from northern Alberta south and east to Wisconsin, Pennsylvania, and Nova Scotia, and south in the Appalachians to Georgia (Reitsma et al. 2010). It winters in South America in and east of the Andes from Columbia and Venezuela to Peru, but is rare to uncommon in the western Amazon lowlands. In New Hampshire is occurs statewide but is less common and highly local in the southern third of the state (Foss 1994).

Habitat

The Canada Warbler uses a wide range of forest types with well-developed shrub layers, and often wet or even swampy (Reitsma et al. 2010). Examples include red maple/hemlock swamps, regenerating clear cuts, bogs, and dense riparian thickets.

NH Wildlife Action Plan Habitats

- Hemlock Hardwood Pine Forest
- Northern Hardwood-Conifer Forest
- Lowland Spruce-Fir Forest
- Northern Swamps
- Temperate Swamps



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines and some range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Many forest birds are area sensitive (e.g., Zuckerberg and Porter 2010) and less likely to occupy habitat patches in landscapes with less forest cover. See the forest habitat profiles for more information.

Habitat conversion and fragmentation from tower and turbine development (Threat Rank: Medium)

Towers and turbines and their supporting infrastructure result in both the direct loss of habitat and fragmentation of adjacent non-cleared forest. Both these impacts can affect forest birds as discussed elsewhere. See the forest habitat profiles for more information.

Habitat conversion and degradation from timber harvest (Threat Rank: Medium)

To the extent that timber harvest can remove mature forest from the landscape, its short-term effects can be similar to those of residential or commercial development for forest birds. At the same time, if regenerating forest contains a different species composition its suitability for specific forest birds could either increase or decrease.

Habitat degradation from insect pests (introduced species) (Threat Rank: Medium)

To the extent that insect pests can alter forest species composition, they may have trickle down effects on the bird that use these habitats, although detailed studies of these effects have yet to be carried out. See the forest habitat profiles for more information.

Disturbance (parasitism) and mortality from subsidized or introduced predators (Threat Rank: Medium)

In fragmented forest systems, brood parasitism by the Brown-headed Cowbird (*Molothrus ater*) has been implicated in declining forest bird populations (Brittingham and Temple 1983). Although the extent of such parasitism in New Hampshire is unknown, the state's extensive forest cover likely reduces the overall risk (c.f., Hoover and Brittingham 1993). Ground-nesting birds like the Canada Warbler and their nests are also subject to predation by human commensals such as free-ranging cats, raccoons, and corvids.

List of Lower Ranking Threats:

Habitat impacts and disturbance from acid deposition that can reduce prey

Disturbance from mercury toxicity

Disturbance from noise associated with recreational activity

Habitat impacts from road fragmentation

Habitat conversion and degradation from agriculture on winter grounds

Habitat degradation from habitat shifting and changes in species composition

Habitat conversion due to development on winter grounds

Actions to benefit this Species or Habitat in NH

No actions identified, but see appropriate forest habitat profile(s) for actions that would likely benefit this species.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality

Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015 USGS Patuxent Wildlife Research Center, Laurel, MD.

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Bicknell's Thrush

Catharus bicknelli

Federal Listing	PE
State Listing	SC
Global Rank	S4
State Rank	S2
Regional Status	Very High

Photo by Jason Lambert

Justification (Reason for Concern in NH)

The Bicknell's Thrush is endemic to high-elevation spruce-fir forests of the northeastern United States and southeastern Canada. This limited and fragmented habitat is threatened by a combination of acid deposition, climate change, and development for ski areas, wind facilities, and other uses. Birds nesting in these areas may be at risk from exposure to mercury and other toxins. Almost all of the population winters on the Caribbean island of Hispaniola, where extensive historic and current deforestation likely poses the greatest threat to the species' long-term survival. Although difficulties in monitoring make trend data hard to obtain, there is some evidence of declines, and the species' has definitely disappeared from several more isolated mountaintops where it formerly bred.

Distribution

Bicknell's Thrush is endemic to the Northeast, where it occurs in the mountains of New York (Catskills and Adirondacks), Vermont (Green Mountains and northeast highlands), New Hampshire (see below), Maine (White Mountains to Katahdin), Quebec (north shore of St. Lawrence River and Gaspe), north-central New Brunswick, and Nova Scotia (Cape Breton Island) (Rimmer et al. 2001). Historically occurred in coastal areas within the Canadian range, and south to Mt. Greylock, Massachusetts, where extirpated (Veit and Petersen 1993). Repeated Breeding Bird Atlas projects in New York and Vermont detected no changes in distribution (McGowan and Corwin 2008, Renfrew 2013). The species' entire global population winters in the Greater Antilles, with almost all records from the island of Hispaniola (Haiti and Dominican Republic). Scattered sightings have been made in mountains of southeastern Cuba, Jamaica, and Puerto Rico.

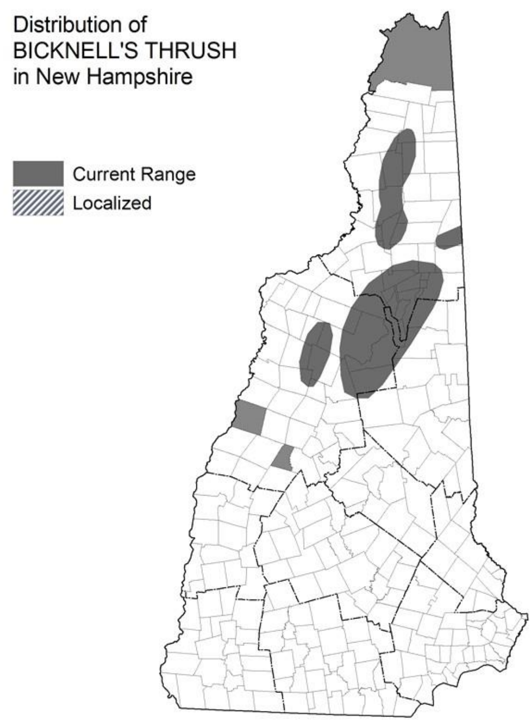
In New Hampshire, Bicknell's Thrush breeding habitat is centered in the White Mountains, with smaller numbers north in suitable habitat to the Canadian border. To the south, it formerly occurred on isolated mountains from Smart's Mountain (Lyme, where still present) south. Of these, it is still present occasionally (but perhaps just as a visitor) on Mt. Cardigan (Orange), but has not been reported from Kearsarge, Sunapee, or Monadnock since at least the 1970s (Foss 1994). In addition to this range retraction from the isolated southern mountains, Bicknell's Thrush has also disappeared from lower elevation sites where it formerly occurred, such as Dixville Notch (it still breeds in the mountains on either side of the notch).

Habitat

Bicknell's Thrush occupies coniferous forests on high elevation mountain slopes in the northeastern United States, and lower elevation forests further north in the Canadian Maritime Provinces. Occupied habitats are characterized by high numbers of standing dead conifers with a dense understory of balsam fir, with varying amounts of red spruce, black spruce, paper birch, mountain ash, and other species depending on latitude and elevation. Within these forests, Bicknell's Thrush are most common in areas that undergo frequent natural disturbance from wind, ice storms, fir waves, fire, and insect outbreaks, and will also readily use similar habitats in regenerating timber harvests (Rimmer et al. 2001). Elevation limits vary with latitude, and are higher in the southern portion of the range (3600' in Catskills of NY) than in the north (2500' in Maine, Rimmer et al. 2001). In New Hampshire, Bicknell's Thrush habitat is found primarily between 3500 and 4500' (Foss 1994). On its wintering grounds, this species occupies moist, primarily broadleaf forests, which have been severely reduced in extent (Rimmer et al. 2001). It is now largely restricted to remnant areas of cloud forest at relatively high elevation (IBTCG 2010).

NH Wildlife Action Plan Habitats

- High Elevation Spruce-Fir Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

Trend data are limited and equivocal. Overall, Mountain Birdwatch data for the US show a stable population from 2001-2009 (IBTCG 2010), including in the White Mountains, whereas King et al. (2008) report a 7% annual decline from 1993-2003 in this region. All data from the species' range in Canada indicate declines (IBTCG 2010). Overall, the species' range has retracted since the late 1900s.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Migratory Bird Treaty Act (1918)

Quality of Habitat

Montane spruce-fir forests occupied by Bicknell's Thrush during the breeding season are impacted by atmospheric deposition of acidic compounds, heavy metals and other pollutants, development of wind power, telecommunications, and ski area facilities, human disturbance along hiking trails, and climate change impacts. Several alpine ski resorts and thousands of miles of hiking trails attract millions of visitors each year. Ski slopes in higher elevations may be wide enough to limit movement and effectively fragment and degrade breeding habitat. Extensive traffic on popular hiking trails may disturb birds in adjacent habitats and cause damage to soils and vegetation. An assessment of habitat quality for different patches should include size of habitat block, forest stand characteristics, natural and human disturbance factors, predator populations, and measures of ecosystem health that could include invertebrate community, soil toxicology, and other factors. Habitat condition should be correlated with Bicknell's Thrush population parameters, including reproduction and mortality rates, blood mercury content, etc.

Habitat Protection Status

Most of the Bicknell's Thrush habitat in New Hampshire is within the White Mountain National Forest, and overall 94% of potential habitat statewide is under some sort of conservation (Lambert 2003).

Habitat Management Status

Habitat management has not been implemented for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and degradation from agriculture on winter grounds (Threat Rank: High)

Considerable evidence suggests that habitat loss on the Caribbean winter grounds may be the most critical threat facing Bicknell's Thrush. On Hispaniola, only 10% of original forest cover remains in the Dominican Republic, while the figure for Haiti is less than 2% (IBTCG 2010), and remaining forests are under continual pressure from agriculture and charcoal making. At the same time, protection of existing conserved areas is often inadequate or non-existent and habitat continues to be lost even in reserves.

Habitat conversion due to development (Threat Rank: Medium)

See high-elevation spruce-fir forest habitat profile for more detail on this threat.

Habitat conversion and fragmentation from tower and turbine development (Threat Rank: Medium)

In a study of Bicknell's Thrush at a wind facility in northern New Hampshire, Parrish (2013) found no effects of turbines on home range size, although behavioral data suggested that birds avoided turbines when the latter were emitting moderate-to-high amounts of noise. The effects of noise on stress levels, site fidelity, and reproductive success are in need of further research.

Habitat degradation from insect pests (Balsam Woolly Adelgid and spruce budworm) (Threat Rank: Medium)

Range expansion by the non-native Balsam Woolly Adelgid has the potential to alter forest composition and this habitat suitability. The adelgid is currently limited by winter temperatures. See the high-elevation spruce-fi forest habitat profile for more information.

Habitat degradation from acid deposition (Threat Rank: Medium)

High-elevation spruce-fir forests throughout the Northeast have been affected by acid deposition, which has resulted in extensive die-offs of red spruce. Because red spruce is not the dominant species in Bicknell's Thrush habitat, the species may be less impacted by acid deposition than the forest as a whole, and would even benefit if spruce was replaced with dense regrowth of balsam fir. Acidification also leaches calcium from the soil, causing declines in tree health, invertebrate prey quality, and potentially reproductive success in Bicknell's Thrush and other species which share its habitat.

List of Lower Ranking Threats:

Disturbance from persistent organic compounds

Disturbance from mercury toxicity

Disturbance from recreational activity (walkers, dog walkers)

Habitat conversion and impacts (fragmentation) from ski area development

Disturbance during research activities

Habitat degradation from timber harvest

Habitat impacts from road fragmentation

Habitat conversion and degradation from warming temperatures and associated increase of hardwood species

Actions to benefit this Species or Habitat in NH

Support Mountain Birdwatch

Objective:

Maintain continuous monitoring of Bicknell's Thrush populations so as to assess trends and possibly the spatial scale at which threats manifest

General Strategy:

Work with the Vermont Center for Ecostudies to ensure complete coverage of Mountain Birdwatch routes in New Hampshire.

Political Location:
Coos County, Grafton County

Watershed Location:

Hispaniolan Habitat Conservation

Primary Threat Addressed: Habitat conversion and degradation from agriculture on winter grounds

Specific Threat (IUCN Threat Levels): Agriculture & aquaculture

Objective:

Maintain, preserve, and enhance winter habitat for Bicknell's Thrush

General Strategy:

There are already projects in place that seek to conserve wintering habitat for Bicknell's Thrush in the Dominican Republic and Haiti. New Hampshire should consider participating in and/or supporting such efforts given the state's responsibility for the species' breeding population.

Political Location:
National

Watershed Location:
Statewide

Pollutant effects research

Primary Threat Addressed: Habitat degradation from acid deposition

Specific Threat (IUCN Threat Levels): Pollution / Air-borne pollutants / Acid rain

Objective:

Determine the importance of acid deposition, mercury, and other atmospheric pollutants on Bicknell's Thrush reproductive success

General Strategy:

Conduct research at sites with varying exposure to atmospheric pollutants (and climate change) to assess the direct or indirect impacts of these stressors to reproductive success, survival, or other demographic parameters.

Political Location: Regional

Watershed Location:

References, Data Sources and Authors

Data Sources

Mountain Birdwatch is a program run by the Vermont Center for Ecostudies. Additional broad distribution data obtained from NHBR.NH eBird.

Data Quality

Because Bicknell's Thrush habitat is often remote, and birds difficult to detect even when present, it can be very difficult to obtain good estimates of population size or trend. Although more robust monitoring methods have been developed in recent years, more data need to be collected before strong inferences can be made.

2015 Authors:
Pamela Hunt, NHA, Laura Deming, NHA

2005 Authors:
Laura Deming, NHA

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Veery

Catharus fuscescens

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S5
Regional Status	High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

The Veery is one of several still-common forest birds that are experiencing significant population declines across much of their ranges, and as a result is considered a Regional SGCN in the Northeastern United States (USFWS Region 50. Populations in New Hampshire have declined at 1.65%/year since 1966, and 1.38%/year since 2003. Long term trends are similar in BCR 14 (-2.04%/year) and BCR 30 (-0.95%/year).

Distribution

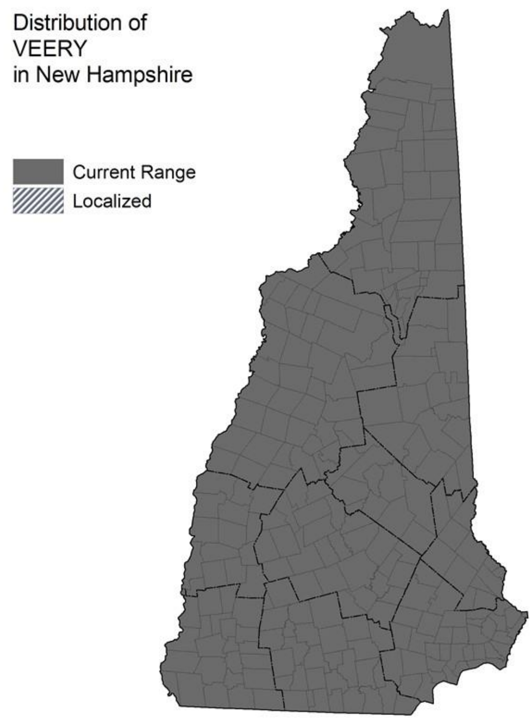
The Veery breeds across most of the northern United States and southern Canada, from British Columbia and Oregon to Newfoundland and New Jersey, and south in mountains to Colorado and Georgia. It winters in southeastern and south-central Brazil (Bevier et al 2005). It is found statewide in New Hampshire except at high elevations (Foss 1994).

Habitat

The Veery is most common in moist hardwood forests with abundant disturbance-related elements (Bevier et al. 2005). Such sites include mid-successional forests, floodplains, swamps, and mature forests with dense shrub layers. They are also area sensitive, although minimum patch size varies geographically and there are no data specific to New Hampshire. At higher elevations and latitudes, also uses forests with some coniferous elements.

NH Wildlife Action Plan Habitats

- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Floodplain Habitats
- Northern Hardwood-Conifer Forest
- Northern Swamps
- Temperate Swamps



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Many forest birds are area sensitive (e.g., Zuckerberg and Porter 2010) and less likely to occupy habitat patches in landscapes with less forest cover. See the forest habitat profiles for more information.

Habitat conversion and fragmentation from tower and turbine development (Threat Rank: Medium)

Towers and turbines and their supporting infrastructure result in both the direct loss of habitat and fragmentation of adjacent non-cleared forest. Both these impacts can affect forest birds as discussed elsewhere. See the forest habitat profiles for more information.

Habitat conversion and degradation from timber harvest (Threat Rank: Medium)

To the extent that timber harvest can remove mature forest from the landscape, its short-term effects can be similar to those of residential or commercial development for forest birds. At the same time, if regenerating forest contains a different species composition its suitability for specific forest birds could either increase or decrease.

Habitat degradation from insect pests (introduced species) (Threat Rank: Medium)

To the extent that insect pests can alter forest species composition, they may have trickle down effects on the bird that use these habitats, although detailed studies of these effects have yet to be carried out. See the forest habitat profiles for more information.

Disturbance (parasitism) and mortality from subsidized or introduced predators (Threat Rank: Medium)

In fragmented forest systems, brood parasitism by the Brown-headed Cowbird (*Molothrus ater*) has been implicated in declining forest bird populations (Brittingham and Temple 1983). Although the extent of such parasitism in New Hampshire is unknown, the state's extensive forest cover likely reduces the overall risk (c.f., Hoover and Brittingham 1993). Thrushes and their nests are also subject to predation by human commensals such as free-ranging cats, raccoons, and corvids.

Habitat impacts and disturbance from acid deposition that reduces availability of prey species (Threat Rank: Medium)

Although emissions controls have moderated the pH of precipitation in the northeastern United States, potential long-term effects on ecosystems are now known to include declines in terrestrial invertebrates that require calcium in their shells or exoskeletons. In turn, birds that prey upon such invertebrates may experience prey limitation or insufficient calcium intake, which can compromise reproductive success (Graveland 1998). In a study of the ecologically similar Wood Thrush, Hames et al. (2002) determined that the probability of breeding was negatively correlated with the intensity of acid deposition across the species' range in the eastern United States, and that such a relationship could contribute to observed population declines.

List of Lower Ranking Threats:

Disturbance from noise associated with recreational activity

Habitat impacts from road fragmentation

Habitat conversion and degradation from agriculture on winter grounds

Habitat conversion due to development on winter grounds

Actions to benefit this Species or Habitat in NH

No actions identified, but see appropriate forest habitat profile(s) for actions that would likely benefit this species.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Zuckerberg, B. and W.F. Porter. 2010. Thresholds in the long-term responses of breeding birds to forest cover and fragmentation. Biological Conservation 143: 952–962.

Chimney Swift

Chaetura pelagica

Photo by Deb La Valley

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S4
Regional Status	High

Justification (Reason for Concern in NH)

Aerial insectivores (here including nightjars, swifts, flycatchers, and swallows) have recently received increased conservation attention due to significant declines in several species (Hunt 2009, Nebel et al. 2010). Because all species share a common prey base of flying insects, there has been much speculation on a potential common cause for many of the declines. Much current research has been directed toward swifts and swallows in North America, resulting in greater knowledge of potential threats. Swifts and swallows have several ecological characteristics in common. All are highly aerial, and feed entirely on insects captured during sustained flight – often quite high in the air column. Threats identified for the group as a whole include changes in food supply, effects of insecticides on adults or young, loss of nesting locations, and climate change. It should be noted that any of these factors could be affecting birds at any point in their annual cycle, and knowledge of their winter ecology is currently largely unknown. Like many aerial insectivores, populations of Chimney Swifts are in strong decline. Based on BBS (Sauer et al. 2014) data the species has declined at 2.8% annually since 1966 in NH, with this rate increasing to 4.23% in the period 2003-2013. Regionally, declines are higher in the north (BCR 14: -4.18%) than the south (BCR 30: -1.85%) (see also Nebel et al. 2010). Repeated Breeding Bird Atlases have documented declines in occupancy, particularly in Ontario (Cadman et al. 2007), and to a lesser extent in NY (McGowan and Corwin 2008) and Vermont (Renfrew 2013). Chimney Swift is considered a species of concern in Connecticut and Maine, a RSGCN in USFWS Region 5, and Threatened in Canada.

Distribution

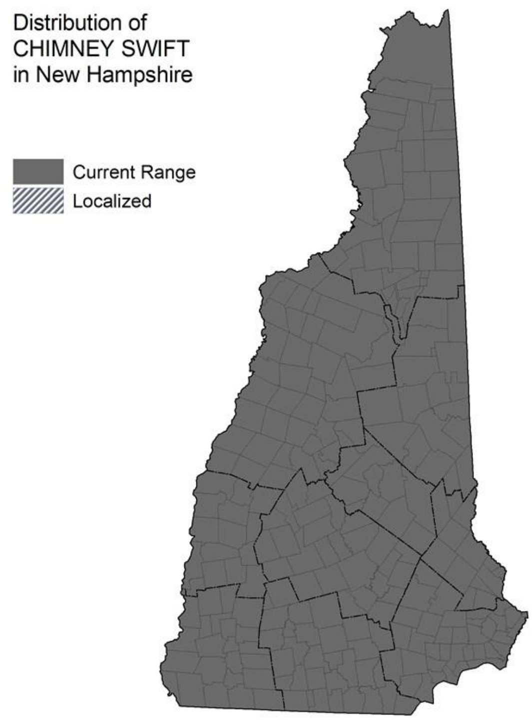
Breeds across eastern United States and southern Canada (Montana and Texas to Nova Scotia and Florida), and winters in South America (especially in the western Amazon basin). Occurs statewide in New Hampshire, although concentrated in urban areas.

Habitat

Prior to European colonization, Chimney Swifts nested in forested areas, building their nests in large hollow trees. By the late 1600s they had adapted to nest in chimneys and became a common feature of urban areas, and were nesting almost entirely in chimneys by 1800. Most birds presently occur in the latter, although data are limited from extensively forested landscapes where suitable nesting trees may still be present. Migrants and non-breeding birds also form large communal roosts in chimneys.

NH Wildlife Action Plan Habitats

- Developed Habitats
- Lowland Spruce-Fir Forest
- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Northern Hardwood-Conifer Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines and some range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Limited information. Studies elsewhere in the species range (CT, Canada) suggest that suitable (i.e., not capped or lined) chimneys in urban areas are not limiting, although the proportion of such chimneys is apparently declining (Mordecai 2008, Fitzgerald et al. 2014). There is also evidence that past and increasing current use of various insecticides can significantly impact local insect populations and thus Chimney Swifts' food supply (Nocera et al. 2012).

Habitat Protection Status

Most nesting locations are probably on private property and thus not protected in the traditional sense of the term.

Habitat Management Status

Habitat management has not been implemented for this species, although there is growing interest in developing BMPs for minimizing impacts to swifts nesting in residential chimneys.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion from chimney capping and lining (Threat Rank: High)

Capping or lining chimneys renders them unsuitable for nesting, and in some cases chimneys are removed entirely as heating systems change. Studies in North Carolina, Connecticut, and Ontario suggest that suitable chimneys are not currently limiting (Mordecai 2008, Rubega et al. 2013, Fitzgerald et al. 2014), but that their availability continues to decline. Note that even if a chimney is suitable for swifts and used for breeding, cleaning during the breeding season will result in failed nests.

Mortality during southward migration during hurricane season (Threat Rank: Medium)

There is some evidence that Chimney Swift short-term population fluctuations are tied to the timing and intensity of tropical storm activity in the northwest Atlantic (Butler 2000, Dionne et al. 2008). If such storms become more frequent and more intense as a result of climate change, their impacts on swift populations could increase.

Species impacts from agricultural pesticide use causing prey declines (Threat Rank: Medium)

Research on historic diets of Chimney Swifts (Nocera et al. 2012) has documented a diet shift associated with the DDT era in North America, although this work did not specifically link the shift to regional population trajectories. There is also concern about the use of insecticides on these species on their winter grounds in South America, where some chemicals are known to have direct toxic effects on migratory birds (Goldstein et al. 1999). A recent analysis of pesticide import data suggests that aerial insectivores showing the strongest declines tend to winter in Latin American countries with higher than average imports (and thus presumably use, J. Nocera pers. comm.).

List of Lower Ranking Threats:

Mortality from pesticide use in South America

Disturbance from agricultural pesticide use in North America

Disturbance and destruction of nests from work activities

Habitat degradation from the loss of old growth forest trees

Disturbance and mortality from spring cold snaps and intense storms

Actions to benefit this Species or Habitat in NH

Roost site monitoring

Objective:
Identify and monitor significant roost sites

General Strategy:
Recruit and train volunteers to find and monitor Chimney Swift roost. Such data may provide additional information on trend while also identifying important sites that might warrant more detailed characterization.

Political Location:
Statewide

Watershed Location:
Statewide

Chimney availability surveys

Primary Threat Addressed: Habitat conversion from chimney capping and lining

Specific Threat (IUCN Threat Levels): Other options / Other threat / Alteration of human structures that wildlife use

Objective:
Determine availability of suitable nesting chimneys. Can also provide a baseline against which changes in availability can be measured at later intervals.

General Strategy:
Select study areas in a variety of developed locations and sample pre-determined sub-sections for chimneys. Where possible, record whether chimneys are capped, lined, both, or neither, involving homeowners whenever possible. Although surveys of chimney availability in CT and Canada have found that nesting structures are not currently limiting, some NH-specific data on patterns of chimney availability and “loss” may be valuable for future conservation planning

Political Location:
Statewide

Watershed Location:
Statewide

Historic diet research

Primary Threat Addressed: Species impacts from agricultural pesticide use causing prey declines

Specific Threat (IUCN Threat Levels): Pollution / Agricultural & forestry effluents / Herbicides & pesticides

Objective:
Determine if diets of swifts in New Hampshire have changed significantly.

General Strategy:
If significant historical roosts are found, consider participating in ongoing efforts to quantify changes in diet (e.g., Nocera et al. 2012)

Political Location:
Northeast, Statewide

Watershed Location:
Statewide

Roost site protection

Primary Threat Addressed: Habitat conversion from chimney capping and lining

Specific Threat (IUCN Threat Levels): Other options / Other threat / Alteration of human structures that wildlife use

Objective:
Protect roost sites from loss or other impacts

General Strategy:
Identify significant roosts (a separate action). Inform building owners about the importance of the site and encourage steps to preserve it as a valuable location for swifts. Potential specific actions could include retaining chimneys otherwise slated for removal, securing unsafe structures, or opting not to cap or otherwise alter a chimney.

Political Location:
Statewide

Watershed Location:
Statewide

Provide artificial nesting structures

Primary Threat Addressed: Habitat conversion from chimney capping and lining

Specific Threat (IUCN Threat Levels): Other options / Other threat / Alteration of human structures that wildlife use

Objective:
Increase nesting habitat for swifts by constructing artificial nesting towers

General Strategy:
Artificial nesting/roosting towers (Kyle and Kyle 1998) have been used extensively by birds in the southern U.S., but are largely unused elsewhere, particularly the northern U.S. and Canada (Rubega et al. 2013, multiple pers. comm.).

Political Location:
Statewide

Watershed Location:
Statewide

Chimney Swift outreach

Primary Threat Addressed: Disturbance and destruction of nests from work activities

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Minimize cleaning of chimneys during periods when nests are active and vulnerable to destruction.

General Strategy:
Chimney swifts would benefit from outreach directed at homeowners and chimney sweeps about

declining swift populations, characteristics of suitable chimneys, and timing of chimney cleaning.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources
Trend data from BBS and Breeding Bird Atlases (citations above)

Data Quality
Although there are considerable data on trend, BBS data are not ideal for this species because it often forages high in the air column or far from nesting sites. As a result, it is difficult to estimate actual abundance or tie locations to potential breeding sites. Declines noted in some Atlases corroborate those seen in BBS data.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

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Piping Plover

Charadrius melodus [A]

Federal Listing	T
State Listing	E
Global Rank	G3
State Rank	S1
Regional Status	Very High

Justification (Reason for Concern in NH)

Before the Migratory Bird Treaty Act of 1918, unregulated hunting caused the decline of the Atlantic coast Piping Plover population (USFWS 1996). Since the 1940s, the population has steadily declined due to increased development along coastal habitats. This development boom has increased habitat loss and degradation, human disturbance, and predation, all of which have contributed to population declines from Nova Scotia to North Carolina (USFWS 1985, Haig 1992). Though the Piping Plover was absent for several years along the New Hampshire coast, it was discovered nesting again in 1996. The Atlantic coast Piping Plover population is the aggregate of many small groups with many breeding sites, with most sites having fewer than 10 breeding pairs (A. Hecht, USFWS, personal communication). Therefore, even protecting breeding locations with only a few pairs is crucial to maintaining the integrity of the overall population.

Distribution

The Atlantic coast Piping Plover population breeds from Nova Scotia south to North Carolina. They are monogamous and territorial during the breeding season with pairs staying together to help raise their young.

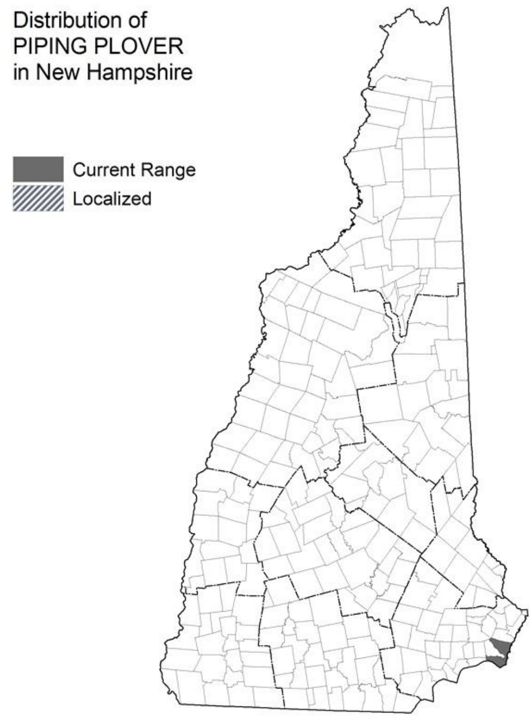
New Hampshire Fish and Game (NHFG) began a Piping Plover protection effort in 1997 after the nesting was observed the previous summer. Since then, Piping Plovers have consistently nested on the beaches and dunes along the Atlantic coast in the towns of Hampton and Seabrook. One to 3 pairs have consistently nested north of Hampton Harbor Inlet at Hampton Beach State Park with 1 to 5 pairs annually nesting south of Hampton Harbor Inlet on Seabrook Beach (NHFG data).

Habitat

Piping Plovers nest on sandy beaches in areas of sparse vegetation such as the edges of gently sloping foredunes or open sand flats that remain above the high tide line (USFWS 1996). Winter storms often shift sands and create blowouts or overwash which in turn provide attractive nesting habitat the following spring. The location of nesting areas may shift annually as habitat is lost from increased vegetation or created through sand deposits. In New Hampshire most nesting occurs along the fordunes where vegetation is sparse.

NH Wildlife Action Plan Habitats

- Dunes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Piping Plovers that breed along the New Hampshire coast are part of the greater Atlantic Coast population. The Atlantic Coast population will be considered recovered when 2,000 breeding pairs are maintained for 5 years and are distributed throughout 4 recovery units, as delineated by the USFWS Piping Plover Atlantic Coast Population Revised Recovery Plan (1996). As of 2012, the Atlantic coast population was estimated to be 1,898 pairs (USFWS 2013).

New Hampshire falls within the New England recovery unit that must achieve and maintain 625 breeding pairs to meet the recovery goal (USFWS 1996). This goal was first attained in 1998 when 627 breeding pairs were recorded. This goal has been exceeded every year since 2006 and preliminary estimates for 2012 breeding season indicate 879 pairs for the New England recovery unit (USFWS 2013).

According to population monitoring by S.M. Melvin and J.P. Gibbs (1994), a minimum of 1.24 chicks fledged per pair is necessary to maintain a stationary population. However, the USFWS Piping Plover Atlantic Coast Population Revised Recovery Plan states that a higher productivity rate of 1.50 chicks fledged per pair is necessary to prevent extinction and maintain a population of 2000 breeding pairs (USFWS 1996).

Since 1997, when protection efforts began in New Hampshire, between 3 and 8 pairs have nested annually along the coast and have fledged a total of 127 chicks. Productivity for Piping Plovers in New Hampshire has varied between 0.0 and 2.7 chicks fledged per pair each year with the average productivity of 1.23 between 1997 and 2015 (NHFG Data).

Population Management Status

Piping Plovers are monitored each year throughout the breeding season. Nesting areas are protected with symbolic fencing to minimize human disturbance and nests are protected from predation with fenced exclosures. Chicks are monitored daily from hatching to fledging (25-35 days), and recreational activities are managed in breeding areas to prevent disturbance. Beach management activities such as beach raking and boardwalk maintenance are coordinated with local, town, state and federal officials.

Regulatory Protection (for explanations, see Appendix I)

- Federal Endangered Species Act
- Endangered Species Conservation Act (RSA 212-A)
- Comprehensive Shoreland Protection Act - NHDES
- Migratory Bird Treaty Act (1918)

Quality of Habitat

In New Hampshire there are only three known habitat patches that provide suitable nesting grounds for Piping Plovers. Each patch is subject to intensive recreational use during the breeding season and the high human densities have contributed to high predator densities.

Habitat Protection Status

All known Piping Plover breeding areas are protected under Federal Threatened and Endangered Species Laws. Coastal sand dune systems are protected under the Federal Coastal Zone Management Act (1972) and NH RSA 482-A pertaining to Fill and Dredge in Wetlands. Refer to the Dune habitat profile for more information.

Habitat Management Status

In areas where Piping Plovers are known to occur, habitat management protects nesting areas during the breeding season. Management activities include fencing suitable habitat areas during the breeding season, restricting motorized vehicle use and coordinating beach management activities, such as beach raking and boardwalk maintenance. Habitat management is conducted by NHFG according to USFWS Atlantic Coast Piping Plover Population Revised Recovery Plan guidelines and in cooperation with town and state officials.

Coastal sand dune systems are managed by local towns and New Hampshire State Parks, and are managed primarily for recreation.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality and disturbance from human recreational activities near nesting areas (Threat Rank: High)

Dune habitats in New Hampshire exist in areas that receive intense human use. Recreational activities that have been observed near plover breeding areas include sunbathing, swimming, jogging, dog walking, kite flying, volleyball, surfing and fishing. Human presence near plover nests may cause adults to flush off the nest exposing the eggs to adverse environmental conditions. Repeated flushing may result in nest failure or abandonment. Chicks are unable to fly for the first 25 days of life and are vulnerable to be stepped on.

Hampton Beach State Park receives over 100,000 visitors annually (J. Lyons, New Hampshire Department of Resource and Economic Development, personal communication). Although Seabrook beach receives fewer visitors, nesting plovers are often disturbed when people use private pathways across the dunes to access the beach. Human disturbance has been the suspected cause of abandonment for multiple nests in Seabrook and predator exclosures in Hampton have been occasionally tampered with by humans causing direct egg mortality . Children and adults have been observed chasing and capturing chicks and NHFG has documented one case in which a chick was stepped on and killed.

Mortality and disturbance from motorized vehicles on the beach (OHRVs and beach rakes) (Threat Rank: High)

Nests that are established outside of fenced-off areas are difficult to detect and vulnerable to being crushed by vehicles. Soon after hatching, chicks are very mobile, moving between intertidal zones and dunes and along the length of beaches. This errant nature, combined with the chicks' inability to fly, leaves them particularly vulnerable to motorized vehicles. Vehicles may also degrade Piping Plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate (Hoopes et al. 1992, Goldin 1993) or may create ruts that can trap or impede movements of chicks (USFWS 1996).

Piping Plover mortality due to motorized vehicles has been well documented throughout its breeding range. In New Hampshire, motorized vehicles have been the documented cause of mortality for 5 chicks since 1997.

Mortality from subsidized or introduced predators (Threat Rank: High)

Predation is a major and well-documented threat to Piping Plover reproductive success along the Atlantic coast (Burger 1987, MacIvor 1990, Patterson et al. 1991, Cross 1991, Elias-Gerken 1994). The high human density surrounding the plover breeding areas in NH provides an attractive habitat for several potential predators. Foxes, Striped Skunks, crows, gulls, Common Grackles, domestic dogs and domestic and feral cats have all been documented near plover breeding areas. Predators may cause adults to flush from nests and may prey on unprotected eggs, chicks or adults.

In NH, feral cats have been documented in Piping Plover breeding areas at both Hampton and Seabrook, and cats are the suspected cause of mortality for several chicks and multiple adults since 2005 (NHFG Data). Dogs have been observed running freely through areas restricted for piping plovers, particularly in Seabrook, often flushing adults from nests (NHFG data). In recent years a skunk predated two nests before they could be protected by predator exclosures in Hampton, and a fox is suspected to have predated several chicks in Seabrook (NHFG Data).

Mortality from oil spills (Threat Rank: High)

Oil can enter marine waters as a result from platform construction, drilling, shipping and spillage, and low-level seepage from surface runoff or subsurface sources (Boesch et al 2001). The effect of oil spills may be localized or very extensive depending on the source and timing of the contamination and the affected species or habitat. Wildlife species that become coated in oil or that ingest food contaminated by oil may be killed or have reduced reproductive success.

To date Piping Plovers in New Hampshire have not been affected by oil spills.

Habitat conversion due to shoreline stabilization (Threat Rank: Medium)

Artificial dunes may not function in the same manner as natural dunes. They are often built as continuous ridges and may be too steep to serve as plover nesting sites. Beach renourishment may create habitat in the short term but it may promote dune growth and increased vegetation reducing the long term suitability of nesting habitat.

Deposits from harbor dredging are placed on Hampton and Seabrook every 5-7 years. Although the specifications on the location and slope of the material are set forth by the USFWS to minimize impacts to plovers there is the potential for a reduction in habitat over the long term.

Habitat conversion due to dune modification (Threat Rank: Medium)

Although dune habitats are protected from development, restoration efforts that focus on re-vegetating areas with little or no vegetation may reduce the habitat quality. Piping Plovers typically nest amongst sparse vegetation along gently sloping foredunes, blowouts or areas of sand overwash (USFWS 1996). Efforts to restore these areas by planting vegetation may degrade or eliminate nesting habitat.

Egg and chick mortality from increased storm intensity and frequency (Threat Rank: Medium)

Climate models predict an increase in the frequency and intensity of coastal storms. Inclement weather can disrupt bird migrations and make breeding and nesting sites inhospitable, forcing birds into marginal habitats (NHFG 2005). Piping Plovers that nest along the foredune are vulnerable to tidal overwash from abnormally high tides.

Most nesting habitat in NH is in close proximity to high tide lines. Several nests have been lost to tidal overwash since plover monitoring efforts were initiated (NHFG Data). Additionally, high tides from stormy weather have been the suspected cause of chick mortality at several sites in the Northeast.

Species disturbance from the potential development of wind turbines near nesting areas (Threat Rank: Medium)

The noise associated with the construction of wind turbines near Piping Plover nesting areas may cause flushing and reduce nest success.

To date no turbines have been constructed or proposed along the New Hampshire coast.

Species impacts from beach raking that removes wrack (foraging substrate) (Threat Rank: Medium)

There is a high public demand to remove wrack (seaweed) from town and state beaches for aesthetic purposes. However, the wrack build-up provides an important foraging source for Piping Plover chicks. The removal of wrack reduces the food availability and may force adults and chicks to move further and more frequently to find suitable foraging sites.

Beach raking occurs annually on Hampton Beach State Park and Seabrook beach. The NHFG Piping Plover monitor coordinates raking activities with the town and state raking crews to ensure wrack is left to build up near plover nests prior to hatching. Sections of beach on either side of nests are left unraked in the two weeks prior to expected hatching to allow wrack build-up.

Habitat degradation from naturally increasing dune vegetation that reduces available nesting habitat (Threat Rank: Medium)

Piping Plovers typically nest amongst sparse vegetation along gently sloping foredunes, blowouts or areas of sand overwash (USFWS 1996). Increases in vegetation may reduce the habitat suitability in traditional breeding areas and force plovers to select marginal habitats for nesting.

The dunes at Hampton Beach State Park and Seabrook beach have grown substantially in height and width since the initiation of Piping Plover protection efforts in 1997 (Brendan Clifford, personal observation). Many traditional nesting areas that supported plovers in the past have become overgrown with beach grass and are now unsuitable for nesting. The succession of the dunes in Seabrook has forced plovers to nest closer to the high tide line and closer to human activities (e.g., walkers).

Mortality from nuclear contamination (Threat Rank: Medium)

The Seabrook nuclear power plant is located less than two miles from Piping Plover breeding areas. Contaminants may cause mortality or reduced reproductive success of Piping Plovers.

To date Piping Plovers in New Hampshire have not been affected by nuclear contaminants.

List of Lower Ranking Threats:

Habitat degradation from introduced or invasive plants that invade nesting habitats

Disturbance from construction activities (including on existing structures)

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Annually monitor and manage Piping Plover habitat during the breeding season

Primary Threat Addressed: Mortality and disturbance from human recreational activities near nesting areas

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:

Monitor and manage known and potential breeding areas to limit disturbance from recreational use of beaches

General Strategy:
Manage Piping Plover breeding areas in accordance with the Piping Plover Atlantic Coast Population Recovery Plan (USFWS 1996). Install symbolic fencing to protect all potential nesting areas and hire a seasonal Piping Plover monitor to identify all nest locations, install predator exclosures and monitor the movement and survival of chicks. Provide annual productivity data to the USFWS.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Provide technical assistance to beach managers to prevent negative impacts from the use of motorized vehicles on the beach

Primary Threat Addressed: Mortality and disturbance from motorized vehicles on the beach (OHRVs and beach rakes)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Protect Piping Plover nests and chicks from the use of motorized vehicles.

General Strategy:
Hold pre-season meetings with town and state officials, police and lifeguards to reinforce the guidelines for plover management. Maintain regular communication with town and state officials that may use vehicles on the beach. Close sections of the beach to vehicular traffic as necessary to protect nests or chicks. Identify areas where beach maintenance or vehicle use can occur without impacting plovers (per the USFWS guidelines) and inform town officials.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Improve enforcement of existing laws and town ordinances to reduce impacts to Piping Plovers

Primary Threat Addressed: Mortality and disturbance from human recreational activities near nesting areas

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Improve enforcement of existing laws and town ordinances to reduce impacts to Piping Plovers

General Strategy:
Work with town and state officials to identify strategies that better enforce dog leash laws and the use of personal fireworks on the beach. Consider hiring a part time law enforcement officer to enforce violations.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Reduce the number of natural and introduced predators in breeding areas

Primary Threat Addressed: Mortality from subsidized or introduced predators

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

Objective:
Protect eggs and chicks to increase productivity and minimize the risk of adult mortality.

General Strategy:
Survey for the presence of potential predators prior to the breeding season and conduct trapping accordingly to minimize the number of active predators during nest establishment. Continue intermittent trapping throughout the breeding season as necessary.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Provide education and outreach to residents and day-visitors about plover protection efforts

Primary Threat Addressed: Mortality and disturbance from human recreational activities near nesting areas

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Alert beachgoers about the presence of Piping Plover nests or chicks to minimize disturbance.

General Strategy:
Provide outreach to beachfront residents before the start of each breeding season to raise awareness. Educate beachgoers about plover management during the summer months with signs, brochures and direct communication. Give presentations at beach commission meetings and local schools to build support for conservation efforts.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Recruit volunteers to assist with Piping Plover monitoring and protection.

Primary Threat Addressed: Mortality and disturbance from human recreational activities near nesting areas

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Increase awareness and reduce the disturbance to nesting plovers and chicks from beachgoers.

General Strategy:
Identify potential volunteers and provide training for plover monitoring. Give presentations to local conservation groups and schools and stress the importance of volunteers. Communicate with plover monitors in adjacent states to identify opportunities to 'share' volunteers.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Conduct habitat management to enhance breeding habitat

Primary Threat Addressed: Habitat degradation from naturally increasing dune vegetation that reduces available nesting habitat

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Maintain, enhance or create suitable nesting habitat through vegetation management.

General Strategy:
Reduce the density of beach grass along foredunes that have become too vegetated for nesting and transplant to existing or potential dune habitats that lack vegetation (but are not known breeding areas for Piping Plovers).

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Reduce the use of private dune paths by beachgoers

Primary Threat Addressed: Mortality and disturbance from human recreational activities near nesting areas

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Reduce the use of private dune paths by beachgoers to minimize disturbance to nesting plovers and chicks

General Strategy:
Work with the town and state to minimize foot-traffic through the dunes. Explore conservation strategies such as the installation of boardwalks or sand fencing that funnels beachgoers into designated public access points.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

References, Data Sources and Authors

Data Sources
Information on Piping Plover habitat, population distribution and status was collected from recovery plans, USFWS data, NHFG data and scientific journals.
Information on habitat protection and management was obtained from NHFG Piping Plover monitoring data and annual reports, personal communication, and the Dune habitat maps created for this process.

Data Quality
Piping Plovers have been intensively managed throughout their breeding range along the Atlantic coast since their listing under the Federal Endangered Species Act (ESA) in 1986. In New Hampshire,

breeding habitat has been managed and Piping Plovers have been monitored annually since 1997. Piping Plovers have been intensively managed throughout their breeding range along the Atlantic coast since their listing under the Federal Endangered Species Act (ESA) in 1986. In New Hampshire, occupied breeding habitat has been managed, and Piping Plovers have been monitored annually since 1997.
Information on the location of coastal sand dunes and associated natural plant communities is available from New Hampshire Natural Heritage Inventory (NHNHI) . However, there is a lack of information available about the overall health and condition of coastal sand dune systems and Piping Plover breeding habitat.

2015 Authors:
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2005 Authors:
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Common Nighthawk

Chordeiles minor

Photo by Pamela Hunt

Federal Listing	N/A
State Listing	E
Global Rank	
State Rank	S1
Regional Status	Very High

Justification (Reason for Concern in NH)

Common Nighthawks have been exhibiting a rangewide decline and range retraction since the mid-1900s. Evidence for this decline comes from the Breeding Bird Survey, Breeding Bird Atlases, and multiple anecdotal accounts. Although BBS data are generally poor for this species in the Northeast, they indicate annual declines of -6.71% in NH, -3.03% in BCR 14, and -4.84% in BCR 30 from 1966 to 2013 (Sauer et al. 2014). The range-wide trend for this period is -1.88%. Repeated Breeding Bird Atlases have documented declines in occupancy of approximately 70% in the northeastern United States (McGowan and Corwin 2008, Renfrew 2013, Massachusetts Audubon Society 2014), but only 39% in Ontario (Cadman et al. 2007). Over this time the species has disappeared from most urban areas that it occupied as recently as the late 1970s and early 1980s, including in New Hampshire. Nighthawks are considered an SGCN in most states where they occur (all states in the Northeast), and were identified as a Regional SGCN in USFWS Region 5. Loss of habitat and potentially changes in food supply have both been identified as major threats to populations of this species.

Distribution

The Common Nighthawk breeds across most of North America south of the tundra, from Yukon Territory and Labrador to California and Florida, and continuing south in the highlands of Middle America to Panama (Brigham et al. 2011). It winters in South America, where specific details of its range are largely unknown. Most substantiated winter records appear to come from the lowlands east of the Andes, from Ecuador and Peru south to northern Argentina (Brigham et al. 2011).

The distribution of the Common Nighthawk in New Hampshire prior to European settlement is unknown, but was presumably limited to pine barrens, heaths, bald mountaintops, and small openings created by fire, wind, or indigenous agriculture. Creation and expansion of urban areas in the nineteenth and twentieth centuries probably allowed the species to expand its range considerably, and by the Breeding Bird Atlas in the early 1980s they were believed to occur almost exclusively in urban habitats (Foss 1994). Although distributed statewide, atlas records were concentrated in the lower Connecticut and Merrimack River valleys and parts of Strafford County. Isolated urban sites included Groveton, Berlin/Gorham, and Conway. Known or suspected nesting in natural areas occurred in the Ossipee area and northwestern Merrimack County.

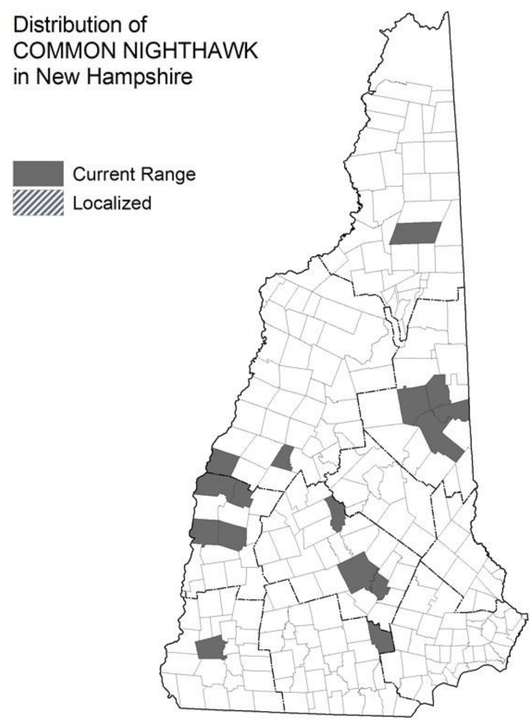
Nighthawks disappeared from most urban areas in the state by the early 2000s (Hunt 2003), and are now found only in Concord, Franklin, and Keene, with the former also including birds in natural landscapes. A small population persists in the Ossipee pine barrens, and along rocky ridgelines in the western part of the state (Lempster, Grantham, Orange).

Habitat

Historically, Common Nighthawks nested on the ground in prairies, rock outcrops, beaches and dunes, forest openings, abandoned quarries, and pine barrens, and began using flat gravel roofs by the late 1800s (Brigham et al. 2011). With respect to the latter, Nighthawks prefer buildings 5 to 15 m (16 to 48 ft) high (Grazma 1967) that are surrounded by a parapet and surfaced with small “pea” gravel (6 to 15 mm in diameter, Marzilli 1986, 1989; Wedgewood 1992). Roofs surfaced with larger crushed stone (more than 25 mm) are rarely used by nighthawks (Marzilli 1986, Wedgewood 1992).
In New Hampshire, nighthawks primarily use pine barrens, openings in Appalachian oak-pine forests, rocky ridges, and urban habitats.

NH Wildlife Action Plan Habitats

- Pine Barrens
- Developed Habitats
- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Rocky Ridge
- Cliff
- and Talus



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines and range retractions have occurred. See Justification for more information.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Given increased conservation interest in the Ossipee Pine Barrens by The Nature Conservancy and its partners, portions of this area appear to be of relatively high quality. Although loss of habitat to development is still a factor, periodic controlled burns combined with vegetation management create openings that nighthawks use. The same is true to a lesser extent for the pine barrens around the Concord Airport (Fuller et al. 2003), although nighthawk use is irregular and nesting has not been confirmed in the managed areas. The Concord pine barrens habitat is much smaller in size than in Ossipee and more highly fragmented. There are insufficient data on other pine barrens or sand plain forests to evaluate their current suitability for nighthawks. Mountaintop balds may remain suitable habitats, although data are lacking. For urban areas, habitat evaluation would require data on rooftop construction and configuration, and predation risks. However, aerial photographs show few stone roofs in cities that were former nighthawk strongholds, such as Manchester, and in Concord, existing peastone roofs are typically older and in poor condition. Nesting occurs on some stone roofs, but appears to be successful only on those with a large surface area, such as malls.

Habitat Protection Status

Highly variable. Portions of both the Ossipee and Concord pine barrens have been preserved by easement or fee ownership. At least two mountaintops (Cardigan and Kearsarge) used by this species historically are protected as part of state parks.

Habitat Management Status

Habitat management in natural settings has not been implemented for this species. Project Nighthawk conducted experiments to determine if rooftop nest patches would attract nesting nighthawks, but they do not appear to benefit nighthawks. At the broad habitat level, ongoing use of prescribed fire in the Concord and Ossipee pine barrens is likely to benefit nighthawks in the long run. See the pine barrens habitat profile for more information.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Not only is development a threat in natural habitats where nighthawks occur (e.g., pine barrens), but expansion of existing urban footprints in already developed landscapes may convert areas from a suitable to an unsuitable condition (e.g., paving a gravel parking lot, ongoing activity at gravel pits).

Disturbance and mortality from subsidized or introduced predators (Threat Rank: High)

As ground nesters, nighthawks in urban areas are at risk from nest predators such as cats, opossums, skunks, and raccoons, which often reach higher densities in such landscapes. There is some evidence (T. Hoppe, per. comm.) that declines in roof-nesting in the Northeast are related to increased predation by crows, which are more able to find nests when a smaller proportion of roofs have suitable nesting substrate.

Habitat conversion due to loss of roof habitats (Threat Rank: Medium)

One of the oft-stated reasons for declines in urban nighthawk populations has been the conversion of roof coverings from pea stone to larger stone or rubber (Brigham et al. 2011). Anecdotal evidence and recent aerial photos show a continued conversion of stone roofs to rubber in NH. Experiments with rooftop nest patches in New Hampshire and Pennsylvania have not been successful at attracting nighthawks to nest on rooftops.

Disturbance from increased cold weather on breeding grounds (Threat Rank: Medium)

One prediction from climate change models is that there will be more variable temperature and precipitation patterns, especially in spring. Cold and wet weather that suppresses insect activity will reduce nighthawk foraging success, which in turn could lead to nest abandonment, lower chick provisioning, and even mortality (Griscom 1949, Firman et al. 1993). Project Nighthawk monitoring has shown a potential connection between nest failure and heavy rains both at rooftop and natural nest sites. Cold, wet weather in June of 2013 coincided with the lowest nesting activity in Concord, NH observed during 2007-2014.

Disturbance from commercial activities at nest sites (airports, businesses) (Threat Rank: Medium)

Many ground nests in Concord in recent years have been associated with commercial activities, including gravel pits, businesses, and an airport. Day-to-day human traffic, vehicles, construction, or other disturbance has the potential to cause nest destruction and possibly abandonment.

Habitat degradation and conversion due to fire suppression (Threat Rank: Medium)

In the absence of fire, pine barrens have fewer open areas and develop a more dense understory of oaks or other plants, and are less suitable for nesting nighthawks. See also pine barrens habitat profile.

Habitat degradation from the succession of cleared areas (Threat Rank: Medium)

In the absence of disturbance or management, forest openings used by this species will eventually revert to forest and become unsuitable. See also forest and shrublands profiles.

List of Lower Ranking Threats:

Species impacts from acid deposition that can reduce prey

Disturbance from acid deposition that impacts reproduction

Mortality from pesticide use in South America

Disturbance from agricultural pesticide use in North America

Species impacts from pesticide use causing prey declines

Species impacts from introduced or invasive animals

Disturbance to nest sites from recreational activity

Mortality from wind tower and turbine development on rocky ridges

Mortality from increased storm intensity and frequency during migration

Actions to benefit this Species or Habitat in NH

Improve urban rooftop habitat

Primary Threat Addressed: Habitat conversion due to loss of roof habitats

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:
Create incentives for use and retention of nighthawk-friendly roofing materials (peastone) in urban areas.

General Strategy:
Target incentives for building owners to maintain peastone roofs and create educational materials. Stipulate peastone roofing materials on Site Specific Permits. Investigate the potential for WHIP grants for peastone roofs.

Political Location:
Cheshire County, Hillsborough County, Merrimack County

Watershed Location:

Manage human activity around breeding sites

Primary Threat Addressed: Disturbance from commercial activities at nest sites (airports, businesses)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Reduce negative effects of human activity on breeding nighthawks

General Strategy:
Develop protocols that minimize the effects of human activity on nighthawk nests in developed areas (e.g.,. airports, businesses, wind facilities).

Political Location:
Cheshire County, Hillsborough County, Merrimack County

Watershed Location:

Nighthawk distribution surveys and Nighthawk demographic monitoring

Objective:
Determine status of Common Nighthawk in the western part of NH, and determine reproductive success of a larger sample of potentially breeding nighthawks.

General Strategy:
Conduct surveys of known or potential sites for nighthawks along rocky ridges in the western highlands. In areas where the species is regularly monitored, displaying male nighthawks are highly visible, but they do not represent confirmed breeding. There appear to be far fewer females than males (1:4 in Concord and Keene, NH) and more information is needed on actual nesting and nest success.

Political Location:
Statewide

Watershed Location:

Nighthawk prey research

Objective:
Determine the extent that prey populations have declined and are a limiting factor for Common Nighthawks

General Strategy:
Collect data on insect abundance and nighthawk foraging behavior at nighthawk sites

Political Location:
Carroll County, Cheshire County, Merrimack County

Watershed Location:

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014). NH distribution data from NHBR/NH eBird and NH Audubon Project Nighthawk. 2007-2014. Behavior observations recorded by New Hampshire Audubon's Project Nighthawk staff and volunteers, 2007-2014. Data on population trends for common nighthawks were obtained from NHBR and summaries of annual nighthawk surveys between 1982 and 1991 and 2001 and 2002. Information on management activity at specific sites was obtained through discussions with pertinent parties or from existing management plans or agreements.

Data Quality
Because nighthawks are largely nocturnal, there are limited data on their overall distribution and abundance in New Hampshire during the breeding season. Recent systematic efforts in Concord, Keene, and the Ossipee Pine Barrens have begun to yield more detailed data on behavior, habitat use, and breeding biology, but other potential locations are not monitored. In particular, data on nighthawk use of rocky ridges in the western highlands are almost non-existent, in part due to the feasibility of access to these habitats when nighthawks are most active.
In the absence of comprehensive surveys, it is difficult to evaluate variation in habitat condition for this species in New Hampshire. There are no data on the specific characteristics of rooftops that could be used to determine the availability of nesting habitat in urban areas.

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Northern Harrier

Circus cyaneus

Federal Listing	N/A
State Listing	E
Global Rank	G5
State Rank	S1
Regional Status	Very High

Photo by Jason Lambert

Justification (Reason for Concern in NH)

At the continental scale, harrier populations have declined at 1.2% per year from 1966 to 2013. From 2003-2013, the trend started to level out, and was a non-significant -0.63%/year (Sauer et al. 2014). A similar pattern is seen in most other regions, with stronger declines followed by smaller ones, suggesting at least in part that detectability is declining to the point where BBS is not accurately tracking this species' populations. This is particularly true in the Northeast, where harriers are uncommon and highly dispersed. Data from repeat Breeding Bird Atlases are equivocal with regard to range changes. Harrier occupancy declined in southern Ontario but increased in the north (Cadman et al. 2007), was stable in New York (McGowan and Corwin 2008), and increased in Vermont and Massachusetts (Renfrew 2013, Mass Audubon 2014). Because of its overall rarity in the Northeast, the Northern Harrier is a SGCN in most states where it occurs, and in the Region as a whole.

Distribution

Breeds across most of Alaska, Canada, and the northern and western United States. Winters from southern Canada to Central America, and parts of the western Caribbean (Smith et al. 2011). Also occurs across Europe and northern Asia. Scant data exist on the distribution of northern harriers in New Hampshire prior to the 1800s. Historically, the species was probably restricted to bogs, fens, and similar wetlands (e.g., beaver meadows), and perhaps isolated agricultural clearings along major river valleys. The species may have benefited from extensive forest clearing in the 1800s, and by the early 1900s it was nesting in small numbers over most of the state, with the possible exception of the southwest (Foss 1994).

By the 1960s, Coos County was the stronghold for New Hampshire's harrier population, a distribution that was largely unchanged through the 1980s. Roughly 16 territories were documented during the Breeding Bird Atlas (Foss 1994), and over the next 15 years there were between 19 and 21 territories, eight to 13 of which were active breeding territories. Between 1998 and 2003, breeding season harriers were reported at 15 locations, and only six of these were in the species' traditional stronghold in the northern Connecticut River valley. Most recently (2004-2014), the vast majority of potential breeding records have been from Coos County, mainly in Pittsburg, Colebrook, Errol, and Jefferson/Whitefield. In the absence of systematic surveys, there are no data on the number of birds and/or territories in this region. All summer records south of the White Mountains appear to represent isolated single individuals, or – along the coast – birds wandering north from breeding sites in Massachusetts.

Habitat

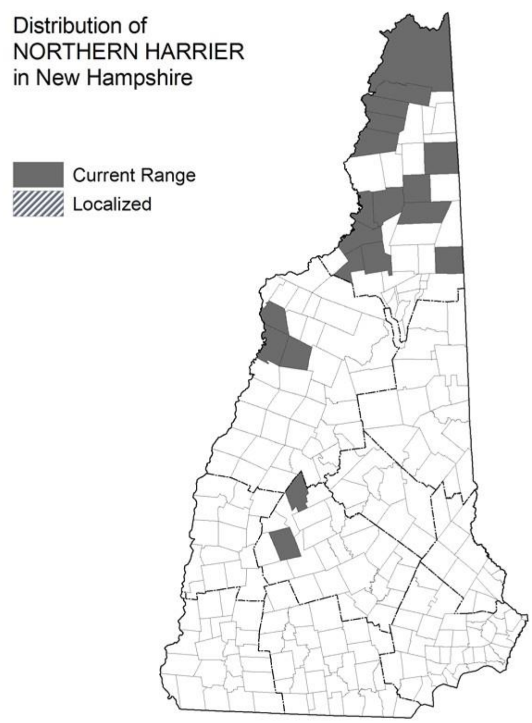
Northern harriers use a variety of open and semi-open habitat throughout the year, including grassland, cattail marsh, salt marsh, shrub-steppe, and agricultural land (Smith et al. 2011). In the Northeast, the species may nest in wetter habitat, although birds still forage extensively in upland areas (Serrentino 1992). The species also frequents bogs and fens with open foraging areas and a brushy border for nesting. Important features of nesting areas in northern New Hampshire include dense stands of low woody plants (*Spirea, Alnus, Cornus*, heaths) near open grassland areas for foraging (Serrentino 1992, 1998).

In northern Coos County, key habitats included hayfield, pasture, early successional field, late successional field, and shrub wetland (Serrentino 1998). Collectively, open and partially open upland habitats in this study comprised 59-75% of total habitat in each focal area. In west-central New Hampshire, historic sites in Danbury and Sutton are large wetlands bordered by shrubs and cattails. Limited data suggest that harriers prefer larger fields. In Massachusetts, harriers only used fields over 11 ha (27.5 ac) (Serrentino 1992), whereas blueberry barrens in Maine needed to be at least 100 ha (250 ac) (Vickery et al. 1994). Wetlands used for foraging need not be as large, with areas as small as 1 ha (2.5 ac) being used in Maine (Gibbs et al. 1991).

Non-breeding habitat includes a similar variety of open habitats and wetlands, as well as agricultural fields. Most winter records of harriers in New Hampshire are from the Seacoast, where the species is found in salt marsh and associated upland brushy edges.

NH Wildlife Action Plan Habitats

- Grasslands
- Peatlands
- Marsh and Shrub Wetlands
- Salt Marshes
- Shrublands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Unknown, although the harrier population in NH is generally believed to be declining. This is based on the species' absence from former (albeit occasional) breeding sites south of the White Mountains, and some suggestion of declines in its stronghold in Coos County.

Population Management Status

Harrier populations are not managed in New Hampshire (but see section 2.6).

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Data are insufficient to evaluate the condition of harrier territories in New Hampshire. Anecdotal information suggests that agriculture continues to decline in the northern Connecticut River valley, which would imply that some harrier territories may be affected by habitat change through succession. Many areas that include harrier territories appear stable in Pittsburg, Lake Umbagog, and Pondicherry, and some are protected.

Habitat Protection Status

Variable. Harrier territories around Lake Umbagog and Cherry Pond are largely within National Wildlife Refuges, and some locations in Pittsburg are within the Connecticut Lakes management area. Sites elsewhere in the Connecticut and Androscoggin valleys are generally not protected, although in the absence of recent data on harrier locations this is difficult to evaluate fully. To the south, most historic harrier areas (e.g., Cascade Marsh and part of Danbury Bog) are protected as state wildlife management areas.

Habitat Management Status

Habitat management directed specifically at Northern Harriers is not occurring. The exception is the Whitefield Airport, which has a Memorandum of Agreement with NHFG that defines a Northern Harrier Management Area and requires the following:

- Brush removal only between 1 September and 30 March
- Consultation with NHFG prior to any brush removal
- No use of herbicides, insecticides, or rodenticides without prior approval
- If nesting habitat is modified because of airport activities, the equivalent amount of suitable habitat must be provided elsewhere on the property

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Development results in both net loss of habitat and fragmentation of the remainder. Although development is generally less of a threat in northern New Hampshire, the continued decline of agriculture and subsequent selling of land for second homes is likely having an effect on Northern Harriers in the Connecticut River valley.

Habitat degradation from grasslands maturing into forest (Threat Rank: Medium)

In the absence of periodic mowing, grassland sites revert to shrublands and eventually to forest. This can reduce both foraging and nesting habitat for Northern Harriers, although the latter impact is relatively low because most harriers in NH appear to nest in wetlands.

List of Lower Ranking Threats:

Disturbance from persistent organic compounds

Disturbance from mercury toxicity

Habitat degradation and species impacts from introduced or invasive plants

Mortality and species impacts from subsidized or introduced predators

Species disturbance through nest loss due to mowing

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Northern Harrier Surveys

Objective:
Obtain up-to-date information on the distribution, abundance, and productivity of harriers in NH

General Strategy:
Develop a protocol for systematic surveys of historic harrier breeding areas, particularly in Coos County. Protocol should include components that allow for determination of mating status and potential for young. Conduct surveys over a 3-5 year period to obtain baseline data. Compare these data to historic data from the 1980s and 1990s to assess changes in range and identify priority areas for other conservation actions (e.g., habitat management). See also the grasslands habitat profile for actions that may benefit this species.

Political Location:
Coos County, Grafton County

Watershed Location:
Androscoggin-Saco Watershed, Upper CT Watershed

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014, above). Recent NH distribution data from NHBR/NH eBird

Data Quality

Because harriers have not been consistently surveyed in northern Coos County since 1997, data are lacking on the species' current distribution in this former stronghold. Harriers continue in the Androscoggin and Lancaster/Jefferson areas, which are visited more frequently.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Pamela Hunt, NHA

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Marsh Wren

Cistothorus palustris

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S3
Regional Status	High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Secretive marsh birds like the Marsh Wren have generally been considered conservation priorities because of known losses of wetland habitats, combined with often poor data on species' distribution, abundance, and trend. In the case of the Marsh Wren, repeated Breeding Bird Atlases in the Northeast have consistently documented stable or increasing range occupancy (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014). The Breeding Bird Survey does a better job of estimating trends for Marsh Wren than other wetland birds, and based on BBS data populations are generally increasing or stable, although most data are from the West and Midwest (Sauer et al. 2014). Data for the Northeast are more equivocal, with declines in some areas, increases in others, and few significant trends. There are no data on trends in New Hampshire, although there is some evidence for local extirpations related to changes in habitat.

Distribution

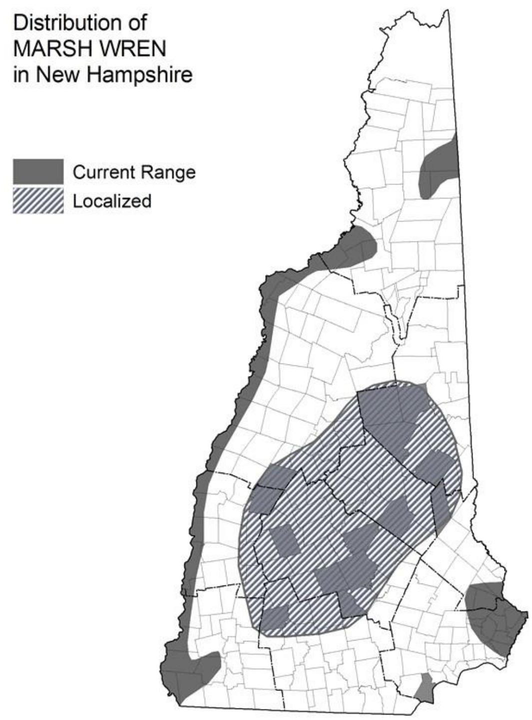
Breeds across southern Canada and the northern and western United States, and along the Atlantic and Gulf coasts. There is also an isolated population in central Mexico (Kroodsma and Verner 2014). Winters in the western and coastal portions of the breeding range, and also in much of Mexico and the southwestern U.S. In New Hampshire, most breeding season records are from two general areas: the Connecticut River valley and Great Bay/Seacoast, with scattered records elsewhere inland where suitable habitat is present.

Habitat

Breeds in a variety of freshwater wetlands, as well as brackish and salt marshes (Kroodsma and Verner 2014). Important habitat features in all cases are some form of tall emergent graminoid plants (e.g., *Typha, Scirpus, Phragmites, Spartina*).

NH Wildlife Action Plan Habitats

- Marsh and Shrub Wetlands
- Salt Marshes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Stable or increasing across most of the Northeast. Probably stable in New Hampshire.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES
- Marsh and shrub wetlands
- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

No information

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation and species impacts from introduced or invasive plants (Threat Rank: Medium)

There are limited data on specific responses by wrens to invasive plants, but this species appears to occur in lower densities at sites dominated by purple loosestrife (Whitt et al. 1999).

List of Lower Ranking Threats:

Habitat degradation from mercury deposition

Habitat degradation from removal or management of vegetation

Disturbance to nests by watercraft

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Marshbird Monitoring

Objective:
Assess population status of secretive marsh birds

General Strategy:
Any broad wetland bird monitoring project should include this species, and should ensure that observers can identify it.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources
NH distribution data from NHBR/NH eBird

Data Quality
Many of the wetlands where Marsh Wren have been recorded in recent decades are not regularly surveyed, and the species may persist undetected

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

Cadman et al. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Naturalists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

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http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/308doi:10.2173/bna.308

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Sedge Wren

Cistothorus platensis

Federal Listing	N/A
State Listing	E G
Global Rank	G5
State Rank	S1
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Sedge Wren was originally listed as Endangered in NH on the basis of rarity, long-term historic declines, and habitat specificity. It has never been common in New England, which is generally considered the extreme eastern edge of its range in North America. There is some evidence for locally high populations in the early 20th century, but it has not been confirmed breeding for over 30 years and probably should no longer be considered a regular member of the state's avifauna. Sedge Wren was considered Very High Concern but Low Responsibility in the RSGCN list for the Northeast (USFWS Region 5).

Distribution

Sedge Wrens have a wide but disjunct distribution across the Western Hemisphere from southern Canada to Tierra del Fuego. In North America the bulk of the population breeds in the northern Great Plains and Great Lakes regions, with irregular nesting east to the Northeast (Maryland to New Brunswick) (Heckert et al. 2001). It winters in the southeastern United States. Breeding occurs earlier in the northwest than in the south and east of this range (Herkert et al. 2001). Most documented breeding in New York and New England happens between July and September, and probably represents second attempts by individuals from the Midwest.

There have been only seven "breeding season" records of Sedge Wren in New Hampshire since 1980, as follows:

- Alton – 8/15/1980
- Newmarket – 6/22-7/1/1985 (single unmated male nest-building)
- Sutton – 5/21/1989
- Kensington – 5/19-6/18/1994 (persistent singing male, 2 birds at one point)
- Derry – 5/19-6/4/1998
- Durham – 7/25-8/12/2001 (2 birds on 7/29)
- Sandwich – 7/16-18/2012

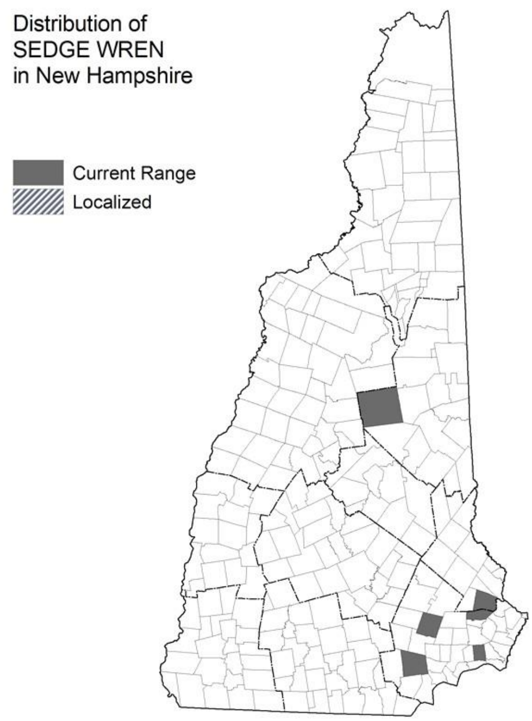
Of these, four are of birds that persisted for more than two weeks or which built a nest. These can be considered "probable" breeding records under Breeding Bird Atlas criteria, but "confirmed" breeding has not been documented in New Hampshire for a considerable time. Given the distribution of these records, any future breeding is most likely in wetlands in the southeastern portion of the state, but is considered highly unlikely given the irregular history of the species here.

Habitat

Such areas include wet hayfields, sphagnum moss bogs, and the margins of ponds (Herkert et al. 2001), and in these habitats, they prefer shrub cover. The species does not use wetlands with sparse vegetative cover or those dominated by cattails (*Typha* sp.). Historically, coastal populations in the Northeast also occurred in salt marshes. Recent verified reports from New Hampshire come from weedy grass fields, tussock marshes, and wet shrubby areas at the margins of marshes or wet meadows.

NH Wildlife Action Plan Habitats

● Marsh and Shrub Wetlands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Although historic declines have been noted in the Northeast, recent Atlas data suggest increases in New York (McGowan and Corwin 2008) and small but stable distributions in Vermont and Massachusetts (Renfrew 2013, MassAudubon 2014). BBS data also indicate stable or increasing populations over most of its core range in the Midwest (Sauer et al. 2014).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Endangered Species Conservation Act (RSA 212-A)
● Fill and Dredge in Wetlands - NHDES

- Marsh and shrub wetlands
- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

No information

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation and species impacts from introduced or invasive plants (Threat Rank: Medium)

Given the types of wetlands this species uses and its extreme irregularity in the state, this threat is likely actually "Low"

List of Lower Ranking Threats:

Habitat degradation from mercury deposition

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Sedge Wren monitoring

Objective:
Assess current status of Sedge Wren in NH

General Strategy:
Although Sedge Wrens are too scarce in New Hampshire to warrant any species-specific inventory or monitoring projects, birders frequenting appropriate habitat should be familiar with its song and report it if found. In addition, any broad wetland bird monitoring project should include this species, and should ensure that observers can identify it.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

NH distribution data from NHBR/NH eBird

Data Quality

Given the species' recent scarcity in the state, the available data are probably insufficient to fully warrant conservation should action be desired. In addition, the potential for confusion with the similar Marsh Wren (*Cistothorus palustris*) makes even evaluation of historic records problematic.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

Herkert, J.R., D.E. Kroodsma, and J.P. Gibbs. 2001. Sedge Wren (*Cistothorus platensis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/582doi:10.2173/bna.582

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Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version

Black-billed Cuckoo

Coccyzus erythropthalmus

Photo by Jason Lambert

Federal Listing	N/A
State Listing	
Global Rank	S5
State Rank	S4
Regional Status	Very High

Justification (Reason for Concern in NH)

Populations of many shrubland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Brown Thrasher populations in New Hampshire show a stable trend (non-significant decline of -0.56%/year) since 1966, with a non-significant increase of 9.75%/year from 2003-2013. Trends are equally variable in regional data. Both BCR 14 and BCR 30 showed significant declines from 1966 to 2013 (-3.13%/year and -4.22%/year, respectively), but non-significant trends in 2003-2013 (0.77 and -1.78, respectively). At larger scales (Eastern US, entire range), BBS data show consistent trends of -2 to -3% year in both time periods. Data from repeated Breeding Bird Atlases in the northeast show stable or slightly increasing occupancy (Cadman et al. 2007, McGowan and Corwin 2008), relatively small declines (8%, MassAudubon 2014), or large declines (23%, Renfrew 2013).

Distribution

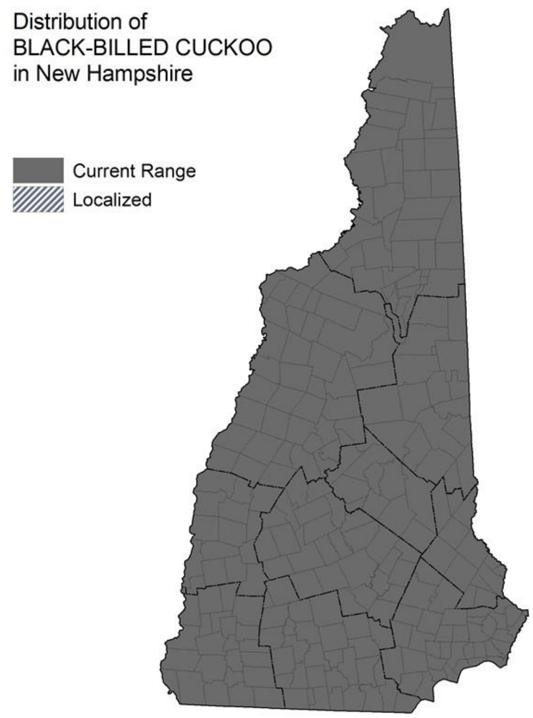
The Black-billed Cuckoo breeds from southern Alberta and Oklahoma east to Nova Scotia and North Carolina, and winters in South American. It occurs throughout New Hampshire although it is uncommon and irregular in occurrence from the White Mountains north.

Habitat

Black-billed Cuckoos use a different mix of habitats than most species considered early successional specialists. In addition to shrub- or sapling-dominated habitats (regrowing cuts, rights-of-way, old fields), cuckoos also nest in shrubby wetlands and open woodlands/forest edges with limited early-successional features (e.g., golf courses, woodlots, orchards, and fencerows) (Hughes 2001). Nests are built higher above the ground (1-2 meters, but as high as 13) than other shrubland species.

NH Wildlife Action Plan Habitats

● Shrublands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant population declines rangewide, but data from New Hampshire and elsewhere in the Northeast are unequivocal. The tendency is toward a decline, but it is not as strong or consistent as for many other early-successional species.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable – see shrubland habitat profile

Habitat Protection Status

Highly variable – see shrubland habitat profile

Habitat Management Status

Habitat management has not been implemented specifically for this species, although management does occur for other species (American Woodcock, New England Cottontail) that often use the same habitats. See also shrubland habitat profile

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by shrubland birds are already embedded in developed landscapes (e.g., right-of-way, old fields) or viewed as "undesirable" or "waste" habitats, they may be more vulnerable to this threat.

Habitat degradation and conversion due to natural succession or lack of active management (Threat Rank: High)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used, and as a result forest maturation is generally considered the most significant threat facing birds that use shrublands and young forests. See shrubland habitat profile for more information.

Habitat degradation from aspects of right-of-way management (Threat Rank: Medium)

Rights-of-way need to be maintained as short vegetation so as to reduce risks associated with trees and powerlines. As a result these corridors are regularly treated by mechanical (rarely chemical) means to remove or cut back vegetation. In general, such practices create habitat suitable for shrubland birds, although in extreme cases a site may be rendered unsuitable for 1-2 years large areas of vegetation are completely removed. If management occurs during the breeding season, reproductive success will be reduced. See also shrubland habitat profile.

Habitat and species impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants, particularly shrubs, have been demonstrated to have several negative effects on birds using shrubland habitats. Insect prey (particularly caterpillars) are usually less common on non-native shrubs (Burghardt et al. 2008, Fickenscher et al. 2014), while data on the nutritional value of fruit are more equivocal (e.g., Davis 2011). In some cases, birds experience lower reproductive success in non-native shrubs, although there is considerable variation (Rodewald et al. 2010, Schlossberg and King 2010), and local predator communities play an important role as well. In all cases, the effects of invasives on shrubland birds depend to a large extent on their relative abundance. If plant diversity is high, the negative effects are diluted and less likely to impact bird populations. However, if the habitat tends toward a monoculture, reduced insect supplies and/or higher predation may reduce reproductive success to the extent that the habitat becomes a sink.

List of Lower Ranking Threats:

Species impacts from pesticide use causing prey declines (hairy caterpillars)

Actions to benefit this Species or Habitat in NH

No actions identified, but see the shrubland habitat profile for actions that would likely benefit this species.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Cuckoos are irruptive, and show seasonal variation in when irruptions occur. As a result they are not necessarily well-tracked by either BBS or Atlases. It is perhaps for these reasons that trends available for the Northeast are inconsistent

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Olive-sided Flycatcher

Contopus cooperi

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	Very High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Aerial insectivores (here including nightjars, swifts, flycatchers, and swallows) have recently received increased conservation attention due to significant declines in several species (Hunt 2009, Nebel et al. 2010). Because all species share a common prey base of flying insects, there has been much speculation on a potential common cause for many of the declines. Threats identified for the group as a whole include changes in food supply, effects of insecticides on adults or young, loss of nesting locations, climate change. It should be noted that any of these factors could be affecting birds at any point in their annual cycle, and knowledge of their winter ecology is currently largely unknown. Populations of olive-sided Flycatchers have been declining on a continental scale for over 40 years (Sauer et al. 2014). Annual rates of decline for the entire population and in the northeastern United States (USFWS Region 5) are between -3.5 and -3.9% per year, while in NH the rate is -6.8%/year. The latter estimate has only moderate credibility because of small sample size and relatively low abundance. Targeted surveys for this species in NH during 2014 failed to detect it in >90% of 7.5" topographic quads in southwestern NH where it had been present during the Breeding Bird Atlas in the early 1980s. Surveys in the central portion of the state (Lakes Region, southern White Mountains), found it in roughly 50% of previously-occupied quads (PDH, unpubl. data). These distributional data from NH are consistent with range losses seen in other northeastern states and Ontario (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014).

Distribution

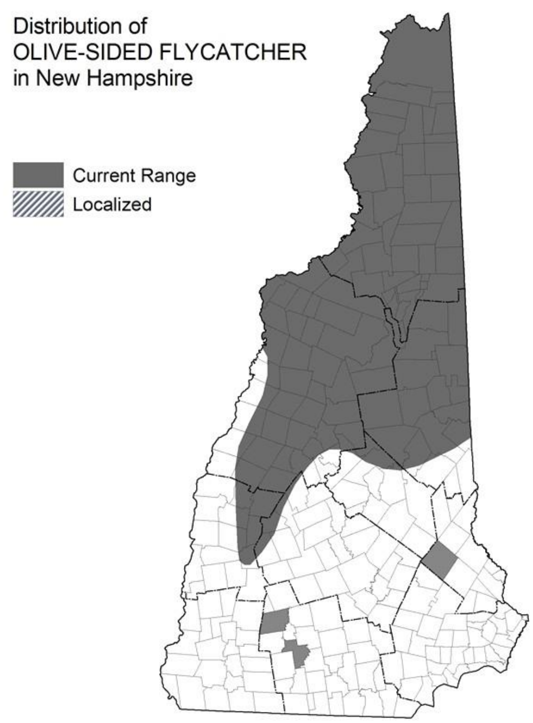
The Olive-sided Flycatcher breeds across most of northern and western North America. In the west, it occupies primarily mountainous areas in the Rockies and coastal ranges south to Arizona and Baja California. Across most of Alaska and Canada it occurs in lowland boreal forest, extending south into the northern Great Lakes and Northeast (NY, VT, NH, ME). It formerly occurred farther south in New England and through the Appalachians to NC, but populations south of northern New England and New York are now highly fragmented and apparently declining. The species spends the winter (Oct-Apr) primarily in the mountains of northwestern South America (Venezuela to Bolivia), generally between 1000 and 2000 meters. It is uncommon in winter in the highlands from southern Mexico to Panama (Altman and Sallabanks 2012). During the late 20th century, Olive-sided Flycatchers were found across much of western, central, and northern NH, and were mostly absent from the Merrimack/Contoocook River valley and east to the coast (Foss 1994). They were most common in the north and least common in the southwest, and have largely disappeared from the latter region (see Justification).

Habitat

Across their broad range, Olive-sided flycatchers are generally associated with opening or edges in coniferous forest (COSEWIC 2007, Altman and Sallabanks 2012). Such openings include harvested areas (often with residual trees), burns, bogs, and other wetlands, as well as naturally open forest types. Key habitat features include scattered dead and/or emergent trees that are used as foraging or singing perches, and most sites have a significant coniferous element. Examples of habitats used in NH include partially-harvested lowland spruce/fir, spruce/tamarack bogs, beaver ponds, and edges of marshes, shrub wetlands, and northern swamps. In the mountains of western North America, it is found most frequently in burned or otherwise disturbed forest, and lack of recent fire history in the Northeast may be one reason for its restriction to wetlands and harvests in this part of the country. During the winter, Olive-sided Flycatchers use forest edges and openings in evergreen montane forest.

NH Wildlife Action Plan Habitats

- Peatlands
- Lowland Spruce-Fir Forest
- Marsh and Shrub Wetlands
- Northern Hardwood-Conifer Forest
- Northern Swamps
- Temperate Swamps



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines and some range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. This threat is ranked as "moderate" largely because it was ranked this way for one or more of the habitats used by Olive-sided Flycatchers. In reality the sites usually occupied by this species are probably at relatively low risk due to protected status, remoteness, or wetland character.

List of Lower Ranking Threats:

Species impacts from pesticide use causing prey declines

Habitat degradation in harvested areas that become ecological traps due to increased predation

Habitat impacts from road fragmentation

Habitat conversion from deforestation in Latin America

Habitat degradation from habitat shifting and changes in species composition

Actions to benefit this Species or Habitat in NH

Habitat selection research

Objective:
Determine characteristics of habitats used by Olive-sided Flycatchers in the Northeast, including response to forest management.

General Strategy:
Use available data on locations for this species to select focal areas for more in depth surveys, which could involve individually-marked birds, radio telemetry, and/or territory mapping. Collect habitat data from used and unused areas to identify important features or habitats selected by this species. Such data are currently lacking for Olive-sided Flycatchers in the northeastern United States.

Political Location:
Carroll County, Coos County, Grafton County

Watershed Location:
Androscoggin-Saco Watershed, Upper CT Watershed, Pemi-Winni Watershed

Migratory connectivity research

Objective:
Determine migratory routes and winter range for Olive-sided Flycatchers in the Northeast

General Strategy:
Use geolocators to collect data on Olive-sided Flycatcher locations and movement during the non-breeding season. Such data can identify critical non-breeding sites and timing of migration stopover, which may be important for future conservation.

Political Location:
Carroll County, Coos County, Grafton County

Watershed Location:
Androscoggin-Saco Watershed, Upper CT Watershed, Pemi-Winni Watershed

References, Data Sources and Authors

Data Sources
Trend data from BBS and Breeding Bird Atlases (citations above)
NH distributional data from NHBR/NH eBird and P. Hunt.

Data Quality
Because of low densities, BBS data for Olive-sided Flycatcher at the southern edge of its range are of only moderate credibility, although trends for these regions are comparable to those elsewhere in the species' range and are corroborated by Atlas data.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

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Bobolink

Dolichonyx oryzivorus

Federal Listing N/A
State Listing N/A
Global Rank G5
State Rank S4
Regional Status Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of most grassland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Bobolink populations in New Hampshire have declined at 1.87% annually since 1966 (1.9%/year from 2003-2013). These trends are more negative in regional data: BCR 14 = -4.42%/year, BCR 30 = -2.48%/year. Although the declines seen in the BBS are widespread, they have not manifest as significant loss of range occupancy in repeated Breeding Bird Atlases in the northeast (McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014).

Distribution

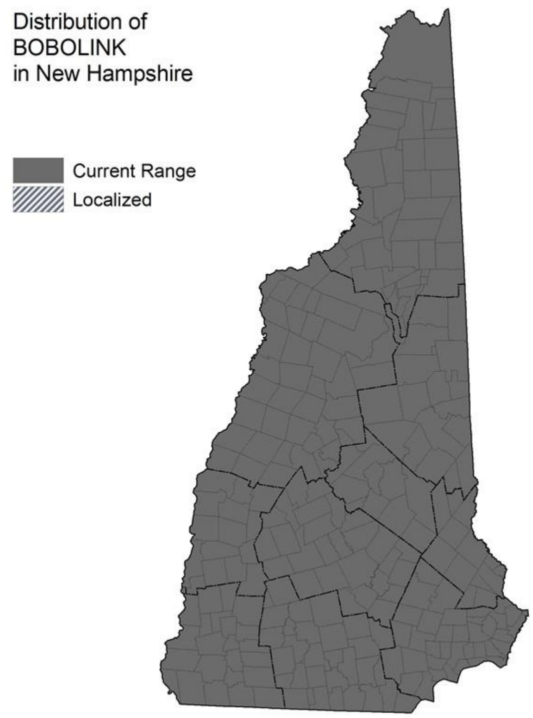
Bobolinks breed across the northern United States and southern Canada from Oregon and British Columbia to Virginia and (rarely) Newfoundland. They winter east of the Andes in South America from Bolivia to northern Argentina. The species occurs throughout New Hampshire where suitable habitat is present.

Habitat

Bobolinks breed in a variety of grassland habitats, although these generally contain a mix of tall grasses and scattered leafy forbs such as legumes or dandelions (Martin and Gavin 1995). A relatively dense litter layer is also important, a feature that is more prevalent in older fields (e.g., eight of more years since planting/reseeding, Bollinger and Gavin 1992). Bobolinks, like many grassland birds, are area sensitive, and are more likely to occur at higher densities in fields over 30 hectares. However, unlike most grassland birds, they will successfully nest in fields as small as two hectares.

NH Wildlife Action Plan Habitats

● Grasslands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Moderate population declines (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

Highly variable – see grasslands habitat profile.

Habitat Management Status

Habitat management has not been implemented specifically for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and impacts from airport construction (Threat Rank: Medium)

Expansion of runways or addition of new infrastructure (e.g., hangers) has the potential to remove suitable grassland habitat at some of the more important sites for this species in the state. However, given the relatively small portion of the state's Bobolink population that breeds at airports, this threat is not as significant as its ranking suggests.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: Medium)

As a more widely distributed grassland bird, the Bobolink is subject to direct habitat loss as fields are lost or fragmented due to development. But because Bobolinks will use relatively small fields, the fragmentation component of this threat is less of an issue than it is for other grassland birds.

Mortality and nest disturbance resulting from frequency and timing of mowing (Threat Rank: Medium)

Mowing is generally considered the greatest threat to grassland birds because it either destroys nests outright or exposes them to greater predation risk. Frequency of mowing varies with location and land use. Airports are required to mow areas adjacent to runways and taxiways for safety reasons, while in active hayfields mowing is an economic activity. To maximize both quality and quantity of hay, farmers may harvest as many as 3-4 times a season, a frequency which generally does not allow for successful reproduction by grassland birds (Bollinger et al. 1990). Mowing at airports may be less detrimental since smaller areas are generally mowed, although mowing usually occurs more frequently.

Habitat conversion to cropland or sod (excluding hay) (Threat Rank: Medium)

Many of the existing sites for Bobolinks in New Hampshire are in river valleys, where they are subject to agricultural conversion from hayfields, which are suitable breeding habitat, to row crops or sod, which generally are not. See the grassland habitat profile for more details.

Habitat degradation and conversion from a lack of field maintenance and associated succession (Threat Rank: Medium)

In the absence of periodic mowing, grassland sites revert to shrublands and eventually to forest. Because Bobolinks will use smaller fields that are more at risk of abandonment or lapse of management, this is a more important (although still minor) threat to this species than most other grassland birds.

Habitat impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants are an increasing problem in grasslands elsewhere in the Northeast. Their impacts on grassland birds are poorly known, but could include reduced availability of nesting microhabitat (Scheiman et al. 2003), and/or altered insect communities. See the grassland habitat profile for more information.

Mortality and species disturbance from insecticide use on winter grounds (Threat Rank: Medium)

Significant mortality events associated with agricultural insecticides have been documented in migratory birds that winter in South America (Goldstein et al. 1999), and lethal/sublethal doses of these same chemicals have been documented in Bobolinks in Bolivia (R. Renfrew, unpubl. data).

List of Lower Ranking Threats:

Habitat impacts and mortality from insecticide use

Habitat degradation and disturbance from airport runway maintenance

Habitat conversion and degradation from agriculture on winter grounds

Habitat degradation and species disturbance from overgrazing of grassland habitat

Actions to benefit this Species or Habitat in NH

Landowner outreach and conservation implementation

Primary Threat Addressed: Mortality and nest disturbance resulting from frequency and timing of mowing

Specific Threat (IUCN Threat Levels): Agriculture & aquaculture

Objective:
minimize mortality and nest loss from haying operations

General Strategy:
Provide landowners of important grasslands information on practices that benefit wildlife in this habitat. Specific actions include outreach about appropriate management practices (delayed mowing, etc.), cost-share programs, and other options for land protection and/or management. In a study conducted in the Connecticut River Valley of New Hampshire and Vermont, 64% of farmers and 92% of other grassland landowners were unaware of the financial assistance available for managing grassland habitats (Sydoriak 2014). For more information see the grassland habitat profile.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Horned Lark

Eremophila alpestris

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of most grassland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Horned Lark populations in the Northeast have declined at 1.64% annually since 1966 (non-significant decline of 1.19%/year from 2003-2013). Because of the species' overall rarity in the region, BBS data on smaller scales (e.g., NH) are less accurate, although the species also shows a significant annual decline of 12.01% in BCR 14. Populations appear stable in BCR 30. There have also been declines of 30-40% based on repeated Breeding Bird Atlases in the northeast (McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014). Horned Larks were never common in New Hampshire, but have declined since the 1960s and are now found entirely at airports in the southern part of the state.

Distribution

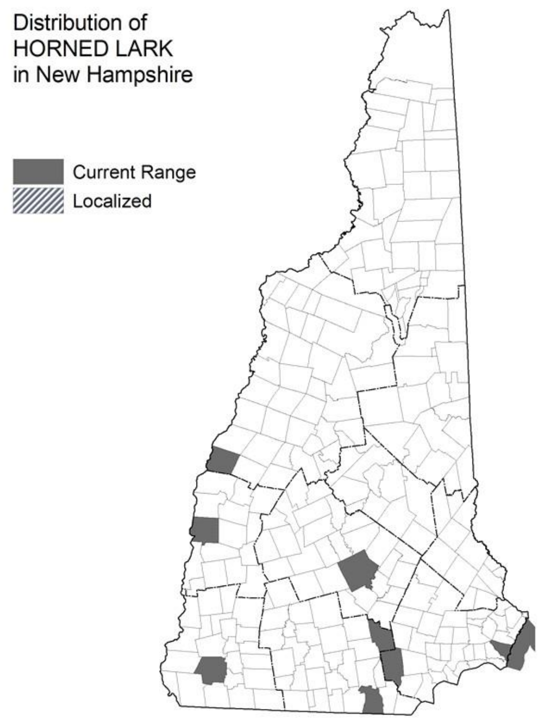
Occurs across the northern hemisphere in appropriate habitat. In North America breeds in non-forested areas from central Mexico north to the Arctic Ocean and winters in open habitats in the southern half of this range. Horned Larks colonized New Hampshire following clearing of forests in the 1800s, and were at one point locally common north of the White Mountains (Foss 1994). But by the late 1990s the species had disappeared from almost all of its former range in the state, a distribution that remains largely unchanged. Current sites are all airports, with records from Claremont, Keene, Nashua, Manchester, Concord, and Pease since 2005. Horned Larks formerly nested in dunes at Hampton and Seabrook, but have not been reported from this area during the breeding season since at least 1998. A singing bird in April 2012 however, suggests that breeding attempts may still occasionally occur. In addition to limited breeding, Horned Larks are a common migrant and wintering species in the state, with highest densities in the Connecticut and Merrimack River valleys and in the Seacoast region.

Habitat

The Horned Lark breeds in sparsely-vegetated open lands including arctic and alpine tundra, native grasslands, dunes, and airports (Beason 1995). During the non-breeding season, it also occurs in agricultural fields, feedlots, and other open habitats that provide foraging opportunities (Beason 1995).

NH Wildlife Action Plan Habitats

- Grasslands
- Dunes



Distribution Map

Current Species and Habitat Condition in New Hampshire

No data for New Hampshire. See also Justification.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

Historical sites in the Hampton/Seabrook dunes are partially protected. Airport sites are not protected in the conventional sense.

Habitat Management Status

Habitat management has not been implemented specifically for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and impacts from airport construction (Threat Rank: High)

Expansion of runways or addition of new infrastructure (e.g., hangers) has the potential to remove suitable grassland habitat at the only known sites for this species in the state.

Habitat degradation and disturbance from airport runway maintenance (Threat Rank: Medium)

This threat is separate from both mowing and construction, and pertains to human activity associated with existing infrastructure. Such activity includes paving, light installation, and other things that might result in vehicles and other equipment being parked off-runway in potential lark habitat.

Habitat degradation and conversion from a lack of field maintenance and associated succession (Threat Rank: Medium)

In the absence of periodic mowing, grassland sites revert to shrublands and eventually to forest. However, since most sites for Horned Larks in New Hampshire are airports, this is not in reality a significant threat to the species.

List of Lower Ranking Threats:

Disturbance from agricultural contaminants

Actions to benefit this Species or Habitat in NH

Grassland bird monitoring

Objective:
Monitor trends for rare grassland birds in NH.

General Strategy:
Periodic surveys of key areas for grassland birds (e.g., focal areas, see grasslands habitat profile) are needed to assess trends in distribution and abundance because broad-scale surveys like the BBS fail to capture these species in sufficient numbers. Surveys need not be annual, but should employ consistent methodology among years. For Horned Lark, such surveys should also include sites in the Hampton and Seabrook dunes. See also the grassland and dunes habitat profiles for more detail on broad actions that may benefit Horned Larks.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

In the absence of systematic surveys, data on Horned Lark distribution in New Hampshire is largely limited to anecdotal accounts from birders. The early breeding season (starting April-May) may also limit the number of reports since birders are often not visiting lark nesting areas at this time of year.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Alina Pyzikiewicz, NHFG

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Rusty Blackbird

Euphagus carolinus

Federal Listing	N/A
State Listing	SC
Global Rank	G4
State Rank	S3
Regional Status	Very High

Photo by Len Medlock

Justification (Reason for Concern in NH)

The Rusty Blackbird has experienced one of the most dramatic declines of any North American songbird (Niven et al. 2004, Greenberg and Matsuoka 2010, Sauer et al. 2014). BBS data indicates a range-wide annual population decline of 5.12% between 1966 and 2013, and a 5.45% annual decline in BCR 14 (Sauer et al. 2014). The rate of decline appears to have lessened somewhat since 2003, with BBS trends of -3.04 range-wide and -4.58 for BCR 14. Neither figure is statistically significant, but this may be an artifact of low numbers and small sample sizes. Data from Maine indicate a range retraction of 65-100 km during the twentieth century, with a particularly dramatic contraction during the final two decades (Greenberg et al. 2011). Repeated Breeding Bird Atlases in the northeastern United States document a 25% loss of formerly occupied areas (McGowan and Corwin 2008, Renfrew 2013), and apparent extirpation from Massachusetts (Massachusetts Audubon Society 2014). In Ontario, the species declined by 30% in the southern portion of the province, but may have increased by a similar amount in the north (Cadman et al. 2007). In NH, limited BBS data show a significant annual decline of 9.5% year since 1966, although targeted surveys demonstrate that the majority of occupied territories are in remote locations. Because of these declines, the Rusty Blackbird is a high priority regional SGCN in USFWS Region 5, and also on the continental Watch List for Partners in Flight. Descriptions of this species' abundance in bird distribution books, annotated checklists, and local checklists published during the twentieth century suggest a large scale, long-term decline that began between 1921 and 1950 (Greenberg and Droege 1999). Definitive causes of the decline remain elusive. Hypotheses include habitat loss and pesticide use on the breeding and wintering grounds, acidification and mercury contamination of waterbodies on the breeding grounds, and efforts to control blackbirds on winter roosts.

Distribution

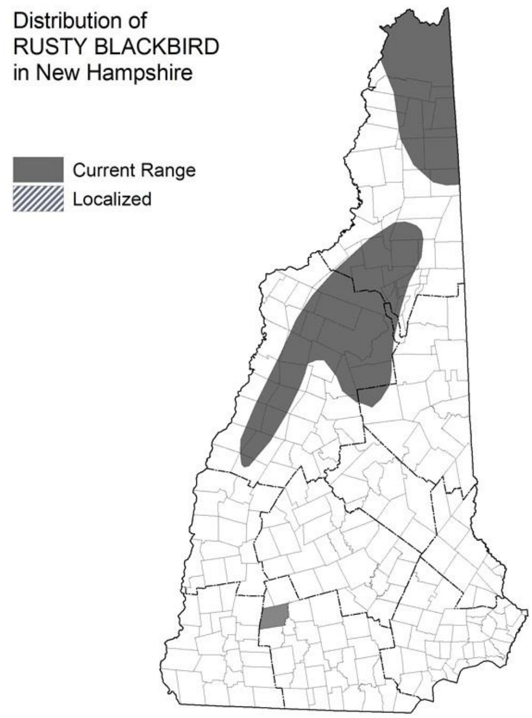
Rusty Blackbirds breed across northern North America from Alaska to Maritime Canada, with extensions south into northern New England and the Adirondacks (Avery 2013). They winter in the southeastern United States, west to the Mississippi Alluvial Valley and north to southern New England. In New Hampshire, breeding occurs in the Connecticut Lakes, Mahoosuc Rangeley Lakes, White Mountains, and Sunapee Uplands ecoregions. Breeding occurs primarily from the White Mountains north, with scattered records in the western highlands (e.g., Antrim in 2014).

Habitat

Breeding habitat for the Rusty Blackbird in New Hampshire consists of stunted or regenerating spruce-fir or mixed spruce-fir-hardwood forest within 500 meters of a stream, pond, fen, or beaver pond.

NH Wildlife Action Plan Habitats

- Lowland Spruce-Fir Forest
- Marsh and Shrub Wetlands
- Peatlands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant range-wide population declines and limited range retraction (see Justification). The New Hampshire breeding population appears to be concentrated in the Upper Androscoggin watershed of eastern Coos County, where targeted surveys have documented more than 100 occupied territories since 2009. This population appears to be stable in recent years (2009-2014), but its full geographic extent is not yet known.
Biologists located and monitored 47 nests within a seven-township area during the 2014 breeding season. Recent trends in the White Mountains ecoregion are unknown, but observers report breeding season activity from several locations annually. The discovery of a breeding pair in Antrim in 2014 raises the possibility of a small breeding population in the western highlands.

Population Management Status

Specific management is not currently occurring for Rusty Blackbirds in New Hampshire. However, it is a focal species for the Umbagog and Silvio O. Conte national wildlife refuges, where future management plans will address the species’ habitat needs.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

•Connecticut Lakes Subsection: Active forest management in lowland spruce-fir and mixed stands combined with widespread beaver activity maintain extensive areas of excellent breeding habitat.

•Mahoosuc-Rangeley Lakes Subsection: Active forest management in lowland spruce-fir and mixed stands combined with widespread beaver activity maintain extensive areas of excellent breeding habitat.

•White Mountains Subsection: Habitat patches are smaller and more scattered than in the more northern subsections, but are of good quality.

•Sunapee Uplands Subsection: The number and extent of habitat patches in this subsection are unknown. Potential habitat exists in the Enfield/Springfield/Grantham area, the Antrim/Stoddard area, and the Dublin/Harrisville area.

Habitat Protection Status

•Connecticut Lakes Subsection: The majority of known territories are on large forestry holdings. Additional breeding habitat exists within the easement area of the Connecticut Lakes Headwaters.
•Mahoosuc-Rangeley Lakes Subsection: Known breeding territories in this subsection are located on large forestry holdings, national wildlife refuge lands, the Nash Stream Forest, and the Kilkenny section of the White Mountain National Forest. Additional potential habitat exists on The Nature Conservancy's Bunnell Preserve.
•White Mountains Subsection: Most of the breeding habitat in this subsection is within the White Mountain National Forest.
•Sunapee Uplands: The territory occupied in 2014 is within a preserve owned by The Nature Conservancy.

Habitat Management Status

Habitat management has not been implemented specifically for this species. However, the Rusty Blackbird is a focal species for the Umbagog and Silvio O. Conte national wildlife refuges, and management plans for these refuges will address the species' habitat needs.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development on winter grounds (Threat Rank: High)

Forested wetland was the only wetland type to decrease in area in the coterminous U.S. during 2004-2009 and development represented the largest cause of permanent loss (Dahl 2011).

Habitat conversion from agriculture on winter grounds (Threat Rank: High)

Widespread conversion to agriculture has occurred in the bottomland hardwood forests in the Rusty Blackbird's primary wintering range (Mississippi Alluvial Valley and southeastern coastal plain) (Hefner and Brown 1984, Hefner et al. 1994, Twedt and Loesch 1999, Dahl 1990)

List of Lower Ranking Threats:

Disturbance from mercury toxicity

Disturbance from persistent organic compounds

Species impacts and habitat degradation from acid deposition that impacts food supply

Species impacts from various diseases (West Nile Virus, EEE (?)

Mortality resulting from blackbird control on winter grounds

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Non-breeding site conservation

Primary Threat Addressed: Habitat conversion from agriculture on winter grounds

Specific Threat (IUCN Threat Levels): Agriculture & aquaculture

Objective:
Develop and implement conservation plans for important migration stopover and wintering areas

General Strategy:
Using data collected from Rusty Blackbird migration blitz and geolocators, identify important stopover and wintering sites and prioritize these for future conservation. Develop plans for these areas that include land conservation and management options that benefit the species.

Political Location: National

Watershed Location:

Acidified habitat research

Objective:
Assess the degree to which Rusty Blackbird distribution and abundance are affected by patterns of acid deposition

General Strategy:
Overlay water body acidification data with historical and current New England Rusty Blackbird distribution.

Political Location:
Northeast

Watershed Location:
Statewide

Rusty Blackbird population research

Objective:

Document survival and reproductive success of Rusty Blackbirds breeding in northern NH.

General Strategy:

Several components include: Continue to document nesting success and productivity Continue to investigate survivorship through annual color-banding Investigate migratory connectivity (including stopover and winter locations) through geolocators, PinPoint GPS tags, and radio-telemetry Investigate genetics of breeding population

Political Location:

Coos County

Watershed Location:

Androscoggin-Saco Watershed, Upper CT Watershed

References, Data Sources and Authors

Data Sources

Documented occupied territories 2009-2014; nesting success data 2010-2014.

Data Quality

New Hampshire Audubon biologists have been conducting research on breeding Rusty Blackbirds in Coos County since 2009. Two S.U.N.Y. Environmental Science and Forestry M.S. students have conducted research on this population..

2015 Authors:

Pamela Hunt, NHA, Carol Foss, NHA

2005 Authors:

Carol Foss, NHA

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Spruce Grouse

Falcipennis canadensis

Photo by Len Medlock

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	Very High

Justification (Reason for Concern in NH)

Although spruce grouse habitat in the East is naturally patchy, anthropogenic destruction of spruce-fir habitat has further contributed to extreme isolation of spruce grouse populations (Keppie 1997). Additionally, spruce fir habitat types are the most likely to experience negative effects from climate change (NHFG, Climate Adaptation Plan 2013) as well as impacts from pest outbreaks such as spruce budworm and balsam woolly adelgid. Anecdotal evidence (limited chick and female sightings) suggests that spruce grouse are limited in New Hampshire. High market demand for spruce and fir has led to extensive cutting of mature softwood habitat at lower elevations. In New Hampshire, Weeks (quoted in Silver 1957) stated that spruce grouse were once common in New Hampshire at the time of settlement, but by 1880, they were seldom seen. Habitat loss, market hunting, and susceptibility of populations to harvest were thought to be the primary causes of decline (Silver 1957).

Distribution

Spruce grouse are distributed throughout boreal forests of North America. In the East, spruce grouse are at the southern extent of their range in northern Minnesota, Wisconsin, Michigan's Lower Peninsula, New York, Vermont, New Hampshire, and Maine (AOU 1983). Spruce grouse are listed in other states/provinces, including Vermont (endangered), New York (endangered), Nova Scotia (Uncommon), Minnesota (Uncommon), Wisconsin (Threatened), and Michigan (Uncommon) (Lumsden and Weeden 1963). In New Hampshire spruce grouse are found primarily within the White Mountain National Forests and isolated habitat fragments throughout Coos County and are a species of special concern.

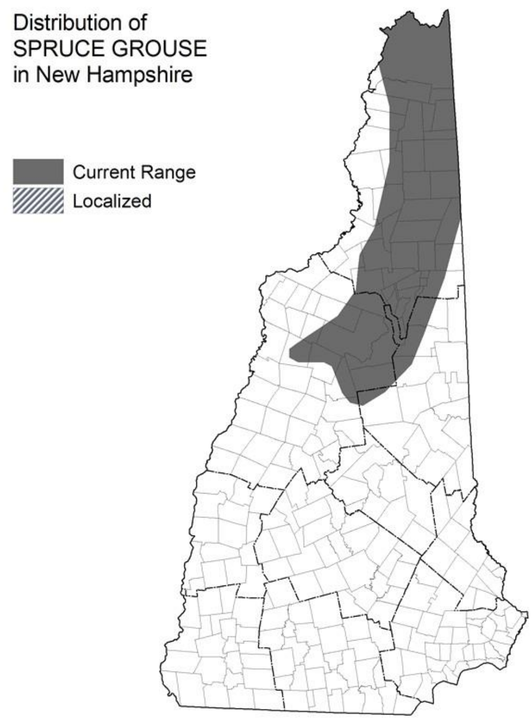
In most cases, there is very little overlap between spruce grouse and ruffed grouse habitat. Common densities of spruce grouse in suitable habitat are around 12-24 grouse/mi2, as opposed to 80 or more ruffed grouse/mi2 in suitable habitat (Johnsgard 1983, Greenwald 1984, Robinson 1980).

Habitat

Spruce grouse prefer dense conifer forests and low-elevation bogs (Boag and Schroeder 1992, Smith 1994). Forest structure, rather than specific tree species, greatly influences habitat use by spruce grouse (Greenwald 1984). Structural components important to spruce grouse include forest openings, bog edges, trees with live branches extending to the ground, and sparse ground cover with optimum forage such as *Vaccinium* (Robinson 1980). In the winter, spruce grouse feed entirely on short conifer needles (NatureServe 2005). Tree species commonly associated with spruce grouse habitat in New England include black spruce, tamarack, and balsam fir (Bryant and Kuropat 1980, Allen 1985).

NH Wildlife Action Plan Habitats

- Lowland Spruce-Fir Forest
- High Elevation Spruce-Fir Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

Historically, spruce grouse were abundant in Coos County due to the extensive spruce-fir habitat. Overall, spruce-fir habitat has declined due to current and historic land use. Spruce grouse may persist sporadically throughout low-elevation spruce forests, but populations are likely isolated and unstable (Keppie 1997). High elevation spruce-fir habitat is more contiguous and susceptible to natural stand dynamics which supports continual availability of spruce grouse habitat. As a result this area likely supports more stable spruce grouse populations (Siren 2015). This is especially true in the White Mountain National Forest where natural stand dynamics (e.g. fir waves) are producing a continuous supply of maturing spruce fir habitat over time. Todd (2003) suggests that spruce grouse in high elevation habitat may be subjected to longer and colder temperatures, resulting in late breeding and decreased annual production. As result high elevation populations would have limited ability in maintaining spruce grouse populations in some of the more contiguous better habitat in New Hampshire.

Population Management Status

NHFG uses signage in areas known to have overlap with popular grouse hunting and outdoor recreation that explain the difference between spruce grouse and ruffed grouse.

NHFG has also partnered with ongoing research to look at spruce grouse genetics and the impacts of isolation on genetic diversity (A. Ross, NYDEC 2014). Past research projects on spruce grouse have also concentrated on habitat found in the White Mountain subsection (Todd 2003).

Regulatory Protection (for explanations, see Appendix I)

● Possession prohibited

Quality of Habitat

Based on a recent analysis comparing the amount of current low elevation spruce fir (Northern NH Landcover Reassessment 2012) to the potential or historical distribution (WAP 2005), low elevation is currently found in smaller patches and less prevalent on the landscape (Siren 2015). Additionally, the areas that remain spruce fir are younger in age. As a result spruce grouse population have likely been segregated to the larger patches of mid to mature spruce fir stands interspersed with preferred feeding and nesting habitat. The patchy nature of the habitat across the landscape may be contributing to the isolation of some populations.

The majority of the high elevation spruce fir habitat is in public ownership, specifically on the White Mountain National Forest and is in a mature age class. As a result habitat may be localized with little to no connectivity between habitat patches.

Mahoosuc-Rangeley region: Conserved land within the Mahoosuc-Rangeley subsection may also support spruce grouse, but unlike the Connecticut Lakes subsection, most of the conserved habitat is at higher elevations. This may require different research and management objectives. Unconserved land has the highest potential for providing spruce grouse habitat within this subsection. Under timber investment and industrial ownership, historical habitat has drastically declined and continues to be harvested at an accelerated pace.

White Mountain region: Populations currently persist in the White Mountain subsection, but are likely isolated due to fragmentation of habitat patches (Todd 2003).

Habitat Protection Status

Over the past 20 year several large land conservation projects have taken place in Coos County that could help to restore historic lowland spruce fir habitat. Low elevation stands of spruce fir within easement areas may be managed in a way that is more conducive to providing spruce grouse habitat in larger patches as well as with better connectivity between patches. According to Siren (2015), significant portions of the low elevation spruce fir in New Hampshire remains in large private land ownership. Analysis shows that much of this habitat is currently regenerating and not likely providing large blocks of spruce grouse habitat at this time.

Siren (2015) also shows that much of the high elevation spruce fir habitat in New Hampshire is currently in public ownership or has a conservation easement helping to guide management. Again this is likely providing larger areas of mature spruce fir that support spruce grouse at a landscape scale, yet these habitats are isolated in nature (Todd 2003).

Mahoosuc-Rangeley region: The majority of the high elevation spruce-fir habitat in the Mahoosuc-Rangeley subsection is currently protected through easement or title fee. Unprotected high elevation habitat includes Dixville/Mt. Kelsey mountain ridge. Low elevation spruce-fir habitat in the Mahoosuc-Rangeley subsection remains virtually unprotected. Unincorporated towns have some level of protection through zoned districts.

White Mountain region: High elevation spruce-fir habitat in the White Mountains subsection is entirely protected by the White Mountain National Forest (WMNF). Under the Proposed Land and Resource Plan for the WMNF, wind towers can be considered as well as ski area expansions in designated areas. Virtually all of the low elevation spruce-fir is under federal ownership as part of the WMNF. Unincorporated towns located within the subsection also have some level of protection through zoned districts.

Habitat Management Status

Conserved land properties contributing to spruce grouse habitat include: The Connecticut Lakes Natural Area , Connecticut Lakes Timber Company, the Vicki Bunnell Preserve, Nash Stream State Forest, Kilkenny National Forest, the White Mountain National Forest, and the Randolph Town Forest and the Errol Town Forest, all of which have specific goals for promoting boreal forest and wildlife species within their boundaries.

Portions of Coos County remain virtually unprotected through easement or conservation ownership. These properties are critical north/south as well as east/west movement corridors between populations and states.

Potentially important ownerships:
Town of Success, no protection
Second College Grant, no protection
Bayroot LLC, no protection
Balsams Resort, partial protection
Perry Stream Land and Timber, No protection
Poor distribution of a variety of age classes in forest structure can be detrimental to spruce grouse abundance. Spruce grouse directly benefit from forest management designed to keep a mix of age classes such as early successional pockets which can be critical areas for chick feeding.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat impacts from retraction of spruce fir habitat (Threat Rank: High)

Timber harvesting that results in an imbalance in age structure and loss of spruce fir habitat (Threat Rank: High)

Habitat loss or conversion by insect pests (Threat Rank: High)

Outbreaks of insect pests including spruce budworm (native) and balsam woolly adelgid (non-native) can cause widespread decline in fir throughout spruce grouse distribution in NH in a short period of time. Due to the even age nature of softwood stands in NH loss of fir could significantly impact the amount of habitat left for spruce grouse in NH.

Habitat impacts from improper habitat management that creates dispersal barriers and isolation (Threat Rank: Medium)

List of Lower Ranking Threats:

Disturbance from OHRV activity

Disturbance from recreation activity (hiking, climbing, foot traffic)

Mortality from incidental take during grouse season

Habitat conversion and fragmentation from tower and turbine development

Habitat conversion and fragmentation due to the development of ski areas

Species impacts from increased forest road density that increases vulnerability to hunting and road mortality

Actions to benefit this Species or Habitat in NH

Identify potential impacts of development on spruce grouse populations and distribution.

Primary Threat Addressed: Species impacts from increased forest road density that increases vulnerability to hunting and road mortality

Specific Threat (IUCN Threat Levels): Biological resource use

Objective: The objective is to better understand the potential impacts of development (i.e. roads, trails and habitat loss) on spruce grouse distribution and abundance.

General Strategy: The impacts of development such as roads, trials, and habitat fragmentation on spruce grouse is poorly understood. Spruce/fir habitat has dramatically decreased and is further threatened by development. Studying the potential impacts will help to make informed decisions into the future.

Political Location: **Watershed Location:**

Identify, protect and maintain potential spruce grouse habitat.

Objective: The objective is to ensure spruce grouse have adequate habitat within their historical range.

General Strategy: Spruce grouse distribution and abundance is poorly understood in New Hampshire. Distribution data is limited. Spruce fir has dramatically declined over the last century and is projected to decrease more due to climate change. Identifying protecting and maintaining key habitats to provide connectivity for spruce grouse is key to their persistence in New Hampshire.

Political Location: **Watershed Location:**

Identify, protect and manage key spruce/fir habitat that will likely be most resilient to climate change.

Primary Threat Addressed: Habitat impacts from retraction of spruce fir habitat

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective: The objective is to identify key spruce grouse habitat that will likely be most resistent to climate change.

General Strategy: Climate changed is predicted to dramatically decrease the distribution of spruce fir, yet NH is predicted to retain remnant parcels due to elevation gradients and current distribution of spruce fir. As a result it will be critical to identify, protect and manage these key parcels and evaluate if spruce grouse will be able to persist on the changing landscape.

Political Location: **Watershed Location:**

Collaborate on regional efforts to study spruce grouse distribution and aubundance.

Objective: The objective is help collect regional data to better understand and provide needed habitat and population connectivity for spruce grouse.

General Strategy: Current spruce grouse distribution and abundance is poorly understood due populations being difficult to access in high elevation habitats as well as generally low abundance in historic habitats. Working with regional efforts on understanding spruce grouse genetics, habitat use and connectivity are critical to maintaining spruce grouse in NH.

Political Location: **Watershed Location:**

Provide technical assistance on spruce fir management and importance to spruce grouse.

Primary Threat Addressed: Timber harvesting that results in an imbalance in age structure and loss of spruce fir habitat

Specific Threat (IUCN Threat Levels): Biological resource use

Objective: The objective is educate and provide assistance to landowners on ways to manage for spruce fir and spruce grouse habitat.

General Strategy: Technical assistance to public and private landowners on the importance of spruce fir and different management techniques that can be used to promote, maintain or transition acres to spruce fir is needed. Outreach efforts could emphasize the need for managing for multi aged stands, managing habitats based on soils and historical distribution of spruce fir. Technical assistance could also be provided in the form of best management practices for spruce grouse habitat.

Political Location: **Watershed Location:**

Increase public awareness on spruce grouse habitat and distribution

Primary Threat Addressed: Mortality from incidental take during grouse season

Specific Threat (IUCN Threat Levels): Biological resource use

Objective: The objective is to increase public awareness on the distribution and abundance of spruce grouse and habitat.

General Strategy: Incidental take of spruce grouse is likely fairly uncommon, but still a potential threat to small populations with poor connectivity. As a result, it is important to increase public awareness regarding the distribution of spruce grouse and their preferred habitats to help minimize the potential impacts.

Political Location: **Watershed Location:**

Monitor and mitigate for the movement and infestation of spruce grouse habitat by forest pests and pathogens.

Primary Threat Addressed: Habitat loss or conversion by insect pests

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

Objective: The objective is to identify and mitigate the potential impacts of forest pests and pathogens on spruce grouse habitat.

General Strategy: Over the next 10 years forest pests such as balsam wooly adelgid and spruce budworm will likely increase and significantly impact the distribution and abundance of spruce fir habitat. Early detection and management techniques can be used to mitigatio and minimize the impacts of pests and pathogens on spruce grouse habitat.

Political Location: **Watershed Location:**

References, Data Sources and Authors

Data Sources

Information on spruce grouse population distribution and status was collected from research (Todd 2003), New Hampshire Fish and Game data, public observation records, Audubon bird records, Breeding Bird Survey (BBS) data (Hunt 2005), and Breeding Bird Atlas (BBA) locations (Smith 1994). Information on habitat protection and management was obtained from literature review, expert review, and consultation

Data Quality

Data on New Hampshire's spruce grouse populations is extremely limited. There are few historic or recent data on distribution and abundance.

Current information is based largely on general observations, Audubon bird records, observation records collected from the public, and surveys conducted for the Breeding Bird Atlas for New Hampshire (Smith 1994). BBS survey methods are poor for detecting spruce grouse.

Systematic assessments include New Hampshire BBA and BBS. Overall, there is little to no information on the distribution, size, and connectivity of local spruce grouse populations and habitat in New Hampshire.

2015 Authors:

Jillian Kilborn, NHFG

2005 Authors:

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Peregrine Falcon

Falco peregrinus [E]

Federal Listing	N/A
State Listing	T
Global Rank	G4
State Rank	S2
Regional Status	Very High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Historically Peregrine falcons established breeding territories in relatively low densities in suitable cliff habitats throughout the United States. Starting in the late 1940s, extensive reproductive failure caused by increasing levels of persistent synthetic chlorinated hydrocarbons (DDT and others) in their avian prey caused a dramatic population decline and range reduction. This decline continued through 1970 (Hickey 1969, Enderson et al. 1995). In New Hampshire, peregrine falcons ceased to breed productively by the late 1950s and all known nesting areas in the state became vacant by the mid-1960s (Spofford 1975). In the wake of the banning of DDT (1973) and extensive reintroduction efforts, falcons gradually recovered and re-occupied vacant historical territories in New Hampshire and across the United States starting in the early 1980s and continuing to the present day (Cade and Burnham 2003). Although largely recovered across the Northeast, the Peregrine Falcon is still considered a SGCN due to historic extirpation, need for ongoing management at many nesting sites, and the potential for emerging threats.

Distribution

The Peregrine Falcon is cosmopolitan in distribution, with breeding documented on all continents except Antarctica. In North America it breeds primarily in tundra and montane habitats where cliffs are present, although it is increasingly common in urban areas and along major river valleys where man-made nesting substrate is available. Non-breeding and wintering birds can occur anywhere with suitable prey populations.

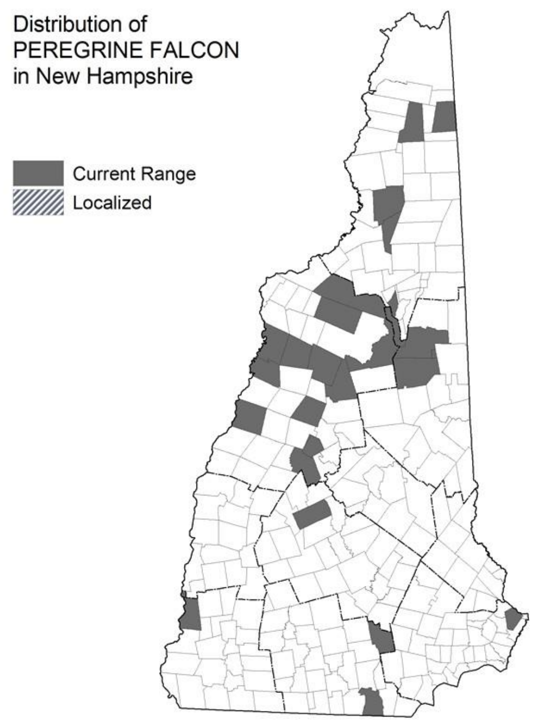
In New Hampshire, Peregrine Falcons historically nested entirely on cliffs, primarily from the White Mountains north. Following extirpation and subsequent recovery, most of this former range has been re-occupied, and falcons have also begun nesting in urban settings in the southeastern portion of the state. Band encounter data for 986 individually marked peregrine falcon fledglings from across New England clearly show that individuals breeding in New Hampshire are not isolated from those breeding in other New England states, but instead are part of an interconnected regional population (Faccio et al. 2013).

Habitat

The peregrine falcon is a wide-ranging species that uses many different habitats across the United States for breeding, wintering, and migration (White et al. 2002). Nests sites are almost entirely on vertical cliffs or man-made structures that possess physical characteristics similar to cliffs. Open landscapes and air spaces, where peregrine falcons can locate and attack their prey in the air, are important components of most habitat types. Preferred habitats include mountainous terrain, agricultural land, wide river valleys, lake shorelines, ocean coastlines, and islands. The urban environment, with high-rise buildings, major bridges, and tall smokestacks, has become an increasingly important habitat for peregrine falcons within the past quarter century (Cade et al. 1996b). The home range of a territorial individual can be relatively small (100 km2) when prey populations are abundant, but may be much larger (350 to 1,500 km2) when prey populations are more dispersed (White et al. 2002). Peregrine falcons can potentially establish breeding territories anywhere in the United States provided that areas with suitable nest sites and sufficient prey base occur in close proximity. Cliffs are abundant in New Hampshire, and suitable nesting substrate does not appear to be a limiting factor in peregrine falcon distribution.

NH Wildlife Action Plan Habitats

- Rocky Ridge, Cliff, and Talus
- Developed Habitats



Distribution Map

Current Species and Habitat Condition in New Hampshire

Following extirpation, Peregrine Falcons did not nest in New Hampshire until 1981, when a single pair occupied a historic site in Franconia Notch. During the 10-year period from 1985 to 1994, the breeding population expanded at an annual rate of 15.9%. From 1995 to 2004, the population continued to expand, but at a less vigorous annual rate of 3.6%. In the most recent decade (2005-2014), the number of occupied territories and active nests have increased by 4-5% per year, and productivity (number of young fledged) grew by 120% (8% per year). In 2014 there were 22 pairs (of 23 occupied territories), and 17 of these pairs attempted to nest, ultimately fledging 33 young from 14 successful nests. Average annual productivity for New Hampshire peregrines has increased from 1.60 fledged/year for 24 seasons from 1981-2004 to 1.64 fledged/year for 34 seasons from 1981-2014. Six additional historical NH eyries that were still unoccupied in 2004 have since been occupied by new pairs (Mt. Kilburn, Peaked Mtn., Pond Ledge, Ragged Mtn. Bulkhead, Sugarloaf (aka Bear Mtn.), and Moat Mtn. (aka Woodchuck Ledge)). Recovery in neighboring Vermont has been considerably more vigorous, with a total of 41 territorial pairs monitored and minimum of 50 fledged young reported in 2014.

Population Management Status

Volunteers from NHA conduct minimal productivity monitoring and presence/absence surveys of approximately 30 potential peregrine falcon breeding sites. Other activities include salvage of eggs and chicks, evaluation and management of human (i.e., recreational) influences, internet broadcasting of nesting activity, and extensive outreach and education to the public and rock-climbing community.

Regulatory Protection (for explanations, see Appendix I)

- CITES - Convention on International Trade of Endangered Species of Wild Fauna and Flora
- Federal Endangered Species Act
- Federal Insecticide/Fungicide/Rodenticide Act
- National Forest Management Act
- Federal Land Management and Policy Act
- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Roughly 80% of Peregrine Falcon breeding sites in New Hampshire are on cliffs, with the remainder on man-made structures (bridges and buildings). In either case, suitable sites must have small horizontal shelves on otherwise vertical faces, minimal access for mammalian predators, and abundant avian prey within several miles. The greatest concern for habitat quality at cliff sites is the growing popularity of recreational climbing and its potential to suppress nesting success and productivity. The most serious habitat quality concerns at urban sites are pigeon abundance, the potential risk of secondary poisoning due to pigeon control efforts, the limited availability of suitable nesting substrates, and the highly variable maintenance schedules of urban structures.

Habitat Protection Status

Of 23 occupied peregrine falcon breeding territories in New Hampshire in 2014, 11 sites (48%) were on public land, 11 (48%) were on private land, and one (4%) was on a mix of public and private land. Of the 11 sites on public land, 5 sites were managed by the United States Forest Service, 4 were on state land managed by the New Hampshire Division of Resources and Economic Development, one was on property managed by NH Department of Transportation, and one was on municipal land managed by the Town of Woodstock. Of the 11 sites on private land, 3 were protected by conservation easements, while 8 were not. Eighteen sites were cliff habitat, and 5 were urban habitat.

Habitat Management Status

Cliff habitats in New Hampshire are subject to very little direct habitat management. There are no efforts to promote or discourage any particular vegetation type or density on cliffs. Establishing temporary restrictions for the recreational use of cliffs is the only current management action. Urban habitat management consists of voluntary adjustments in building maintenance to avoid potentially disruptive activities, and eliminating access to structural entrapment risks during the breeding season.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Disturbance from increased spring storms that impact reproduction (Threat Rank: Medium)

More intense or more frequent storm events (late-season snow accumulation and heavy rain) are anticipated due to climate change. If these occur during more vulnerable stages of the nesting cycle they may interfere with incubation and/or subject vulnerable young to increased risk of exposure.

Disturbance to nests during building and bridge maintenance (Threat Rank: Medium)

Potentially a more intense version of climber/hiker disturbance issue listed above since disturbance associated with building/bridge maintenance more likely to be longer duration at closer distance with more barriers/obstacles for peregrines to overcome (Cade et al. 1996b, Gahbauer et al. 2015).

Disturbance by climbers and hikers (Threat Rank: Medium)

Increasing peregrine population and growing outdoor recreation industry coupled with diminishing monitoring can increase exposure to this disturbance. Repetitive defense of nest, eggs, and young may reduce food provisioning, expose young to elements and predators, or displace adults from primary nest locations (Lanier et al. 1989, Pyke 1997).

Mortality and disturbance from subsidized or introduced predators (Threat Rank: Medium)

Principally concern about raccoon predation which can increase with urbanization of landscape, particularly in situations where peregrines are using sub-optimal nest sites.

Disturbance from persistent organic compounds (Threat Rank: Medium)

An emerging concern is presence of increasing levels of flame-retardant bromines in peregrines and their prey, as demonstrated in 114 peregrine falcon eggs collected at New England nest sites from 1990-2006 (Chen et al. 2008). It is still unclear whether there is any reduction in productivity associated with increased levels of organic contaminants in prey species.

List of Lower Ranking Threats:

Disturbance from mercury toxicity

Disturbance from the harvest for falconry

Habitat degradation from timber harvesting that removes trees at the top of cliffs

Disturbance during research activities

Mortality related to intentional or unintentional shooting and trapping

Disturbance of nests by aircraft

Mortality from wind tower and turbine development

Habitat conversion from mountaintop removal mining

Habitat degradation from wind tower and turbine development

Habitat degradation due to residential ridgetop development

Actions to benefit this Species or Habitat in NH

Temporary cliff closures

Primary Threat Addressed: Disturbance by climbers and hikers

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Minimize disturbance of nesting Peregrine Falcons by recreational climbers

General Strategy:
Several more specific actions are nested within this larger one. Most important are a) conduct outreach to climbing community on the need for closures, and encourage volunteer stewardship on its part, b) advise land managers on how to mitigate potential climbing impacts within their jurisdictions, and c) actually post (and remove) cliff closure signage at sites with active Peregrine Falcon nesting attempts. This latter action is strongly informed by data collected by ongoing monitoring.

Political Location:
Statewide

Watershed Location:
Statewide

Wind Power Mitigation

Primary Threat Addressed: Mortality from wind tower and turbine development

Specific Threat (IUCN Threat Levels): Energy production & mining

Objective:
Minimize threat to Peregrine Falcons from wind power development.

General Strategy:
Develop and implement BMPS for siting and operation of wind facilities that minimize disturbance and mortality. Includes research that might guide siting and guidelines for operation during falcon nesting season.

Political Location:
Statewide

Watershed Location:
Statewide

Peregrine Falcon monitoring

Objective:
Track population status of Peregrine Falcons in NH

General Strategy:

Ongoing monitoring of both cliff and mad-made nest sites is needed to inform site management (e.g., cliff closures, timing of building maintenance, etc.). Spring surveys of recently active and potential breeding sites should be used to monitor the distribution and abundance of peregrine falcons in New Hampshire. Recently active sites should be checked annually to determine occupancy status and reproductive outcome. Surveys of potential sites should be conducted on a rotating basis, with annual survey intensity determined by funding and available human resources. For example, sites could be checked on a 3-year rotation covering 33% of sites annually, on a 5-year rotation covering 20% annually, or on a 10-year rotation covering 10% annually.

Political Location:
Statewide

Watershed Location:
Statewide

Contaminants Research

Objective:
Assess levels of known and emerging contaminants in Peregrine Falcons

General Strategy:
Participate in collaborative regional sampling for contaminants as a means of assessing their overall prevalence in northeastern Peregrine Falcons. Includes taking tissue samples (eggs, blood, feathers) and having these analyzed for contaminant loads.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

Unless otherwise noted, the source for New Hampshire species data is field monitoring and management activities conducted by the New Hampshire Audubon (NHA) from 1983 through 2015 under annual contracts and/or grants received from the New Hampshire Fish and Game Department (NHFG) and/or the USFWS (e.g., Martin 2007).

Data Quality

Since the early 1980s, the peregrine falcon has been one of the most intensively monitored and managed species in New Hampshire. Breeding site data are derived from three decades of field monitoring by NHA staff and trained volunteers. These observers employ standardized monitoring techniques at historical, active, and other potential sites throughout the state (see Cade et al. 1996a). Both remote sites and sites located close to roads and trails are surveyed, although remote sites are visited less frequently.

2015 Authors:

Pamela Hunt, NHA, Christian Martin, NHA

2005 Authors:

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American Kestrel

Falco sparverius

Federal Listing	N/A
State Listing	SC
Global Rank	
State Rank	S3
Regional Status	High

Photo by Robert Kanter

Justification (Reason for Concern in NH)

The American Kestrel population has decreased slightly since the initiation of the Breeding Bird Survey in 1966. However, regional populations, including the Northeast, have declined more rapidly. Declines are more dramatic in New Hampshire (-3.57% and -2.07%, respectively, although the latter is not significantly different from zero (Sauer et al. 2014). The regrowth and maturation of forests is the most likely cause of this decline rapidly (Smallwood and Bird 2002), Although systematic surveys of suitable habitat have not been conducted since the NH Breeding bird atlas, American Kestrels have disappeared from previously occupied territories even where habitat appears to remain suitable. Populations of American Kestrels are declining across North America. At the continental scale, the populations have declined 1.65% annually since 1966, but only at -0.75%/year since 2003. American Kestrels monitored in a long-term nest box program in New Hampshire have produced an average of 3.9 young/box/year. Despite the relatively consistent annual productivity, the numbers of boxes used by Kestrels has dropped precipitously, and in 2014 only 10 of 35 boxes were used and in 2015 only 5 of 38 were used (S. Wheeler pers. comm).

Distribution

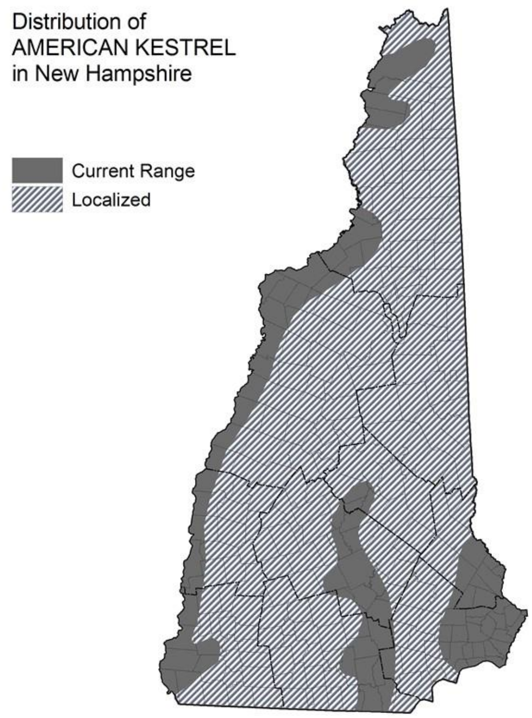
American Kestrels occur statewide but breed in highest numbers in the Connecticut River Valley, Merrimack River Valley, and Seacoast Region. During winter Kestrels move south of New Hampshire.

Habitat

American Kestrels inhabit open areas covered by short ground vegetation (Smallwood and Bird 2002). They nest in natural tree cavities and ones that were previously excavated by woodpeckers. American Kestrels also nest in human-made structures, such as building eaves, and they will readily use nest boxes if they are properly sized and placed. In New Hampshire, most records come from farmland and airports, with a few additional records from wetlands with standing dead trees (e.g., beaver ponds).

NH Wildlife Action Plan Habitats

- Grasslands
- Developed Habitats
- Shrublands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Nest boxes that Kestrel have successfully nested in the last five-years should be targeted. Information on these locations will be sought for future analysis.

Population Management Status

A Long-term nest box program run by Steve Wheeler has provided nesting opportunities and resulted in some continually productive territories for American Kestrels in NH. Steve's 2015 request to erect nest boxes on state properties has been approved by the state lands management committee.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Habitat is not specifically managed for this species, except for the installation of nest boxes as mentioned previously.

Habitat Protection Status

Data are not available for this analysis.

Habitat Management Status

Long-term (approximately 30 years) nest box placement and maintenance program has been effective at maintaining productive American Kestrel territories.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation due to natural succession or lack of active management (Threat Rank: High)

In the absence of periodic mowing, grassland sites revert to shrublands and eventually to forest, and eventually cease being suitable for American Kestrels. In addition, loss of snags along field edges (largely a result of intensified agriculture) is also detrimental to kestrel populations.

Mortality from predation (increased Cooper's Hawk populations) (Threat Rank: Medium)

Populations of Cooper's Hawks have been increasing in NH and the Northeast since the 1980s (Sauer et al. 2014), and increased predation by this specialist bird predator has been proposed as a factor behind kestrel declines. However, analysis of concurrent population data for both kestrels and Cooper's Hawks failed to show significant correlations, suggesting that other factors may be more important (Smallwood et al. 2009).

Species impacts from pesticide use causing prey declines (Threat Rank: Medium)

Insects comprise a significant component of kestrels' diets, and there is increased evidence from studies on other insectivorous birds in agricultural landscapes that increased use of insecticides is impacting prey availability (Evans et al. 2007). More data are needed on kestrel diet and foraging behavior are needed to fully evaluate this potential threat.

List of Lower Ranking Threats:

Habitat and species impacts from the loss of nest sites

Habitat conversion from new development in existing agricultural fields

Actions to benefit this Species or Habitat in NH

Develop volunteer based nest box construction, monitoring and maintenance project with NH Audubon. Suitable nest sites may be absent in highest quality habitats for American kestrels.

Primary Threat Addressed: Habitat and species impacts from the loss of nest sites

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:

Construct and deploy American kestrel nest boxes in areas selected by GIS model and ground-truthed by biologists and skilled volunteers

General Strategy:

Enter into agreement with NH Audubon to develop nest box program.

Political Location:

Statewide

Watershed Location:

Statewide

American kestrel focus areas

Objective:

Model potential habitat of American kestrels using long-term dataset referred to in similar action 'deploy American kestrel nest boxes in areas selected by GIS model and ground-truthed.'

General Strategy:

Utilize NH Fish and Game GIS analyst to conduct modeling

Political Location:

Statewide

Watershed Location:

Statewide

Collaborate with researchers and biologists to incorporate existing information into a georeferenced database.

Objective:

Develop a collaboration with biologist that has instituted long-term nest box and banding program and enter data into a georeferenced database.

General Strategy:

Develop a collaboration with biologist who manages nest boxes and collects data. Accessing this long-term dataset will provide a readily available source of information to improve knowledge of population condition and potential management.

Political Location:

Statewide

Watershed Location:

Statewide

References, Data Sources and Authors

Data Sources

NH Breeding Bird Atlas. NH e-bird data. Steve Wheeler, retired biologist and American kestrel researcher with long-term nest box and banding program in New Hampshire.

Data Quality

Quality of statewide distribution data is unknown, but absence of kestrels from nest boxes in apparently suitable habitat suggests that nest sites are not a limiting factor in the state.
Analysis of e-bird data for May and June American kestrel sighting provides general

knowledge of distribution of potential breeding territories.
North American breeding bird survey provides a modest trend index but lacks probabilistic design.
Data set maintained on nest box use and productivity is maintained by private individual but not available for use at this time.

2015 Authors:
John Kanter, NHFG

2005 Authors:

Literature

Common Gallinule

Gallinula galeata

Photo by Pamela Hunt

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S2
Regional Status	High

Justification (Reason for Concern in NH)

Secretive marsh birds like the Common Gallinule have generally been considered conservation priorities because of known losses of wetland habitats, combined with often poor data on species' distribution, abundance, and trend. In the case of the Common Gallinule, repeated Breeding Bird Atlases in the Northeast have consistently documented a 30-40% loss of occupied range (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014). The Breeding Bird Survey shows a significant decline of over 2% per year in the eastern United States (Sauer et al. 2014), but data are generally poor for this species.

Distribution

Breeds locally across the eastern United States, primarily around the Great Lakes and along the Atlantic and Gulf coastal plains. The species is highly dispersed and local in the West, and widely distributed from Mexico to South America, and also throughout the Caribbean (Bannor and Kiviat 2002). Northern populations withdraw to the southern U.S., Caribbean, and Central America in winter.

Common Gallinules have been recorded during the breeding season (conservatively June-July) at only three New Hampshire locations since 1990, as follows:
•Cherry Pond, Jefferson (1996-97)
•Stubb's Pond, Newington (1999, 2002)
•Surrey Lane marsh, Durham (2005-06)

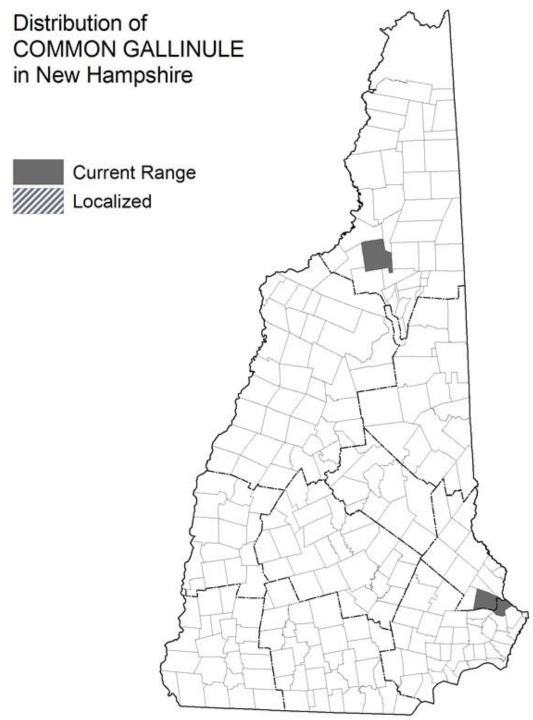
Based on the lack of recent summer records, it is not clear that the Common Gallinule is still a regularly-occurring breeding species in New Hampshire, and records of migrants in spring have also declined since the late 1990s.

Habitat

Common Gallinules breed in a variety of freshwater wetlands, usually containing a dense mix of emergent (e.g., *Typha, Sagittaria*) and floating (e.g., *Nymphaea*) plants (Bannor and Kiviat 2002). They may also use altered or artificial wetlands such as sewage lagoons and farm ponds.

NH Wildlife Action Plan Habitats

- Marsh and Shrub Wetlands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Declining across most of its range in the U.S., and probably extirpated in New Hampshire.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES
- Marsh and shrub wetlands
- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

No information

Habitat Management Status

Habitat management has not been implemented for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation from the succession of artificial wetlands (Threat Rank: Medium)

Some of the more recent sites for gallinules in southern NH have been in artificial wetlands such as unused ponds at wastewater treatment plants or reclaimed borrow pits. While such sites can provide suitable habitat for a number of years, unless vegetation is actively managed they eventually become overgrown to the point that they are no longer quality habitat. Because such sites lack dams or hydrological connections to other wetlands, controlling increased vegetation by regulating water levels is not possible, and the only other alternative – mechanical disturbance – is but expensive and potentially damaging.

Habitat degradation and species impacts from introduced or invasive plants (Threat Rank: Medium)

There are limited data on specific responses by gallinules to invasive plants (see Whitt et al. 1999).

List of Lower Ranking Threats:

Habitat conversion and mortality from drawdowns or removal of dams

Habitat degradation from removal or management of vegetation

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Marshbird Monitoring

Objective:

Assess population status of secretive marshbirds

General Strategy:

Although Common Gallinules are too scarce in New Hampshire to warrant any species-specific inventory or monitoring projects, birders frequenting appropriate habitat should be familiar with its calls and report it if found. In addition, any broad wetland bird monitoring project should include this species, and should ensure that observers can identify it.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

NH distribution data from NHBR/NH eBird

Data Quality

Many of the wetlands where Common Gallinules have been recorded in recent decades are not regularly surveyed, and the species may persist undetected.

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Pamela Hunt, NHA

2005 Authors:

Kim Tuttle, NHFG

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Common Loon

Gavia immer

Federal Listing	N/A
State Listing	T
Global Rank	G5
State Rank	S2
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Common loons are an iconic bird on the lakes of NH. Common Loons have declined or are absent from much of their historical breeding range in North America. Between 1978 and 2014, Loon Preservation Committee (LPC) activities promoted increases in numbers of territorial loon pairs, nesting pairs, successful nests, and fledged young. However, monitoring also revealed a significant variability in loon reproductive success from 1982 on. Negative trends in loon breeding success have resulted in more than 5 years of serious declines in successfully reproducing pairs on the largest lakes in NH, while other lakes are successfully raising chicks to fledging. In addition, there are more pairs on smaller lakes. In the last 10 years, territorial pairs increased from 204 pairs to 289 pairs, and the number of chicks fledging increased from 112 to 154. However, productivity on the three biggest lakes, Squam, Umbagog and Winnipesaukee, and in the eastern Lakes Region remain low, with an exception of 2014, where reproductive success was up (all population data is LPC unpublished data). The reproductive rate, expressed as # chicks surviving until August per territorial pair, remains above the .48 level required for a sustainable population on all but the largest lakes, however it has declined in some regions (LPC unpublished data of 5 year averages). The overall reproductive success rate for the past 5 years (2009-2014) is just above the minimum rate. The limited dispersal, low population densities, and low reproductive potential of loons mean that increasing population size is a slow process. Intensive management by LPC has been important in allowing this to happen. However, recent increases in the intensity of managed sites have not increased the rate of population increase, and needs to be evaluated. As a species with delayed breeding, low fecundity and naturally low adult mortality, loon populations are particularly susceptible to stressors impacting adult survival; even small declines in adult loon survival rates impact loon population fitness (Grear et al. 2009). Anthropogenic mortality has averaged 1.5% of New Hampshire's adult loon population per year over the most recent ten years of data (2004-2013).

Distribution

Loons are widely distributed in freshwater lakes and large rivers in New Hampshire north and south of the White Mountains. Populations are less dense in western parts of Sullivan and Cheshire counties, as well as in Hillsborough county and eastern parts of Strafford and Rockingham counties.

Migration occurs on a wide front throughout New Hampshire, and fall migration is more protracted than spring arrival (Evers 2004). Staging primarily occurs on larger lakes, such as Lake Winnipesaukee, Squam Lake, Lake Sunapee, and Newfound Lake (LPC, unpublished data) before migration to the ocean. Loons from New England winter off the Atlantic coast from Maine south along coastal Massachusetts into Long Island Sound (LPC, unpublished data, BioDiversity Research Institute, unpublished data).

Habitat

Breeding and Nesting Habitat: Loons nest on lakes greater than 6.5 ha (16 ac) but prefer lakes smaller than 24 ha (60 ac) with clear water, small islands, and an irregular shoreline that creates coves. They are also found on major rivers. Lake size and configuration are important determinates for loon density.

Loons nest in close proximity to the water's edge and prefer the lee side of small islands, floating bog mats, and hummocks in marshes (Christenson 1981, Titus and VanDruff 1981, Yonge 1981, Dahmer 1986). Islands can provide the widest range of visibility for loons on the territory and afford better protection from mammalian predators. Marsh and mainland sites are less preferred and are most likely used in response to shoreline development (Alvo 1981, Christenson 1981, McIntyre 1988) and high conspecific densities.

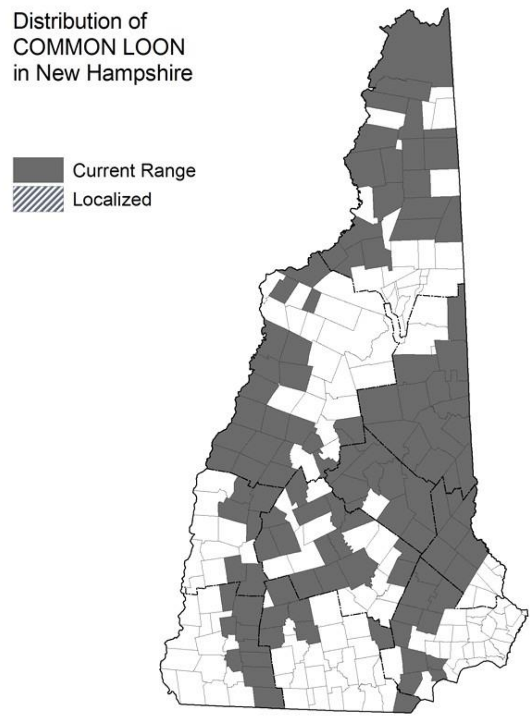
Nest sites generally are within 1 m from the shoreline (Sutcliffe 1980). Available submerged and emergent vegetation is used for nest structures. Extent of the nest bowl diameter varies (27 to 38 cm), and use of depressions, or "scrape" bowls is common (Sutcliffe 1980, Loon Preservation Committee (LPC), unpublished data). Mainland nest sites are more likely to be structures as opposed to scrapes or hummocks (Sutcliffe 1980). Some loons use sites with steep drop-offs that allow for underwater approaches and exits (Olson and Marshall 1952, Christenson 1981, McIntyre 1988), though this is not a predictor of site location (Sutcliffe 1980, Valley 1987). Strong (1987) found between-year reuse of nest sites by Common Loons to be 78-88%. Changes in nest locations were more frequent after nest failures and reuse in subsequent years occurred more often after successful nests (McIntyre 1988).

Chick Rearing Habitat: Chick rearing areas are typically in shallow water close to shore, having prey size classes suitable for feeding young, and experience less prevailing wind and waves that can separate chicks from adults. Chicks have been observed to hide among shoreline vegetation in response to threats or when left unattended (Yonge 1981, Strong and Bissonette 1987).

Winter Habitat: Near-shore coastal waters including bays, channels and inlets serve as winter habitat. Wintering loons generally use more placid waters less than 20 m in depth within 100 km from shore (Haney 1990, Jodice 1992). Band recoveries show NH loons overwinter along the coast from the east end of Long Island Sound to the mid-Maine coast, and that at least some return to the same overwintering area each year (LPC unpublished data).

NH Wildlife Action Plan Habitats

- Lakes and Ponds with Coldwater Habitat
- Warmwater Lakes and Ponds
- Large Warmwater Rivers
- Warmwater Rivers and Streams



Distribution Map

Current Species and Habitat Condition in New Hampshire

In the past 10 years, the populations of loons in all regions of the state have increased except for the Monadnock Region, and lakes Umbagog and Squam. However, the number of chicks fledged in each region has declined in all large lakes (Umbagog, Squam Massabesic and Winnipesaukee) and the Monadnock region. Even worse, based on a 5 year average, reproductive success has declined in all regions except Sunapee. And the success rate, expressed as chicks surviving into August per territorial pair, declined below the sustainable rate of .48 in all the large lakes and the North Country. The other regions still have healthy success rates.

Population Management Status

Populations are managed through a variety of activities to enhance nesting success. Artificial floating nesting platforms are floated to provide safer nesting locations on lakes and ponds that are controlled by dams, and where the water level thus fluctuates more than on natural lakes and ponds. Nest sites and sometimes chick brooding areas are marked with signs, and sometimes roped off, to reduce the impact of humans in boats. LPC has more than doubled the numbers of both techniques used. More chicks are hatched from managed sites however overall nesting success rate has declined. These techniques need to be reevaluated.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Loons are more likely to nest on lakes that are clear (lower phosphorus and sediment), include islands, are located at higher elevations, have lower road densities and are further away from human population centers and are near lakes that also have loons nesting (Kuhn et al 2011). New Hampshire has many lakes that fit these criteria, although road density and development has increased around many lakes over the last 30 years. There are slight differences in preferences in the three loon subpopulations (White Mountains and north, eastern and western south of the White Mountains) (Kuhn 2011). Loons are successfully nesting on a greater number of lakes each year, so there is still good quality habitat for loons. Protection of suitable sites is still critical.

Habitat Protection Status

The Comprehensive Shoreland Protection Act RSA 483-B was created in 1994 to protect against activities affecting water quality by setting minimum standards and requirements for the use of land within 250 feet of the water's edge. This law was revised and renamed in in 2008 (Shoreland Water Quality Protection Act) and removed some of the protections in the earlier law, particularly as regards to natural vegetation removal. Loon nests on protected shoreline remain vulnerable to development along the shoreline, docks and recreational use of public waters. There are few nests that are protected by fee ownership or easement.

Habitat Management Status

Some lakes with hydroelectric dams that are licensed by FERC have restrictions on water level changes during the nesting season. LPC has worked with the NH Dams Bureau and some private dam operators to voluntarily keep water levels stable during the nesting season. As described under population management, artificial floating nesting platforms are used to enhance nesting habitat.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality from lead toxicity from ingesting ammunition and tackle (Threat Rank: High)

Lead poisoning from ingested lead fishing tackle is by far the leading cause of adult loon mortality on New Hampshire lakes, accounting for 45% of collected adult loon mortalities from 1989-2013 (LPC, unpublished data). As a K-selected species, loon populations are particularly susceptible to stressors impacting adult survival; even small declines in adult loon survival rates negatively impact loon population fitness (Grear et al. 2009). Ingested lead fishing tackle is known to have caused the death of an average of at least 1.1% of the total New Hampshire adult loon population from 1989-2013, which exceeds the maximum sustainable level of all human-caused mortalities for related threatened species with similar life history characteristics (Dillingham and Fletcher 2008). Mortality from lead fishing tackle is the greatest quantifiable threat negatively impacting New Hampshire's loon population (LPC, unpublished data). There is no effective treatment for lead poisoning in loons unless the tackle can be flushed out prior to the lead being absorbed into the bloodstream, but lead poisoning is difficult to detect in loons prior to absorption. The ingestion of a single lead sinker or jig can be fatal in loons within 2-4 weeks (M. Pokras, pers. comm.).

The majority of ingested lead tackle in lead-poisoned loons in New Hampshire results from current fishing activity (LPC, unpublished data), in which loons ingest a fish with attached tackle or by striking at tackle or a fish being retrieved through the water. As such, cessation of the use of lead fishing tackle would have immediate benefits to New Hampshire's loon population. In 2000, legislation took effect in New Hampshire to restrict the use in lakes and ponds of lead sinkers weighing one ounce or less and lead-headed jigs measuring less than one inch in total length (including the hook). Subsequent legislation to restrict the use of these tackle in all freshwater in New Hampshire took effect in 2005, and the sale of these tackle was restricted beginning in 2006. Although the rate of lead fishing tackle mortalities in New Hampshire loons fell slightly subsequent to these restrictions (LPC, unpublished data), this reduction was not large enough to protect the loon population; and the majority of the loons that had ingested lead tackle subsequent to 2000 died of ingested lead jigs longer than 1 inch (LPC, unpublished data). In 2013, legislation was passed restricting the sale and use of jigs weighing one ounce or less. This law takes effect June 1, 2016.

Habitat degradation from late-season large storm floods that impacts nests (Threat Rank: Medium)

Loons nest in close proximity to the water's edge and prefer the lee side of small islands, floating bog mats, and hummocks in marshes (Christenson 1981, Titus and VanDruff 1981, Yonge 1981, Dahmer 1986). The nests, situated 6-12 inches above the water surface, are subject to flooding due to water fluctuations (Younge 1981). Increased storms in the late spring and early summer, when loons nest, can flood existing nests. In addition, and early drought which lowers lake levels in the spring, flowed by early summer rains can also flood nests (LPC unpublished data). Although loons can renest, they do not always do so, resulting in overall lowered reproductive success in the population.

Mortality from motorboats that hit adults and chicks and mortality and disturbance from non-motorized boats. (Threat Rank: Medium)

Non-motorized watercrafts, such as canoes and kayaks, have access to shallow water near loon nesting and brood sites, which can lead to nest abandonment. Additionally, canoeists and kayakers are more apt to use remote areas and have a greater ability for stealth. This type of activity is most detrimental during early incubation when egg investment is lowest and the likelihood of nest abandonment is highest. Disturbance from sailboats and windsurfing has not been quantified. Anecdotal and behavioral evidence suggests a sail can be perceived as a visual threat, and therefore has the potential to disrupt nesting and brooding activity, even in areas of high recreational use (LPC, unpublished data).

Loons can habituate to moderate use of motorboats. Recreational motor boating represents a greater disturbance and risk to loon adults and young in open water than to those nesting and foraging in shallow water. Habituation to boating activity can dull response times in loons, making them more susceptible to collisions (LPC, unpublished data). Personal watercraft can cause significant damage since they have a shallow draft and are able to closely approach nests and shorelines at high speeds. Repeated travel of personal watercraft near nest sites or loon families for extended periods of time can disrupt incubation, expose eggs to predators, or impede parental care of young (Burger 1998).

Excessive angler use of shallow, vegetated areas of lakes through wading and boating can disturb nesting and foraging activity (Titus 1978, Titus and VanDruff 1981, Christenson 1981, Kelly 1992). The increased popularity of fishing tournaments offering substantial prizes can create an unfortunate incentive for improper practices. In New Hampshire and Maine, vulnerable nesting pairs are vigorously monitored during bass tournaments, as a few participants disregard posted and cordoned-off nest exclosures (LPC, unpublished data.).

Species impacts (reduced fitness) from mercury toxicity (Threat Rank: Medium)

Mercury is a result of anthropogenic sources such as municipal and medical waste incinerators and coal-fired power plants (Swain et al. 1992, USEPA 1997, NESCAUM 1998). Mercury is a highly mobile contaminant with the ability to cycle through land, air, and water. One of its organic forms, methylmercury, bioaccumulates in upper trophic level wildlife, including loons and other piscivorous birds (see Meyer et al. 1995, Evers et al. 1998, 2003, 2005).

Mercury deposition models developed by the USEPA (1997) indicate the northeastern United States to be at particular risk to elevated levels of mercury deposition. Nearly fifty percent of this deposition is from sources within the region. One of the highest exposure areas predicted in these models is the southeastern corner of New Hampshire.

Concentrations of mercury in loon eggs and in adult loons, and the accumulation of mercury in individual loons over time, suggest that current levels of mercury emissions are high enough to pose a threat to loons and other wildlife in New Hampshire. Ever et al (2008) determined that loons with high mercury levels produced 19% fewer eggs and 41% fewer fledged chicks. Nesting loons spent less time incubating (as low as 86% versus a norm of 99%) and showed lethargic behavior including less foraging.

The Common Loon has been nationally identified by a USEPA-led working group as one of the best indicators of persistent bioaccumulative toxins, including mercury, in lakes (Wolfe et al. 2004, Evers et al. 2005).

List of Lower Ranking Threats:

Species impacts (reduced fitness) and mortality from entanglement in monofilament fishing line

Mortality and impacts (reduced fitness) from emerging diseases

Species impacts from persistent organic pollutants that reduce reproduction (egg failure)

Mortality and impacts (reduced fitness) from oil

Species impacts (reduced fitness) from nutrient run-off that causes reduction in water quality

Species impacts from acidity that causes a reduction in prey

Habitat degradation from shoreline development that impacts nesting (including docks)

Actions to benefit this Species or Habitat in NH

Strengthen shoreline protections

Primary Threat Addressed: Habitat degradation from shoreline development that impacts nesting (including docks)

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:
Strengthen shoreline protections to prevent degradation of natural shoreline vegetation in developed and undeveloped areas, control development, and protect existing shoreline nesting habitat.

General Strategy:
Work with DES to strengthen the rules protecting shorelines to include stricter regulations on docks and boat houses and any other alteration of shore habitat. Target land protection on known nest sites and high value habitat.

Political Location:

Watershed Location:

Manage water level fluctuations above dams.

Primary Threat Addressed: Habitat degradation from late-season large storm floods that impacts nests

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:
Work with dam operators to hold water levels stable during the loon nesting season.

General Strategy:
Work with DES Dams Bureau to address water level fluctuations on state-owned dams. Work with private landowners to have them voluntarily keep water levels constant during the loon nesting season.

Political Location:

Watershed Location:

Educate all lake users on loon behavior and sensitivity to disturbance.

Primary Threat Addressed: Mortality from motorboats that hit adults and chicks and mortality and disturbance from non-motorized boats.

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Educate both paddlers and motor boat users on the sensitive of loons to nest disturbance, the vulnerability of chicks and the rules regarding loon harassment.

General Strategy:
Provide information on websites and kiosks on the effects of disturbances by boaters on loons. Add language to websites that promote tourism including loon watching on these effects. Work with Marine Patrol and NHFG law enforcement to address issues as they are reported.

Political Location: **Watershed Location:**

Expand education on the ban of lead fishing tackle

Primary Threat Addressed: Mortality from lead toxicity from ingesting ammunition and tackle

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:
Continue to work together with agencies including NHFG and Marine Patrol, lake associations, LPC, other NGOs and angler groups to education anglers about the laws and voluntary recommendations on using lead-free tackle.

General Strategy:
Develop language for pages on websites hosted by all groups that promote the use of lead free tackle, addressing both regulatory requirement and voluntary additional practices. Develop posters or brochures for kiosks, tackle shops, etc. that promote the use of lead-free tackle. Include the risks of entanglement in fishing tackle in these efforts.

Political Location: **Watershed Location:**

Increase enforcement efforts to reduce use of banned lead fishing tackle

Primary Threat Addressed: Mortality from lead toxicity from ingesting ammunition and tackle

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:
Work with NHFG Law Enforcement to assist them in enforcement issues.

General Strategy:
Work with NHFG Law Enforcement to assist them in enforcement issues. Develop easy method to identify lead tackle versus non-lead tackle in the field.

Political Location: **Watershed Location:**

Monitor loon populations

Objective:
Continue efforts to monitor the loon population.

General Strategy:
Continue monitoring loon nesting success and consider the development of protocols to monitor loon nesting through a sampling effort. Use this data to understand the changes in populations over time.

Political Location: **Watershed Location:**

Conduct research into the causes of declines in loon populations on larger lakes.

Objective:
Conduct research into the causes of declines in loon populations on larger lakes to find ways to mitigate the issues causing these declines.

General Strategy:
Research causes such as disturbance, shoreline alteration, toxins, forage quantity and quality, interspecies interaction, and other possibilities. Develop actions to address causes as they are discovered

Political Location: **Watershed Location:**

Review use of rafts, ropes and signs for nest protection

Objective:
Review use of rafts, ropes and signs for nest protection to ensure these management tools are being used most efficiently and effectively

General Strategy:
Review nesting success data on use of artificial nesting rafts including looking at the success of natural nests that have been replaced by rafts, looking at chicks surviving instead of only chick hatched from rafts, and identifying where nest rafts might be encouraging nesting in areas subject to higher nest and/or chick disturbance. Develop decision trees to be used in floating rafts in new locations. Consider the same information in assessing the use of ropes and signs or signs alone.

Political Location: **Watershed Location:**

References, Data Sources and Authors

Data Sources
Information on Common Loon habitat, population distribution, and status is from LPC's database and technical field reports, the Status and Assessment Plan for Common Loons in North America (Evers 2004), and peer-reviewed journals.
Information on habitat patch protection status was obtained from NHDES. Data on rafts, water-level management, and signs were derived from LPC's database.

Data Quality

The Common Loon is one of the most intensively monitored and managed species in New Hampshire. Statewide surveys have been conducted annually by LPC since 1976. Loons are also well studied throughout their range.

2015 Authors:

Emily Preston, NHFG

2005 Authors:

Harry Vogel and Kate Taylor, Loon Preservation Committee

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Purple Finch

Haemorhous purpureus

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S5
Regional Status	

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

The Purple Finch is one of several still-common forest birds that are experiencing significant population declines across much of their ranges, and as a result is considered a Regional SGCN in the Northeastern United States (USFWS Region 50. It is also on the Partners in Flight Watch. Populations in New Hampshire have declined at -2.96%/year since 1966, and 3.03%/year since 2003. Long term declines are greater in the south: -6.28%/year in BCR 30 vs. -1.51%/year in BCR 30.

Distribution

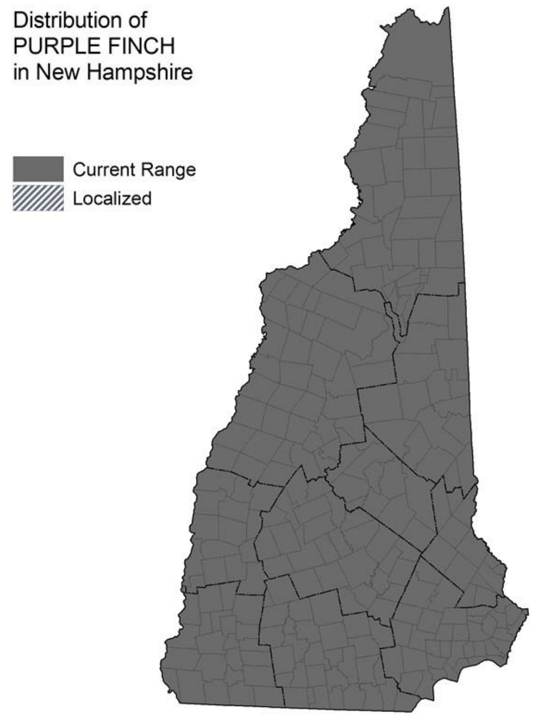
The Purple Finch breeds from the Yukon Territory south in the Pacific mountain ranges to southern California, and southeast across Canada to West Virginia, New England, and Newfoundland (Wootton 1996). It winters from southern British Columbia south through the western breeding range, and east of the Great Plains from southern Manitoba to the Gulf of Mexico. Because of irruptive tendencies, numbers in the eastern winter range can show extensive latitudinal variation from year to year. Breeds statewide in New Hampshire, but uncommon at lower elevations in the southern counties, particularly near the coast (Foss 1994).

Habitat

The Purple Finch uses a wide range of forest types, including those of an anthropogenic nature such as orchards, conifer plantations, and suburban yards (Wootton 1996). Densities are probably highest in more northern forest types with significant conifer components.

NH Wildlife Action Plan Habitats

- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Developed Habitats
- Floodplain Habitats
- High Elevation Spruce-Fir Forest
- Lowland Spruce-Fir Forest
- Northern Hardwood-Conifer Forest
- Northern Swamps



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Many forest birds are area sensitive (e.g., Zuckerberg and Porter 2010) and less likely to occupy habitat patches in landscapes with less forest cover. See the forest habitat profiles for more information.

Habitat conversion and fragmentation from tower and turbine development (Threat Rank: Medium)

Towers and turbines and their supporting infrastructure result in both the direct loss of habitat and fragmentation of adjacent non-cleared forest. Both these impacts can affect forest birds as discussed elsewhere. See the forest habitat profiles for more information.

Habitat conversion and degradation from timber harvest (Threat Rank: Medium)

To the extent that timber harvest can remove mature forest from the landscape, its short-term effects can be similar to those of residential or commercial development for forest birds. At the same time, if regenerating forest contains a different species composition its suitability for specific forest birds could either increase or decrease.

Habitat degradation from insect pests (introduced species) (Threat Rank: Medium)

To the extent that insect pests can alter forest species composition, they may have trickle down effects on the bird that use these habitats, although detailed studies of these effects have yet to be carried out. See the forest habitat profiles for more information.

List of Lower Ranking Threats:

Disturbance from noise associated with recreational activity

Habitat impacts from road fragmentation

Habitat degradation from habitat shifting and changes in species composition

Actions to benefit this Species or Habitat in NH

No actions identified, but see appropriate forest habitat profile(s) for actions that would likely benefit this species.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird.

Data Quality

Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

John Kanter, NHFG

Literature

Foss, C.R. 1994. Atlas of Breeding Birds in New Hampshire. New Hampshire Audubon, Concord, NH.

Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version

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Zuckerberg, B. and W.F. Porter. 2010. Thresholds in the long-term responses of breeding birds to forest cover and fragmentation. Biological Conservation 143: 952–962.

Bald Eagle

Haliaetus leucocephalus

Federal Listing	N/A
State Listing	T
Global Rank	G4
State Rank	S2
Regional Status	

Photo by Jason Lambert

Justification (Reason for Concern in NH)

Bald Eagle populations in the conterminous United States entered a severe population decline in the 1950s, largely a result of reproductive failure induced by biomagnification of the insecticide DDT (Buehler 2000). Some regional breeding populations, especially in eastern and southern states, became locally extirpated. This serious decline led to the designation of the bald eagle as Endangered under the Endangered Species Act. Following the banning of DDT and intensive reintroduction efforts, Bald Eagle populations gradually rebounded, and the species was removed from the federal endangered list in 2007. In the Northeast, recovery has been particularly strong since 2000. However, most states still consider Bald Eagle a SGCN due to historic extirpations and historic sensitivity to certain environmental stressors, particularly contaminants.

Distribution

Bald eagles currently occur and breed in all Lower 48 states and in Alaska. Based upon data provided by state agencies, from a population low of 417 breeding pairs in 1963 the U.S. Fish and Wildlife Service estimated that there were an estimated 1,500 breeding pairs in the contiguous 48 states in 1982 and an estimated 5,300 pairs in the same area in 1997 (derived from data in Buehler 2000), and nearly 9800 breeding pairs in the Lower 48 states in 2006. The USFWS estimated that there were 463 breeding pairs in the six New England states in 2006. The nationwide population has probably increased substantially since 2006, but more recently compiled information is not available from USFWS. Bald eagles were federally delisted in 2007. Post-delisting monitoring was implemented beginning in 2009, and consists of sampling sub-populations once every five years for 20 years (2009, 2014, 2019, 2024).

Wintering populations in the continental United States, which include thousands of individuals that breed in Canada, have shown similarly dramatic increases, from an estimated 13,800 individuals in 1982 to an estimated 26,100 individuals in 1997 (Buehler 2000). In the northeastern states, breeding bald eagle population recovery has been led by the states of Maine and New York, which supported 94% of the 459 territorial bald eagle pairs documented in the northeast in 2004. However, since federal delisting in 2007, it has become increasingly difficult to find reliable comprehensive summary data on bald eagle populations.

In New Hampshire in 2014, there were 41 breeding territories distributed widely across the state (figure 1), including in the Androscoggin, Connecticut, and Merrimack River watersheds. From 1988 through 2014, there was a total of 206 active nesting attempts documented in the state, 159 (77%) attempts were successful, resulting in 274 fledglings (1.33 young per active nest).

New Hampshire has participated in the national midwinter survey since 1981 (Steenhof 2002), surveying major wintering areas along the Androscoggin, Connecticut, and Merrimack rivers, as well as the state’s Lakes Region and Great Bay/Seacoast area, and other portions of the state where eagles winter in lesser numbers. The number of individual eagles documented in the midwinter survey has risen from an average of 8 individuals detected during the 1981 through 1984 surveys, to an average of greater than 43 individuals from 2001 through 2004 surveys, to nearly 79 individuals from 2011 to 2014.

Habitat

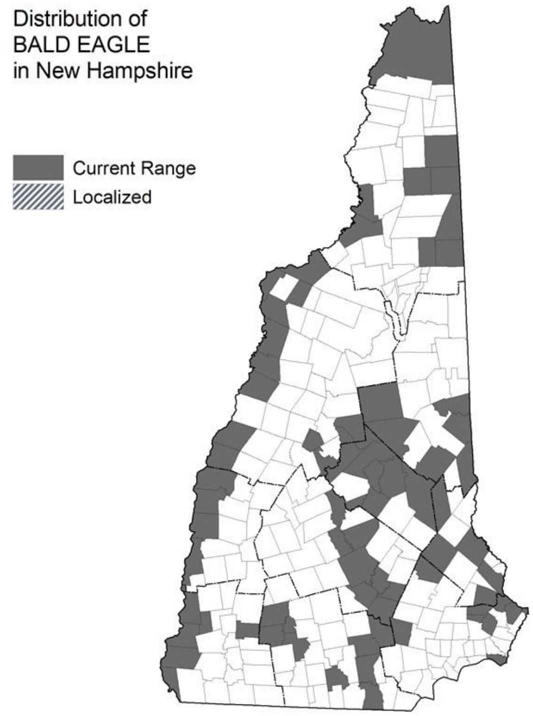
Bald Eagles breed in association with a wide range of aquatic habitats such as lakes, rivers, reservoirs, and coastal estuaries (Buehler 2000). Except for coastal Alaska and parts of northern Canada, where they nest on cliffs or on the ground, eagles nest primarily in forested areas, typically near large water bodies, in mature trees near forest edges, or in super-canopy trees within more uniform forest cover. Distances between nests and water bodies are variable, but are often less than two km. Proximity to foraging areas that harbor abundant, diverse, accessible prey may be a more important factor than actual distance from water. In 2014, 33 of 34 known bald eagle nest structures documented in New Hampshire were in white pines (97%), although cottonwoods or red oaks have also been used infrequently from 1988 to 2014.

During the non-breeding season, Bald Eagles are generally associated with open water, although as opportunistic foragers they will also occur far from water if sufficient food (e.g., carrion) is available. Other important habitat features in the winter include suitable roost sites, where several eagles may congregate in areas with good thermal cover and protection from disturbance.

Populations in different parts of their continent-wide range exhibit variable migratory behaviors, depending on age, breeding status, geographic location of breeding area, and year-round availability of food sources. While territorial on their breeding sites, eagles frequently assemble in higher densities on preferred wintering areas. Such places offer a combination of readily available food and roost sites with good thermal cover and protection from disturbance. Breeding adults from territories in interior Canada typically leave breeding areas for the winter months. Adults breeding in the northern United States often remain on or near breeding territories year-round, while juveniles and non-territorial immatures tend to migrate away from natal areas.

NH Wildlife Action Plan Habitats

- Large Warmwater Rivers
- Warmwater Rivers and Streams
- Appalachian Oak Pine Forest
- Coldwater Rivers and Streams
- Floodplain Habitats
- Hemlock Hardwood Pine Forest
- High Elevation Spruce-Fir Forest
- Lowland Spruce-Fir Forest
- Marsh and Shrub Wetlands
- Northern Hardwood-Conifer Forest
- Warmwater Lakes and Ponds



Distribution Map

Current Species and Habitat Condition in New Hampshire

From a single pair at Lake Umbagog from 1988 to 1997, New Hampshire's breeding Bald Eagle population has grown considerably, doubling every five years. As of 2014, there were at least 41 breeding territories in the state, up from ten in 2005. The number of eagles wintering in the state (based on a mid-January survey) has increased threefold in the same time period – from 32 in 2005 to 90 in 2015 (NH Mid-winter Bald Eagle Survey data, http://gis.nacse.org/eagles/). Statewide bald eagle productivity has improved from 11 young fledged in 2005 to 41 young fledged in 2014. Productivity per active nest increased from 1.05 young/year over the period 1988-2004 to 1.44 young/year in 2005-2014.

Bioaccumulation of chemical contaminants is a major concern in high trophic-level predators, such as bald eagles (Dominguez et al. 2003, Evers 2005, Welch 1994). Cooperative studies have assessed mercury levels in northern New England's bald eagle nestlings (DeSorbo et al. 2009). These studies have found mercury present in low to moderate levels in most nestling eagles.

Population Management Status

Ongoing management strategies for bald eagles in New Hampshire fall into 4 main categories:

(1) Locate territorial pairs
In collaboration with NHFG, NHA biologists solicit and evaluate public reports of bald eagles in areas of potential breeding habitat and follow up with field surveys to identify occupied territories.

(2) Monitor and manage nesting attempts and wintering areas
Nesting attempts are monitored by trained volunteers observers and NHA staff biologists. NHA staff installed sheet metal predator guards around the bases of nest trees to deter tree-climbing mammalian nest predators and increase nesting success. NHA staff and trained volunteers monitor numbers and distribution of bald eagles in winter foraging and roosting areas through participation in the national Mid-winter Bald Eagle Survey coordinated by USGS.

(3) Manage human activity at breeding and wintering sites
In collaboration with NHFG, NHA biologists evaluated potential negative impacts of human recreation on nesting sites and implemented temporary closures when appropriate. In situations where the volume of boating or pedestrian activity threatens to jeopardize the nesting attempt, land-based or floating signs have been placed to create a buffer zone around the nest area. The NHA staff assists NHFG personnel with implementation of appropriate closures and landowner outreach strategies at important winter roost sites.

(4) Public outreach and education
Disseminating information on the goals, objectives, and status of bald eagle conservation efforts in New Hampshire has occurred in a variety of ways and has involved many different target audiences. Extensive efforts are made to educate the public on accurate identification and reporting of bald eagles. Articles and media news releases on the state's bald eagle recovery efforts and opportunities for direct public volunteer involvement appear frequently in print and electronic media. NHA staff offers public lectures to encourage effective public participation in bald eagle conservation. Outreach to landowners, developers, and others concerning bald eagle habitat needs are ongoing and essential.

Regulatory Protection (for explanations, see Appendix I)

- CITES - Convention on International Trade of Endangered Species of Wild Fauna and Flora
- Federal Endangered Species Act
- Bald and Golden Eagle Protection Act
- Federal Insecticide/Fungicide/Rodenticide Act
- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

The bald eagle population in New Hampshire is increasing vigorously and habitat in the state is sufficient to support a healthy, expanding population. Large lakes, reservoirs, and ice-free areas below dams will likely support additional breeding pairs over the coming decade. Bald eagles are generalist feeders; in addition to fish, they feed on aquatic mammals, waterfowl and gulls, and often carrion. Suitable nesting substrate does not appear to be a limiting factor. The greatest ongoing habitat quality concerns include the following:

• Additional shoreline development on rivers and large lakes, especially in the Merrimack River watershed and Lakes Region areas
• Increasing use of powerful motorized watercraft and growing popularity of kayaks and canoes, especially in the lakes Region and in the Androscoggin River watershed
• Growing pedestrian use in the winter months near wintering sites along the Merrimack River and in

the Lakes Region.
• Increasing concerns about mercury and other contaminants, especially in the Merrimack River watershed and in the Great Bay/Seacoast area

Habitat Protection Status

Of 36 bald eagle nest sites known in 2014, 9 (25%) were located on public lands while the other 27 (75%) were located on private lands. Only a few of the sites on private land were subject to formal conservation easements. Few of the state's winter roost sites are on protected land.

Habitat Management Status

Nest sites on public land are managed in a manner that promotes "no activity" buffer zones around nest trees. Nest sites on private land are subject to landowner decisions, but outreach and education with landowners has usually resulted in land use practices that benefit eagles. Formal management of winter roost areas has been a great challenge because so few sites are on protected land.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality and disturbance from lead toxicity from ingesting ammunition and tackle (Threat Rank: High)

Eagles can ingest lead in the course of scavenging fish and wildlife carcasses that contain lead tackle (e.g., sinkers) or ammunition. Lead is a potent neurotoxin than generally results in the death of the animals that ingest it, and sub-lethal levels may cause physiological impairment. In a study of 127 New England Bald Eagle recovered as either dead or injured, 14% had lead concentrations indicative of poisoning (Mierzykowski et al. 2013).

Habitat conversion due to development of shoreline (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Removal of mature trees in particular will reduce habitat suitability for Bald Eagles.

Mortality of individuals from vehicles on roadways (Threat Rank: Medium)

Eagles are occasionally attracted to road kills, where they run the risk or being hit by vehicles. In the last decade, several eagles with such injuries have been brought to rehabilitators in New Hampshire.

Mortality related to intentional or unintentional shooting and trapping (Threat Rank: Medium)

Bald eagles are attracted to bait placed in traps for other species and are occasionally caught and killed or injured. Anecdotal data in support of this threat include sightings of eagles with missing toes.

Mortality and disturbance due to secondary poisoning from consumption of baits or poisoned target organisms (Threat Rank: Medium)

Poisoned baits (e.g., carcasses) put out for Coyotes or other "nuisance" predators can be consumed by eagles, and this usually results in mortality.

Disturbance at nests and roosts resulting from land-based recreation (Threat Rank: Medium)

Increasing bald eagle population and growing outdoor recreation industry coupled with diminishing monitoring can increase exposure to this disturbance. Repetitive defense of nest, eggs, and young may reduce food provisioning, expose young to elements and predators, displace adults from primary nest locations. Note: add a note about water-based disturbance.

Mortality and disturbance from nest predation (Threat Rank: Medium)

Raccoons are the principal predators of eagle eggs and nestlings in NH, often because they are attracted to prey remains at the base of nest trees. In addition to direct mortality, predators can injure young birds.

Disturbance from persistent organic compounds (Threat Rank: Medium)

An emerging concern is presence of increasing levels of flame-retardant bromines in raptors and their prey, as demonstrated in 114 Peregrine Falcon eggs collected at New England nest sites from 1990-2006 (Chen et al. 2008). It is still unclear whether there is any reduction in productivity associated with increased levels of organic contaminants in prey species.

List of Lower Ranking Threats:

Mortality from oiling or ingesting oil after an oil spill

Disturbance from mercury toxicity

Disturbance from noise associated with recreational activity

Disturbance to nests by watercraft

Habitat degradation from removal of nest trees through forestry practices

Disturbance at nest during research activities

Disturbance from increased spring storms that impact reproduction

Actions to benefit this Species or Habitat in NH

Bald Eagle monitoring

Objective:

Continue to assess Bald Eagle recovery in New Hampshire.

General Strategy:
Future distribution and abundance of bald eagles in New Hampshire should be monitored by conducting spring breeding surveys of known and potential breeding habitat. Active breeding territories should be checked periodically to determine occupancy status and reproductive outcome, and surveys of potential breeding territories should be conducted on a rotating basis, with annual survey intensity determined by funding and human resources available. For example, sites could be checked on a biennial or triennial rotating basis, covering 50% or 33% of potential sites annually. New Hampshire should continue to participate in the national mid-winter bald eagle survey.

Political Location:
Statewide

Watershed Location:
Statewide

Contaminants Research

Objective:
Assess levels of known and emerging contaminants in Bald Eagles.

General Strategy:
Participate in collaborative regional sampling for contaminants as a means of assessing their overall prevalence in northeastern Bald Eagles. Includes taking tissue samples (eggs, blood, feathers) and having these analyzed for contaminant loads.

Political Location:
Statewide

Watershed Location:
Statewide

Predator guards

Primary Threat Addressed: Mortality and disturbance from nest predation

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

Objective:
Reduce predation risk at eagle nests.

General Strategy:
Install predator guards (e.g., metal flashing) at active Bald Eagle nests.

Political Location:
Statewide

Watershed Location:
Statewide

Eagle site management

Primary Threat Addressed: Disturbance at nests and roosts resulting from land-based recreation

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Minimize human disturbance at vulnerable Bald Eagle nest and roost sites.

General Strategy:
Some level of monitoring is required to identify locations where eagles are more vulnerable to human disturbance. At vulnerable sites work with landowners and law enforcement personnel to minimize disturbance through signage, outreach, trail relocation, or other means.

Political Location:
Statewide

Watershed Location:
Statewide

Reduce environmental lead availability

Primary Threat Addressed: Mortality and disturbance from lead toxicity from ingesting ammunition and tackle

Specific Threat (IUCN Threat Levels): Biological resource use

Objective:
Minimize future lead toxicosis in Bald Eagles.

General Strategy:
Support educational and action initiatives to remove lead items from use as fishing tackle and hunting ammunition. This has largely occurred with respect to fishing tackle in New Hampshire, but more work is needed on alternatives to lead ammunition.

Political Location:
National, Northeast, Statewide

Watershed Location:
Statewide

Increased shoreline protection

Primary Threat Addressed: Habitat conversion due to development of shoreline

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:
Reduce the extent to which future shoreline development impacts Bald Eagle habitat.

General Strategy:
Strengthen zoning and land use policies that govern shoreline development, and encourage land conservation initiatives for shoreland areas.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

General natural history information and some sources of original research discussed in this document were obtained primarily from The Birds of North America, No. 506: Bald Eagle (Buehler 2000)). Unless otherwise noted, the source for New Hampshire specific data is field monitoring and management activities conducted by NHA from 1983 to 2004 under annual contracts and/or grants received from the NHFG and/or the USFWS (see Martin 2004a, Martin 2004b, and prior annual reports).
Unless otherwise noted, the source for New Hampshire specific data is field monitoring and management activities conducted by NHA from 1983 to 2015 under annual contracts and/or grants received from the NHFG and/or the USFWS, as well as private funding.

Data Quality

Since the early 1980s, the bald eagle has been one of the most intensively monitored and managed species in New Hampshire. Breeding site data are derived from field monitoring conducted for nearly 2 decades by NHA staff and trained volunteer observers, who employed standardized monitoring techniques to determine nest occupancy and productivity, as well as locations and numbers of individuals present within the state's 5 major wintering areas (Deming 2004, Deming and Martin 2004, Martin 2004b).

Since the early 1980s, the bald eagle has been one of the most intensively monitored and managed species in New Hampshire. Breeding site data are derived from field monitoring conducted for nearly 2 decades by NHA staff and trained volunteer observers, who employed standardized monitoring techniques to determine nest occupancy and productivity, as well as locations and numbers of individuals present within the state's 5 major wintering areas.

2015 Authors:

Pamela Hunt, NHA, Christian Martin, NHA

2005 Authors:

Literature

Buehler, D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In The Birds of North America, No. 683 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, Pennsylvania, USA.

Chen, D., M. J. LaGuardia, E. Harvey, M. Amaral, K. Wohlfort, and R. C. Hale. 2008. Polybrominated diphenyl ethers in peregrine falcon (*Falco peregrinus*) eggs from the northeastern U.S. Environmental Science and Technology 42:7594-7600.

DeSorbo, C. R., C.S. Todd, S.E. Mierzykowski, D.C. Evers, and W. Hanson. 2009. Assessment of mercury in Maine's interior bald eagle population. Peer-reviewed unpublished USFWS. Spec. Proj. Report FY07-MEFO-3-EC. Maine Field Office. Old Town, ME. 42 pp.

Mierzykowski, S.E., C.S. Todd, M.A. Pokras and R.D. Oliveira. 2013. Lead and mercury levels in livers of bald eagles recovered in New England. USFWS. Spec. Proj. Rep. FY13 - MEFO - 2 - EC. Maine Field Office. Orono, ME. 26 pp.

Wood Thrush

Hylocichla mustelina

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S5
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

The Wood Thrush is one of several still-common forest birds that are experiencing significant population declines across much of their ranges, and as a result is considered a Regional SGCN in the Northeastern United States (USFWS Region 50). It is also on the Partners in Flight Watch List and the focus of a working group dedicated to range-wide and full life cycle conservation of the species. Populations in New Hampshire have declined at 4.77%/year since 1966, and 4.88%/year since 2003. Long term trends are similar in BCR 14 (-4.66%/year) and BCR 30 (-2.85%/year).

Distribution

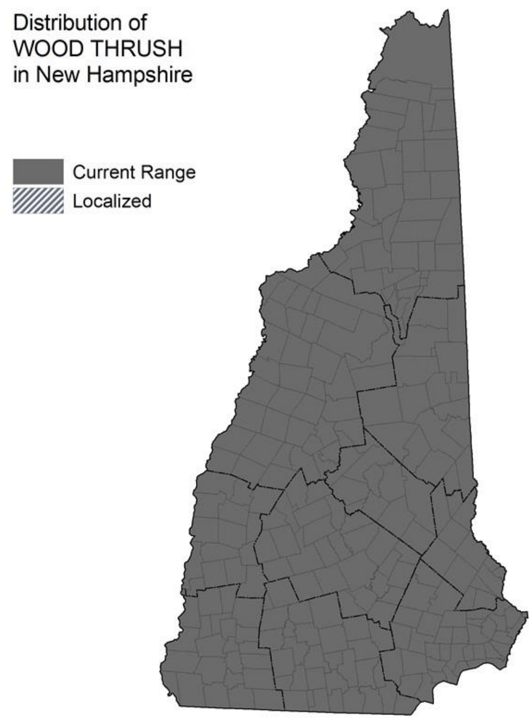
The Wood Thrush breeds east of the Great Plans from southern Canada to northern Florida, and winters in Middle America from southern Mexico through Costa Rica (Evans et al. 2011). In New Hampshire they occur statewide, but are less common north of the White Mountains and absent from higher elevations (Foss 1994).

Habitat

The Wood Thrush uses a wide range of hardwood and mixed forests with mesic soils and well-developed shrub and sub canopy layers. In some parts of its range the species is considered area sensitive, and often experiences reduced reproductive success in smaller forest fragments (Evans et al. 2011).

NH Wildlife Action Plan Habitats

- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Floodplain Habitats
- Northern Hardwood-Conifer Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development on winter grounds (Threat Rank: Medium)

Annual rates of forest loss in some Central American countries are greater than 1%, and winter habitat loss has been proposed as a potentially limiting factor for Wood Thrush populations (Rappole and MacDonald 1994). There is also increasing evidence that habitat quality on the winter grounds can have a significant effect on the population dynamics of migratory birds (Norris et al. 2004), even if habitat is not lost outright to development or agriculture.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Many forest birds are area sensitive (e.g., Zuckerberg and Porter 2010) and less likely to occupy habitat patches in landscapes with less forest cover. See the forest habitat profiles for more information.

Habitat conversion and degradation from agriculture on winter grounds (Threat Rank: Medium)

Annual rates of forest loss in some Central American countries are greater than 1%, and winter habitat loss has been proposed as a potentially limiting factor for Wood Thrush populations (Rappole and MacDonald 1994). There is also increasing evidence that habitat quality on the winter grounds can have a significant effect on the population dynamics of migratory birds (Norris et al. 2004), even if habitat is not lost outright to development or agriculture.

Habitat conversion and fragmentation from tower and turbine development (Threat Rank: Medium)

Towers and turbines and their supporting infrastructure result in both the direct loss of habitat and fragmentation of adjacent non-cleared forest. Both these impacts can affect forest birds as discussed elsewhere. See the forest habitat profiles for more information.

Habitat conversion and degradation from timber harvest (Threat Rank: Medium)

To the extent that timber harvest can remove mature forest from the landscape, its short-term effects can be similar to those of residential or commercial development for forest birds. At the same time, if regenerating forest contains a different species composition its suitability for specific forest birds could either increase or decrease. Wood Thrushes seem to prefer mid-successional stages of hardwood forest, so most logging activity (at the scale it occurs in NH) is unlikely to significantly affect the species population in the state.

Habitat degradation from insect pests (introduced species) (Threat Rank: Medium)

To the extent that insect pests can alter forest species composition, they may have trickle down effects on the bird that use these habitats, although detailed studies of these effects have yet to be carried out. See the forest habitat profiles for more information.

Disturbance (parasitism) and mortality from subsidized or introduced predators (Threat Rank: Medium)

In fragmented forest systems, brood parasitism by the Brown-headed Cowbird (Molothrus ater) has been implicated in declining forest bird populations (Brittingham and Temple 1983), including Wood Thrush. Although the extent of such parasitism in New Hampshire is unknown, the state's extensive forest cover likely reduces the overall risk (c.f., Hoover and Brittingham 1993). Thrushes and their nests are also subject to predation by human commensals such as free-ranging cats, raccoons, and corvids.

Habitat impacts and disturbance from acid deposition that reduces availability of prey species (Threat Rank: Medium)

Although emissions controls have moderated the pH of precipitation in the northeastern United States, potential long-term effects on ecosystems are now known to include declines in terrestrial invertebrates that require calcium in their shells or exoskeletons. In turn, birds that prey upon such invertebrates may experience prey limitation or insufficient calcium intake, which can compromise reproductive success (Graveland 1998). With specific reference to the Wood Thrush, Hames, et al. (2002) determined that the probability of breeding was negatively correlated with the intensity of acid deposition across the species' range in the eastern United States, and that such a relationship could contribute to observed population declines.

List of Lower Ranking Threats:

Disturbance from noise associated with recreational activity

Habitat impacts from road fragmentation

Actions to benefit this Species or Habitat in NH

No actions identified, but see appropriate forest habitat profile(s) for actions that would likely benefit this species.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

Brittingham, M.C., and Temple, S.A. 1983. Have cowbirds caused forest songbirds to decline? BioScience 33: 31-35.

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Least Bittern

Ixobrychus exilis

Photo by Pamela Hunt

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S1
Regional Status	Very High

Justification (Reason for Concern in NH)

Secretive marsh birds like the Least Bittern have generally been considered conservation priorities because of known losses of wetland habitats, combined with often poor data on species' distribution, abundance, and trend. In the case of the Least Bittern, there are only a handful of potential breeding sites in New Hampshire, and some of these (plus a couple of historic sites) are in the more developed southeastern part of the state. Range-wide, Least Bittern populations appear stable (Sauer et al. 2014), although data are limited, and Breeding Bird Atlases in the Northeast did not document significant range retractions in most areas.

Distribution

Breeds locally across the eastern United States, primarily in the Mississippi Valley and along the Atlantic and Gulf coastal plains. The species is highly dispersed and local in the West, and patchily distributed in Mexico, Central America, and the Caribbean, and extends well south into South America (Poole et al. 2009). Northern populations withdraw to the southern U.S., Caribbean, and Central America in winter.

Least Bitterns have been recorded during the breeding season (conservatively June-July) at eight New Hampshire locations since 1990, as follows:
- Tuttle Swamp, Newmarket (1999)
- Stubb's Pond, Newington (1999-2001)
- Jewell Brook wetlands, Stratham (2006)
- Surrey Lane marsh, Durham (2006-2014)
- Lake Wantastiquet marshes, Hinsdale (2007-2013)
- North River Road, Epping (2009)
- Thompson Wildlife Sanctuary, Sandwich (2009)
- World End Pond, Salem (2014)

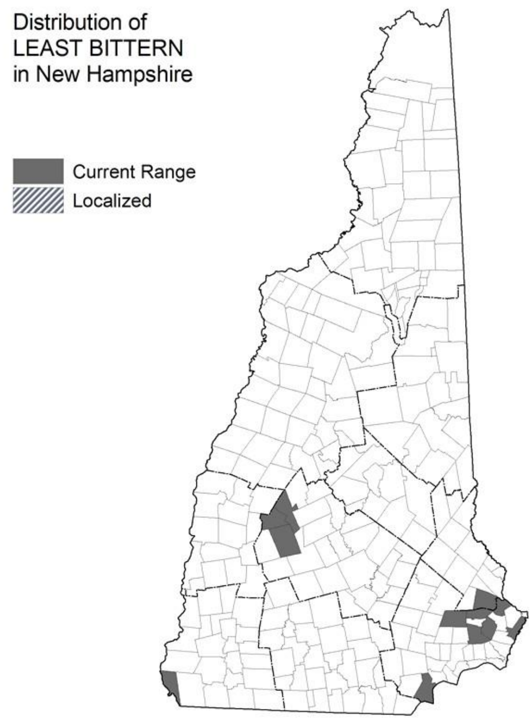
Of these, three are considered sites where the species is considered a probable or confirmed breeder. The sites in Hinsdale and Durham have had sightings over several years, with the former hosting up to three birds in 2007 and 2008. What appears to be the first confirmed breeding for the state was documented in 2014 at World End Pond, where observers discovered a nest and followed it to fledging. The other locations near the coastal plain can be considered possible nesting sites, although the inconsistency of use suggests breeding is rare at best.

Habitat

Carex, Sagittaria, etc.), often with scattered woody vegetation and patches of open water (Poole et al. 2009). Occasionally nests in brackish or salt marshes, but neither of these habitats has been used in New Hampshire.

NH Wildlife Action Plan Habitats

● Marsh and Shrub Wetlands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Although historic declines have been noted in the Northeast, recent Atlas data suggest only small declines in New York (McGowan and Corwin 2008) and small but stable distributions in Vermont and Massachusetts (Renfrew 2013, MassAudubon 2014).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Fill and Dredge in Wetlands - NHDES
● Marsh and shrub wetlands
● Comprehensive Shoreland Protection Act - NHDES
● Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

No information

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation and species impacts from introduced or invasive plants (Threat Rank: Medium)

There are limited data on specific responses by Least Bitterns to invasive plants (see Whitt et al. 1999), but such plants (e.g., purple loosestrife, Phragmites) are known to alter wetland plant community structure.

List of Lower Ranking Threats:

Habitat degradation from mercury deposition

Habitat conversion and mortality from drawdowns or removal of dams

Habitat degradation from removal or management of vegetation

Disturbance to nests by watercraft

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Marshbird Monitoring

Objective:
Assess population status of secretive marshbirds

General Strategy:
Although Least Bitterns are too scarce in New Hampshire to warrant any species-specific inventory or monitoring projects, birders frequenting appropriate habitat should be familiar with its calls and report it if found. In addition, any broad wetland bird monitoring project should include this species, and should ensure that observers can identify it.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

NH distribution data from NHBR/NH eBird

Data Quality

Many of the wetlands where Least Bitterns have been recorded in recent decades are not regularly surveyed, and the species may persist undetected. It can also be very secretive and may not even be detected when present. These points are reinforced by the 2014 discovery of a nest at World End Pond, a site with no prior records of the species.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Whimbrel

Numenius phaeopus [M]

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	SNR
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of several migratory shorebirds are in steep decline (Andres 2009, Winn et al. 2013). Based largely on these declines, several species were proposed as RSGCN for the Northeast, and those that occur regularly in NH are included in the 2015 NH Wildlife Action Plan.

Distribution

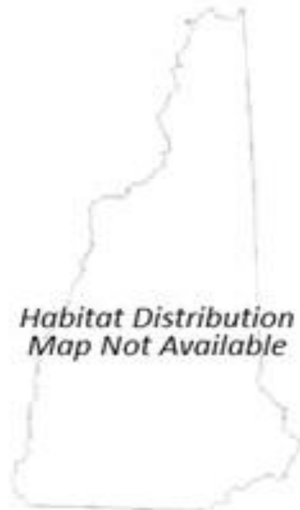
The Whimbrel has a broad breeding range encompassing arctic and subarctic areas of North America and Eurasia, and winters worldwide along south temperate and tropical coastlines (Skeel and Mallory 1996). It is uncommon in New Hampshire, where it occurs primarily from July through September, and almost entirely in the Hampton-Seabrook Estuary ((McKinley and Hunt 2008).

Habitat

Although migratory shorebirds of some species occur inland in NH, the species treated in the 2015 Wildlife Action Plan are almost entirely coastal in distribution, occurring primarily along the immediate coast, Great Bay (rarely), and at the Isles of Shoals. Specific habitats used for foraging include intertidal mudflats, rocky shores, and sandy beaches; and roosting habitats include rocky shores above the high tide line, salt pans, dunes, and elevated areas of salt marsh. Whimbrels use all of these to some extent, but are only rarely seen on beaches. In addition, they will sometimes forage in areas with short grass such as lawns and airstrips.

NH Wildlife Action Plan Habitats

- Salt Marshes
- Estuarine
- Coastal Islands
- Dunes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Populations of many long-distance migrant shorebirds are believed to be in steep decline (Morrison et al. 2006, Andres 2009), and for this reason several species are considered priorities for future conservation. Trend data for Whimbrel are somewhat equivocal, with some assessments indicating stable populations (Morrison et al. 1994) and other suggesting decreases (Morrison et al. 2006, Andres 2009).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown

Habitat Protection Status

Variable. Some of New Hampshire's coastal beaches and salt marsh areas are protected from development, but such protection does not preclude recreation use that may constitute an important threat to migrating shorebirds.

Habitat Management Status

Habitat is not specifically managed for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and degradation due to sea level rise (Threat Rank: Medium)

Much of the original beach/dune/estuary system along the New Hampshire coast has been permanently altered by human infrastructure (roads, buildings, parking lots) and coastal engineering (salt marsh ditching, tidal restrictions, seawalls), with a net loss in habitats available for migrating shorebirds. Projected rises in sea level of even a few inches will further reduce available habitats (estuarine mudflats and rocky intertidal sites) that shorebirds need for roosting and feeding (Galbraith et al. 2014).

Disturbance from human activities (walking, running dogs, shellfish harvest) (Threat Rank: Medium)

Disturbance results from recreational use of beaches or other habitats that shorebirds need for roosting and feeding during migration. People, pets, or vehicles using these habitats regularly flush birds, causing them to both expend energy in avoidance flights and reduce energy intake via foraging. Studies of shorebird behavior combined with physiological models suggest that repeated disturbance can reduce individual birds' chances of successfully completing migration (Harrington and Drilling 1996, Burger et al. 2007).

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat conversion and degradation from human climate change response

Habitat degradation from dredging and the dumping of spoils

Mortality from unregulated hunting in the Caribbean

Habitat conversion and degradation from storm-altered deposition patterns

Disturbance from phenology shifts

Species impacts from siltation, acidification, fresh-water inputs, and increased temperatures

Actions to benefit this Species or Habitat in NH

Incorporate shorebird needs into coastal climate change planning.

Primary Threat Addressed: Habitat conversion and degradation due to sea level rise

Specific Threat (IUCN Threat Levels): Climate change & severe weather

Objective:
Ensure that human activities in response to climate change do not negatively affect important shorebird habitats or stopover sites.

General Strategy:
Provide information on shorebird habitat and important sites to local and regional planning authorities in the seacoast area. Work with these entities to ensure that the needs of migratory shorebirds are considered in climate adaptation and response plans.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Manage human activity relative to shorebird stopover

Primary Threat Addressed: Disturbance from human activities (walking, running dogs, shellfish harvest)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Minimize disturbance of migrating shorebirds

General Strategy:
Manage human disturbance through beach closures, dog restraints, outreach, volunteer “wardens,” and other means as identified. This would only need to occur during peak migration periods and primarily at key sites identified through shorebird monitoring.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

Shorebird stopover monitoring

Objective:
Obtain data on distribution and abundance of shorebirds that can inform trends and prioritize conservation actions.

General Strategy:
Migratory shorebirds are best monitored at staging areas during migration along the Atlantic Coast, with lesser efforts directed at breeding sites and wintering areas. Because New Hampshire has such a small coast and limited shorebird habitat, it is recommended that the State rely on regional and/or national monitoring efforts to inform conservation planning. There may be specific research needs that relate to site-specific activities, in which case more targeted research or monitoring may be warranted.

Political Location:
Northeast

Watershed Location:

References, Data Sources and Authors

Data Sources

Most data on shorebird use of the Hampton-Seabrook estuary come from a study by NH Audubon in 2006-07 (McKinley and Hunt 2008), while general data on distribution and abundance of all species are available in the New Hampshire Bird Records and eBird databases.

Data Quality

Although data on the numbers of birds that pass through New Hampshire on migration is limited, there are good data on which areas are preferred by shorebirds and the number of individuals using these at a given point in time.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

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Cliff Swallow

Petrochelidon pyrrhonota

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	

Photo by Jason Lambert

Justification (Reason for Concern in NH)

Aerial insectivores (here including nightjars, swifts, flycatchers, and swallows) have recently received increased conservation attention due to significant declines in several species (Hunt 2009, Nebel et al. 2010). Because all species share a common prey base of flying insects, there has been much speculation on a potential common cause for many of the declines. Much current research has been directed toward swifts and swallows in North America, resulting in greater knowledge of potential threats. Swifts and swallows have several ecological characteristics in common. All are highly aerial, and feed entirely on insects captured during sustained flight – often quite high in the air column. Threats identified for the group as a whole include changes in food supply, effects of insecticides on adults or young, loss of nesting locations, and climate change. It should be noted that any of these factors could be affecting birds at any point in their annual cycle, and knowledge of their winter ecology is currently largely unknown. Like many aerial insectivores, populations of Cliff Swallow are in strong decline, although declines are most prominent in the north and east (see also Nebel et al. 2010). Based on BBS (Sauer et al. 2014) data the species has declined at 9.04% annually since 1966 in NH (-8.97% from 2003-2013), -5.03% in BCR 14, and -7.12% in BCR 30 (latter not significant, and a non-significant increase in this BCR 2003-2013). Most repeated Breeding Bird Atlases have documented declines in occupancy of roughly 50% (Cadman et al. 2007, Renfrew 2013, Massachusetts Audubon Society 2014), although the decline in NY was only 12% (McGowan and Corwin 2008).

Distribution

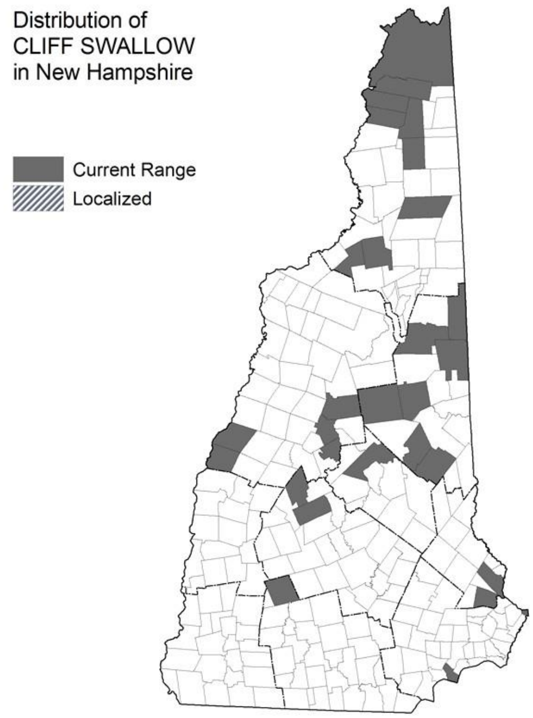
Breeds from Alaska to southern Mexico in the west, and east across southern Canada and the Great Plains to Nova Scotia, New England, and the Appalachians (Brown and Brown 1995). Winters primarily from southern Brazil to central Argentina, and almost entirely east of the Andes. Although rare in the Northeast prior to European settlement, the species increased during the early 19th century and was eventually found statewide in NH (Foss 1994). Over the last 20 years, the number and size of colonies in NH has declined considerably, and the species is now found primarily in Coos County and the Lakes Region, with scattered colonies near the Seacoast (NHBR, NH eBird).

Habitat

Historically, Cliff Swallows bred on rocky cliffs and outcrops in the mountains and foothills of western North America, but spread east beginning in the early 19th century as bridges and buildings provided alternate nesting substrate (Brown and Brown 1995). In the northeastern U.S., including NH, all colonies are located on man-made structures, and generally near open habitats (often fields) for foraging.

NH Wildlife Action Plan Habitats

- Developed Habitats



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant regional population declines and some range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable, depending on local site management.

Habitat Protection Status

Highly variable.

Habitat Management Status

Habitat management has not been implemented for this species. There is limited interest by homeowners where colonies occur in implementing actions to maintain or relocate existing colonies that “conflict” with building maintenance.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a “medium” or “high” score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Disturbance related to nest destruction and access restriction (Threat Rank: High)

Because a Cliff Swallow colony can be somewhat messy (e.g., droppings) or viewed as unsightly, some building owners are known to remove nests, a practice that can result in colony relocation or abandonment. Similarly, bridge construction can disturb colonies with similar effects. If a colony is in the interior of a building and access is blocked (intentionally or not), birds will become trapped and/or excluded and again the colony will fail at least for that year. At least three of the known NH colonies have been impacted to some degree by purposeful or construction-related disturbance of this sort.

Disturbance and mortality from winter drought (Threat Rank: Medium)

Considerable research in both Europe and North America has linked annual survival in several swallow species (but not Cliff) to long-term climate cycles such as El Niño and the North Atlantic Oscillation. In such cases, lower survival generally follows periods in these climate cycles where the winter grounds experience drought (Szép 1995, Robinson et al. 2008, Garcia-Pérez et al. 2014), and if drought increases as a result of climate change then one would expect such periods of low survival to become more frequent. There also appear to be carry-over effects in which productivity is higher in the breeding season following winters with more favorable conditions (Saino et al. 2003).

Disturbance from agricultural pesticides used in North America (Threat Rank: Medium)

Research in Canada has documented a variety of negative effects on Tree Swallows using heavily agricultural areas, including lower adult mass, lower clutch size, poor nestling condition and survival, and reduced annual return rates (Ghilain and Bélisle 2008, Paquette et al. 2014). Because Cliff Swallows are concentrated in agricultural areas, there is good reason to assume that they could experience similar effects. There is also concern about the use of insecticides on these species on their winter grounds in South America, where some chemicals are known to have direct toxic effects on migratory birds (Goldstein et al. 1999). A recent analysis of pesticide import data suggests that aerial insectivores showing the strongest declines tend to winter in Latin American countries with higher than average imports (and thus presumably use, J. Nocera pers. comm.).

Species impacts from agricultural pesticide use causing prey declines (Threat Rank: Medium)

There is increased evidence from studies on other species of swallows that increased use of insecticides is impacting prey availability (Evans et al. 2007). Research in Canada has documented a variety of negative effects on Tree Swallows using heavily agricultural areas, including lower adult mass, lower clutch size, poor nestling condition and survival, and reduced annual return rates (Ghilain and Bélisle 2008, Paquette et al. 2014).

List of Lower Ranking Threats:

Mortality from pesticide use in South America

Species impacts from competition (with non-native cavity nesters)

Disturbance and mortality from spring cold snaps and intense storms

Actions to benefit this Species or Habitat in NH

Cliff Swallow colony management

Primary Threat Addressed: Disturbance related to nest destruction and access restriction

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Enhance local Cliff Swallow productivity

General Strategy:
At sites with good habitat where presence of nesting Cliff Swallows is tolerated, use relatively simple, tested management techniques to encourage breeding success. Work with homeowners to minimize "damage" done by active colonies, or to relocate these colonies to more tolerable locations (if this is even possible, see Silver 2012). This action could also include management of competing House Sparrows.

Political Location:
Statewide

Watershed Location:
Statewide

Cliff Swallow colony host outreach

Primary Threat Addressed: Disturbance related to nest destruction and access restriction

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Increase public awareness about Cliff Swallow declines and discourage homeowners from destroying colonies. This could be extended to highway departments and bridges as well.

General Strategy:
Create materials on the decline of Cliff Swallows and the importance of maintaining the declining number of colonies in the state. Make these materials available to the general public and specifically target sites of significant colonies where the threat of intentional destruction is considered high.

Political Location:
Statewide

Watershed Location:
Statewide

Cliff Swallow colony surveys

Objective:
Obtain a better assessment of the current size and distribution of Cliff Swallow colonies in NH.

General Strategy:
There is still incomplete information on the locations and sizes of Cliff Swallow colonies in New Hampshire. Successful prioritization and implementation of colony management requires knowledge of where significant colonies are located. Encourage birders to keep their eyes out for active colonies and report their locations

Political Location:
Statewide

Watershed Location:
Statewide

Migratory connectivity research

Objective:
Determine migration routes and wintering locations for Cliff Swallows breeding in NH and elsewhere in the Northeast.

General Strategy:
Given that declines in this species are not as uniform across the continent as for many other aerial insectivores, there is value in collecting data on migratory connectivity. If wintering areas for declining populations are different from those that are stable of increasing, it may be possible to better identify threats during the non-breeding season. Employ light-level geolocators in an attempt to collect these sorts of data.

Political Location:
Northeast, Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources
Trend data from BBS and Breeding Bird Atlases (citations above)

Data Quality
The highly colonial nature of this species potentially confounds BBS data because colonies can move in space between years. However, the declines indicated by BSS are corroborated by the systematic data collected by Atlases, as well as more specific data for New Hampshire.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

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American Three-toed Woodpecker

Picoides dorsalis

Federal Listing	N/A
State Listing	T
Global Rank	G5
State Rank	S1
Regional Status	

Photo by Nathan4300, Dreamstime.com

Justification (Reason for Concern in NH)

Although locally common in western North America, the American Three-toed Woodpecker is local in its limited range in the northeastern United States. Despite relatively low abundance and lack of data, several observers have noted declines in this species over the past century, largely attributed to timber harvesting (Forbush 1927 in Oatman 1985, Hagan et al. 1997). More recently, declines were not noted during the second Ontario Breeding Bird Atlas (Cadman et al. 2007), but the species occupied 32% fewer blocks in New York's second Atlas (McGowan and Corwin 2008) and remains extremely rare in Vermont (Renfrew 2013). Over the last 150 years in New Hampshire, extensive logging of coniferous forests has reduced the amount of standing dead and dying timber that the species prefers, and beaver activity, insect outbreaks, salvage logging of affected stands, and suppression of forest fires, have further reduced and degraded potential three-toed woodpecker habitat. The species' close relative in Europe (*P. tridactylus*) appears to be declining in several areas (Leonard 2001), again believed a result of logging and fragmentation of forest.

Distribution

Population and habitat distribution: The American Three-toed woodpecker inhabits boreal and montane coniferous forests of Canada and the northern United States, from Alaska to California in the west, and northern Wisconsin east to northern New York and northern New England. In New Hampshire, the species has been documented in the North Country and in the White Mountains, with Mt. Passaconaway (Waterville Valley) being the southern-most location documented in the state (Foss 1994). There have been only 11 confirmed sightings since 1980, and none since 2000, as listed below.

Livermore 1980 (Greeley Ponds)
Livermore 1981 (Nancy Pond)
Bethlehem 1981 (Mt. Tom)
Success 1986
Pittsburg 1995 (East Inlet)
Pittsburg 1996 (East Inlet)
Low and Burbanks Grant 1996 (Mt. Adams)
Bethlehem 1997 (Mt. Tom)
Pittsburg 1998 (East Inlet)
Thompson and Meserves Purchase 2000 (Caps Ridge Trail)
Pittsburg 2000 (East Inlet)

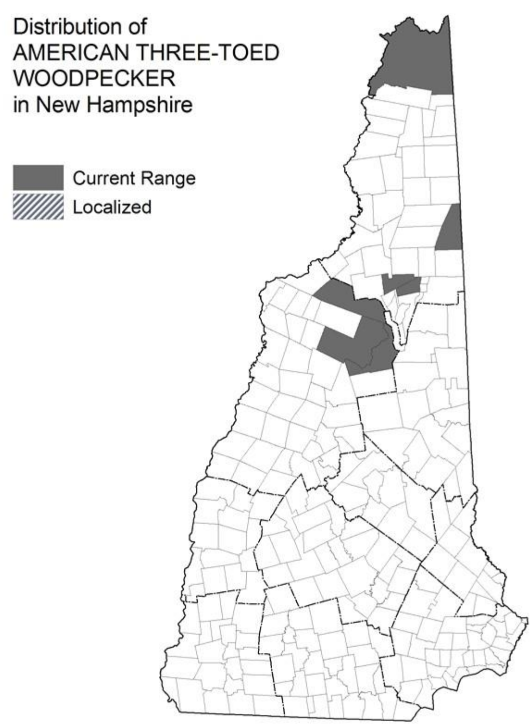
There were also unconfirmed records from Lake Umbagog area in 2004 and 2011

Habitat

Habitat Description: Coniferous forests with abundant dead and dying trees caused by disease, fire, flooding, insects, wind, and pollution. In the Northeast, occupied sites are most often associated with wetlands such as bogs or swamps, or logged areas with standing dead conifers (Foss 1994). A habitat suitability index developed for the species in Alberta suggests that the following habitat features are associated with American Three-toed Woodpecker occupancy (Zapissocki et al. 2000):
•Trees greater than 8 cm (3.15 in) dbh, with trees greater than or equal to 20 cm (7.9 in) optimal.
•Tree heights greater than 4 m (13 Ō) are suitable, with trees greater than or equal to 8 m (26 Ō) Optimal.
•Stands with numerous snags have more food and potential nests, and stands with greater than or equal to 1.2 snags/ha are optimal.
•Conifer-dominated stands (more than 50% conifer) are preferred, and stands with more than 20% conifers are unsuitable.
•Tree canopy closure must be more than 6% for a stand to be suitable for three-toed woodpeckers, and stands with closure greater than 50% are optimal.

NH Wildlife Action Plan Habitats

- Lowland Spruce-Fir Forest
- High Elevation Spruce-Fir Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

No information. Species is exceedingly rare in the state and has not been conclusively reported since 2000.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

All of the known recent sites are protected on either state or federal lands (White Mountain National Forest, Connecticut Lakes Headwaters.

Habitat Management Status

Habitat management has not been implemented for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

See lowland spruce-fir forest profile.

Habitat conversion and fragmentation from energy and communication infrastructure (Threat Rank: Medium)

See high-elevation spruce-fir forest profile.

Habitat conversion and degradation from ski area expansion (Threat Rank: Medium)

See high-elevation spruce-fir forest profile.

List of Lower Ranking Threats:

Disturbance from persistent organic compounds

Habitat degradation from acid deposition

Disturbance from mercury toxicity

Disturbance from hiking activity

Disturbance during research activities

Habitat degradation from harvest practices that prevent much of the forest from reaching later successional stages

Habitat impacts from road fragmentation

Habitat conversion and degradation from warming temperatures and associated increase of hardwood species

Actions to benefit this Species or Habitat in NH

American Three-toed Woodpecker surveys

Objective:
Collect data on current distribution

General Strategy:
Observers in appropriate habitat should be aware of the possibility of this species and report it if detected. See spruce-fir forest habitat profiles for actions related to habitat management.

Political Location:
Coos County, Grafton County

Watershed Location:

References, Data Sources and Authors

Data Sources
Distribution data from Breeding Bird Atlases (citations above), and NHBR/NH eBird
Known sites were derived from NHBR, and conservation and management status was obtained from NHFG, the Umbagog National Wildlife Refuge, and the WMNF.

Data Quality
Data are very limited due to this species' low densities and often inaccessible habitats, and are confounded by its similarity to the much more common Black-backed Woodpecker.
There are few data on distribution and abundance of three-toed woodpeckers and no information on the availability and condition of suitable habitat for them.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:
Laura Deming, NHA

Literature

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Eastern Towhee

Pipilo erythrophthalmus

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S4
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of many shrubland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Eastern Towhee populations in New Hampshire have declined at 9.83% annually since 1966 (-10.88% from 2003-2013). These trends are similar in regional data: BCR 14 = -7.5%/year, BCR 30 = -5.26%/year. There have also been variable declines based on repeated Breeding Bird Atlases in the northeast (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014). At a finer scale, local declines in New England generally seem to be more prevalent at higher elevations (Renfrew 2013, MassAudubon 2014, Hunt unpubl. data), perhaps because these areas have had a greater rate of reforestation.

Distribution

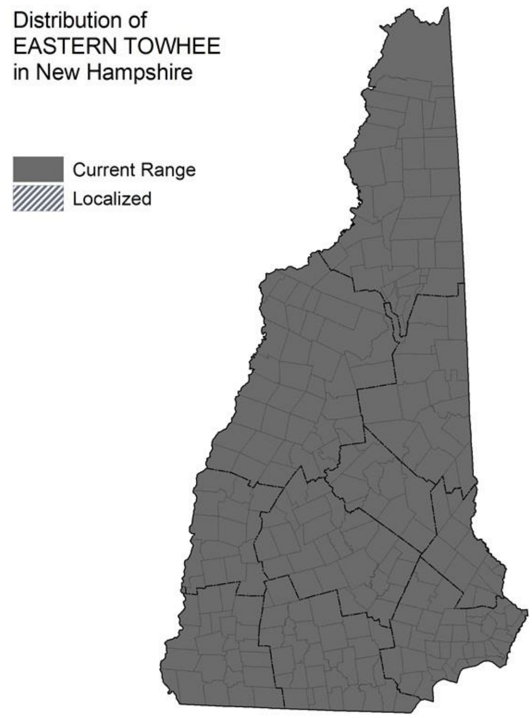
The Eastern Towhee breeds across the U.S. and southern Canada east of the Great Plains, and winters in the southeastern United States. It occurs throughout New Hampshire although it is generally less common and more local from the White Mountains north. There is also some indication that the species is becoming less common to the north based on perusal of route-specific BBS data (PDH).

Habitat

Like all shrubland birds, this species occurs in habitats dominated by shrubs or young trees, sometimes interspersed with mature trees (e.g., pine barrens) or open bare or grassy areas. Typical examples in New Hampshire include regenerating timber harvests, power line rights-of-way, shrubby old fields and edges, and pine barrens. From a bird perspective, such habitats can be subdivided into those dominated by shrubs vs. dominated by saplings. The former – sometimes referred to as “scrub-shrub” – is more typical of abandoned old fields, utility rights-of-way, and open areas within pine barrens. Such habitats often persist for relatively long periods without the need for additional management. Saplings, on the other hand, are typical of areas subject to timber harvest, and rarely retain early successional characteristics beyond 15-20 years. These are also regularly referred to as “young forest.” Although Eastern Towhees will use young forest in early successional stages, it is generally much more common in either scrub-shrub or pine barrens (Hunt 2013). Towhees also occur in some peatlands, openings in mature forest, and on rocky outcrops with shrubby vegetation.

NH Wildlife Action Plan Habitats

- Shrublands
- Pine Barrens
- Appalachian Oak Pine Forest
- Peatlands
- Rocky Ridge
- Cliff
- and Talus



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant population declines and limited range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable – see shrubland and pine barrens habitat profiles.

Habitat Protection Status

Highly variable – see shrubland and pine barrens habitat profiles.

Habitat Management Status

Habitat management has not been implemented specifically for this species, although management does occur for other species (American Woodcock, New England Cottontail) that often use the same habitats. See also shrubland and pine barrens habitat profiles.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by shrubland birds are already embedded in developed landscapes (e.g., right-of-way, old fields) or viewed as "undesirable" or "waste" habitats, they may be more vulnerable to this threat.

Habitat degradation and conversion due to natural succession or lack of active management (Threat Rank: High)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used, and as a result forest maturation is generally considered the most significant threat facing birds that use shrublands and young forests. See Shrubland habitat profile for more information.

Habitat degradation due to fire suppression and associated succession (Threat Rank: Medium)

In the absence of fire, pine barrens have fewer open areas and eventually become closed-canopy pine forests. Although many shrubland birds can persist in such areas for a time, densities are often lower than in more open and shrub-dominated habitats. See pine barrens habitat profile for more information.

Habitat degradation from aspects of right-of-way management (Threat Rank: Medium)

Rights-of-way need to be maintained as short vegetation so as to reduce risks associated with trees and powerlines. As a result these corridors are regularly treated by mechanical (rarely chemical) means to remove or cut back vegetation. In general, such practices create habitat suitable for shrubland birds, although in extreme cases a site may be rendered unsuitable for 1-2 years large areas of vegetation are completely removed. If management occurs during the breeding season, reproductive success will be reduced. See also Shrubland habitat profile.

Habitat and species impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants, particularly shrubs, have been demonstrated to have several negative effects on birds using shrubland habitats. Insect prey (particularly caterpillars) are usually less common on non-native shrubs (Burghardt et al. 2008, Fickenscher et al. 2014), while data on the nutritional value of fruit are more equivocal (e.g., Davis 2011). In some cases, birds experience lower reproductive success in non-native shrubs, although there is considerable variation (Rodewald et al. 2010, Schlossberg and King 2010), and local predator communities play an important role as well. In all cases, the effects of invasives on shrubland birds depend to a large extent on their relative abundance. If plant diversity is high, the negative effects are diluted and less likely to impact bird populations. However, if the habitat tends toward a monoculture, reduced insect supplies and/or higher predation may reduce reproductive success to the extent that the habitat becomes a sink.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

Many predators (e.g., skunks, raccoons, feral cats) occur in relatively high densities in developed landscapes, often because of direct association with humans or food that is provided either intentionally or unintentionally. Most early successional birds nest on or near the ground, and as a result are more susceptible to nest predation. The problem is compounded because much early successional habitat is near human population centers.

List of Lower Ranking Threats:

Habitat degradation from sand and gravel pit reclamation practices that make habitat unsuitable

Actions to benefit this Species or Habitat in NH

Research on response to management

Primary Threat Addressed: Habitat degradation and conversion due to natural succession or lack of active management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
To best conserve this and other shrubland birds, there is a recognized need for information on how it responds to management implemented for other early successional species.

General Strategy:
Collect standardize data on occupancy and abundance of Eastern Towhees at sites managed for New England Cottontail, American Woodcock, Karner Blue Butterfly, and other species. Combine these data with data on habitat availability at the state and regional scale, to estimate actual or potential population size, which in turn could be compared to population objectives that also need to be developed.

Political Location:
Statewide

Watershed Location:
Statewide

See also shrubland and pine barrens habitat profiles

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

Burghardt, K. T., D. W. Tallamy, and W. G. Shriver. 2008. Impact of native plants on bird and butterfly biodiversity in suburban landscapes. Conservation Biology 23:219-224.

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Renfrew, R.B. 2013 (ed.). The Second Atlas of Breeding Birds in Vermont. University Press of New England, Hanover, NH.

Rodewald, A. D., D. P. Shustack, and L. E. Hitchcock. 2010. Exotic shrubs as ephemeral ecological traps for nesting birds. Biological Invasions 12:33-39.

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Schlossberg, S., and D. I. King. 2010. Effects of invasive woody plants on avian nest site selection and nesting success in shrublands. Animal Conservation 13:286-293.

Scarlet Tanager

Piranga olivacea

Photo by Len Medlock

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S5
Regional Status	High

Justification (Reason for Concern in NH)

The Scarlet Tanager is one of several still-common forest birds that are experiencing significant population declines across much of their ranges, and as a result is considered a Regional SGCN in the Northeastern United States (USFWS Region 50. Populations in New Hampshire have declined at 1.55%/year since 1966, but only at 0.66% per year since 2003 (latter trend not statistically significant. Long term trends are similar in BCR 14 (-1.54%/year) and BCR 30 (-1.71%/year).

Distribution

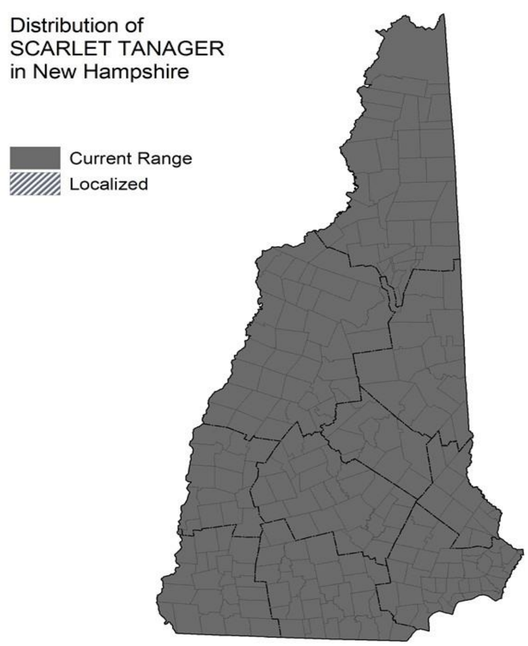
The Scarlet breeds east of the Great Plans from southern Canada to Arkansas and Georgia, and winters in the western Amazon Basin from Columbia to Bolivia (rare in Brazil, Mowbray 1999). In New Hampshire they occur statewide, but are less common north of the White Mountains and absent from higher elevations (Foss 1994).

Habitat

The Scarlet Tanager uses a wide range of mature hardwood and mixed forest, especially with oaks (Mowbray 1999). In most of its range the species is considered area sensitive, rarely occupies forest fragments smaller than 10-12 hectares.

NH Wildlife Action Plan Habitats

- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Northern Hardwood-Conifer Forest



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant rangewide population declines (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Migratory Bird Treaty Act (1918)

Quality of Habitat

unknown

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Many forest birds are area sensitive (e.g., Zuckerberg and Porter 2010) and less likely to occupy habitat patches in landscapes with less forest cover. See the forest habitat profiles for more information.

Habitat conversion and impacts from fragmentation due to energy development (Threat Rank: Medium)

Towers and turbines and their supporting infrastructure result in both the direct loss of habitat and fragmentation of adjacent non-cleared forest. Both these impacts can affect forest birds as discussed elsewhere. See the forest habitat profiles for more information.

Habitat conversion and degradation from timber harvest (Threat Rank: Medium)

To the extent that timber harvest can remove mature forest from the landscape, its short-term effects can be similar to those of residential or commercial development for forest birds. At the same time, if regenerating forest contains a different species composition its suitability for specific forest birds could either increase or decrease.

Habitat impacts and disturbance from acid deposition that can reduce prey (Threat Rank: Medium)

Although emissions controls have moderated the pH of precipitation in the northeastern United States, potential long-term effects on ecosystems are now known to include declines in terrestrial invertebrates that require calcium in their shells or exoskeletons. In turn, birds that prey upon such invertebrates may experience prey limitation or insufficient calcium intake, which can compromise reproductive success (Graveland 1998). Because Scarlet Tanagers forage primarily in the forest canopy, they may be less impacted by such changes in invertebrate communities, although data are currently lacking.

Habitat degradation from insect pests (introduced insects) (Threat Rank: Medium)

To the extent that insect pests can alter forest species composition, they may have trickle down effects on the bird that use these habitats, although detailed studies of these effects have yet to be carried out. See the forest habitat profiles for more information.

Disturbance (parasitism) and mortality from subsidized or introduced predators (Threat Rank: Medium)

In fragmented forest systems, brood parasitism by the Brown-headed Cowbird (*Molothrus ater*) has been implicated in declining forest bird populations (Brittingham and Temple 1983). Although the extent of such parasitism in New Hampshire is unknown, the state's extensive forest cover likely reduces the overall risk (c.f., Hoover and Brittingham 1993).

List of Lower Ranking Threats:

Habitat conversion and degradation from agriculture on winter grounds

Disturbance from noise associated with recreational activity

Habitat impacts from road fragmentation

Actions to benefit this Species or Habitat in NH

No actions identified, but see appropriate forest habitat profile(s) for actions that would likely benefit this species.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

Brittingham, M.C., and Temple, S.A. 1983. Have cowbirds caused forest songbirds to decline? BioScience 33: 31-35.

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Zuckerberg, B. and W.F. Porter. 2010. Thresholds in the long-term responses of breeding birds to forest cover and fragmentation. Biological Conservation 143: 952–962.

Pied-billed Grebe

Podilymbus podiceps

Federal Listing	N/A
State Listing	T
Global Rank	S5
State Rank	S2
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Secretive marsh birds like the Pied-billed Grebe have generally been considered conservation priorities because of known losses of wetland habitats, combined with often poor data on species' distribution, abundance, and trend. In the case of the Pied-billed Grebe, data from repeated Breeding Bird Atlases in the Northeast are equivocal, with increased occupancy in New York (McGowan and Corwin 2008), a slight decline in Vermont (Renfrew 2013), and apparently stable populations in Ontario and Massachusetts (Cadman et al. 2007, MassAudubon 2014). As is the case for most marsh birds, data from the Breeding Bird Survey are generally poor, although some trends are suggested at larger scales. In the eastern and northeastern U.S., the BBS shows non-significant decreases from 1966-2013, and a non-significant increase in the East of 5.23%/year from 2003-2013 (Sauer et al. 2014). Pied-billed Grebe populations in New Hampshire appear to fluctuate considerably, but since 2005 the species has declined or disappeared from many areas where it was once reliable or even common.

Distribution

Population and habitat distribution: Pied-billed Grebes are widely distributed from southern Canada through southern Argentina, including the Caribbean (Muller and Storer 1999). The Pied-billed Grebe occurs throughout New Hampshire (with the exception of the White Mountains), but has always been rare and local in distribution (Foss 1994). Old regional ornithological works variously describe the species as a breeder, primarily a migrant, or absent, and a lack of comprehensive statewide coverage until relatively recently makes it difficult to ascribe any clear pattern to its distribution and abundance. Within this range, there are five areas of more regular occurrence:

•Extensive wetlands in Coos County (Cherry Pond, Androscoggin River, Lake Umbagog, Pittsburg)
•Wetlands around the northern portion of Lake Winnipesaukee (most recent records from Copp's Pond, Tuftonboro
•Several larger wetlands in west-central New Hampshire (southern Grafton, Sullivan, and northwest Merrimack counties, most if not all of these sites now appear unoccupied)
•Southern Piscataquog River watershed (no recent data)
•Southeastern New Hampshire away from the immediate coast (Exeter, Brentwood, Durham, Newington, Rochester)

During 2000-2014, grebes were reported from 18 sites during the breeding season, and consistently (e.g., at least three years) only at eight: East Inlet (Pittsburg), Cherry Pond (Jefferson), Copp's Pond (Tuftonboro), Cascade Marsh (Sutton), Deer Hill WMA (Brentwood), Exeter WTP, Surrey Lane marsh

(Durham), and Pickering Ponds (Rochester). Recent changes in water level at Lake Umbagog appear to have reduced habitat suitability for grebes (R. Quinn, pers. comm.), since there have been only two summer records since 2000. Cascade Marsh, formerly a reliable site for southern NH, has not had a summer record since 2004, and the species' disappeared from other wetlands in this region (e.g., McDaniel's Marsh in Springfield) around the same time. Both sites were surveyed with call playback in 2014 and no grebes were detected. The Deer Hill WMA in Brentwood was once the most reliable site in the state, with regular surveys there in the late 2000s documenting 5-7 pairs per year. But as this man-made wetland has begun to grow in as a result of succession, the number of nesting grebes has dropped, and only 1-2 pairs were reported in 2010-14.

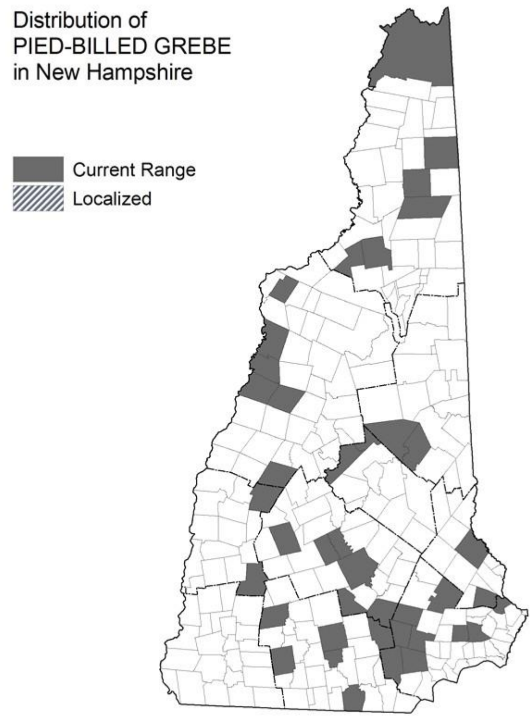
Habitat

Pied-billed Grebes inhabit a range of wetlands, especially ponds or slow portions of streams with dense stands of emergent vegetation (Muller and Storer 1999). In the Northeast, they also appear to prefer areas with submerged aquatic beds (Gibbs et al. 1991). Nearby open water is needed for foraging and take-off prior to flight; sites in Maine averaged at least 34% open water (Gibbs et al. 1991). In Maine, most wetlands occupied by the species were those created by beavers (*Castor canadensis*) or by humans (Gibbs and Melvin 1992). Two additional features appear critical in nest site selection: water depth of at least 25 cm (10 in) and emergent stem densities of at least 10 cm^2/m^2 (0.15 in^2/ft^2) in adjacent wetland patches (Muller and Storer 1999). Home range size is variable, and may depend on habitat type and quality. In the prairie pothole region, home ranges average 1-3.5 ha (2.5-8.75 ac, Muller and Storer 1999). In Maine, however, grebes rarely breed in wetlands less than 5 ha (12 ac) in size (Gibbs et al. 1991, Gibbs and Melvin 1992), suggesting that home range needs may be larger in this part of the country. Alternatively, lower population densities in the Northeast may allow grebes to be more selective since available habitat is not saturated.

All sites in New Hampshire where the species has occurred regularly contain open water and surrounding cattail (*Typha sp*.) marsh and may include ponds or small lakes (including beaver ponds), fens or slow streams, impoundments, sewage lagoons and other man-made wetlands, and backwaters of larger lakes. With the exception of sewage ponds, most Pied-billed Grebe habitat includes some woody vegetation such as alder (*Alnus sp*.) or buttonbush (*Cephalanthus occidentalis*).

NH Wildlife Action Plan Habitats

- Marsh and Shrub Wetlands
- Peatlands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Seemingly in decline at several historically reliable sites in New Hampshire. See Justification and Distribution.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)
- Fill and Dredge in Wetlands - NHDES
- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information, although as noted above, succession and increased water levels appear to be reducing quality at some sites.

Habitat Protection Status

Of the 18 recent locations for the species alluded to under distribution, 14 (77.8%) are protected in whole or in part by easement or fee-simple, and ten of these are state or federal wildlife areas.

However, WMA or other protected status does not preclude loss of habitat quality as noted above, as evidenced by the disappearance or decline of grebes from sites as diverse as Lake Umbagog, Cascade and McDaniel's Marshes, Stubb's Pond (Newington, another water level issue), and the Deer Hill WMA.

Habitat Management Status

At Cascade Marsh, management of water levels to benefit Pied-billed Grebes has been in place since the 1980s (E. Robinson and D. Gagnon, New Hampshire Fish and Game (NHFG), personal communication). Water levels at these sites are first lowered after ice goes out to levels suitable for grebes while still allowing for vegetation growth. This water level is maintained through the summer and is raised in September when grebes are no longer nesting. It is feasible to apply similar water level management at 3 additional grebe sites in State Wildlife Management Areas (Hirst, MacDaniel's Marsh, Danbury Bog). As noted earlier, absence of good water level management may be behind the decline or disappearance of Pied-billed Grebes from the Lake Umbagog and Great Bay NWRs.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation from the succession of artificial wetlands (Threat Rank: Medium)

Some of the more significant sites for Pied-billed Grebe in southeastern NH have been in artificial wetlands such as unused ponds at wastewater treatment plants or reclaimed borrow pits. While such sites can provide suitable habitat for a number of years, unless vegetation is actively managed they eventually become overgrown to the point that they are no longer quality habitat. Because such sites lack dams or hydrological connections to other wetlands, controlling increased vegetation by regulating water levels is not possible, and the only other alternative – mechanical disturbance – is expensive and potentially damaging.

Habitat degradation and species impacts from introduced or invasive plants (Threat Rank: Medium)

There are limited data on specific responses by grebes to invasive plants (see Whitt et al. 1999). In general, if invasives result in a reduced area of open water, habitat may be less attractive to the species, although again data are lacking.

List of Lower Ranking Threats:

Habitat degradation from fertilizer that increases eutrophication

Habitat degradation from non-point and point contaminants

Habitat degradation from mercury deposition

Habitat conversion and mortality from drawdowns or removal of dams

Habitat degradation from dredging ponds and removal or management of vegetation

Mortality and disturbance from lead toxicity from ingesting ammunition and tackle

Disturbance to nests by watercraft

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Pied-billed Grebe Monitoring

Objective:
Conduct monitoring for Pied-billed grebe populations.

General Strategy:
Periodically resurvey recently-active Pied-billed Grebe sites to determine current status and distribution. In addition, any broad wetland bird monitoring project should include this species, and should ensure that observers can identify it.

Political Location:
Statewide

Watershed Location:
Statewide

Stabilize water levels.

Primary Threat Addressed: Habitat conversion and mortality from drawdowns or removal of dams

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Maintain suitable nesting habitat for Pied-billed Grebes

General Strategy:
Appropriate water level management should be instituted as a standard NHFG activity at state Wild-life Management Areas that support or potentially support grebes. It would also be beneficial to deter-mine ownership and management policy of dams associated with other grebe sites, and to improve grebe nesting success at these locations.

Political Location:
Statewide

Watershed Location:
Statewide

Expand mercury research to grebes and other marsh-nesting birds.

Primary Threat Addressed: Habitat degradation from mercury deposition

Specific Threat (IUCN Threat Levels): Pollution / Air-borne pollutants / Mercury

Objective:

Given increasing concern for the effects of mercury in other aquatic birds, it may be valuable to expand mercury research to grebes and other marsh-nesting birds.

General Strategy:

Although various environmental pollutants have been proposed as threats to Pied-billed Grebes (Gibbs and Melvin 1992), there are few, if any, data on the presence and effects of such contaminants on grebe populations. Given increasing concern for the effects of mercury in other aquatic birds, it may be valuable to expand mercury research to grebes and other marsh-nesting birds.

Political Location:

Northeast

Watershed Location:

Research effects of human disturbance, particularly that caused by small watercraft.

Primary Threat Addressed: Disturbance to nests by watercraft

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:

To understand the effects of human disturbance, particularly small watercraft, on the incidence of nest abandonment or failure.

General Strategy:

In the absence of such data it is premature to propose conservation actions such as no-entry zones for this species.

Political Location:

Statewide

Watershed Location:

References, Data Sources and Authors

Data Sources

Data on site occupancy were compiled from NHBR. Information pertaining to management at some grebe sites (state wildlife management areas) was obtained from the NHFG (E. Robinson, NHFG, personal communication).

Data Quality

Information on pied-billed grebe distribution in New Hampshire is limited by habitat inaccessibility and inconsistency of coverage. Because grebes have a history of both patchiness and site fidelity, the discontinuation of regular visits to a given site can significantly alter our broader knowledge of current statewide distribution. Thus, the absence of reports from a known breeding site cannot be taken as evidence of the species' absence.

As indicated above, data on pied-billed grebes and their habitat in New Hampshire are inconsistent. There are no data on management activity at the majority of sites where the species is known to occur.

Appendix A: Birds

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

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Vesper Sparrow

Pooecetes gramineus

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S2
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of most grassland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Vesper Sparrow populations in the Northeast have declined at 5.97% annually since 1966 (-3.77%/year from 2003-2013). Because of the species' overall rarity in the region, BBS data on smaller scales (e.g., NH) are less accurate, although the species also shows significant annual declines of 5.72% in BCR 14 and 4.29% in BCR 30. There have also been declines of 30-70% based on repeated Breeding Bird Atlases in the northeast (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014). Vesper Sparrows were never common in New Hampshire, but have declined since the 1960s and are now found primarily at a handful sites in the southern part of the state, plus the Ossipee Pine Barrens.

Distribution

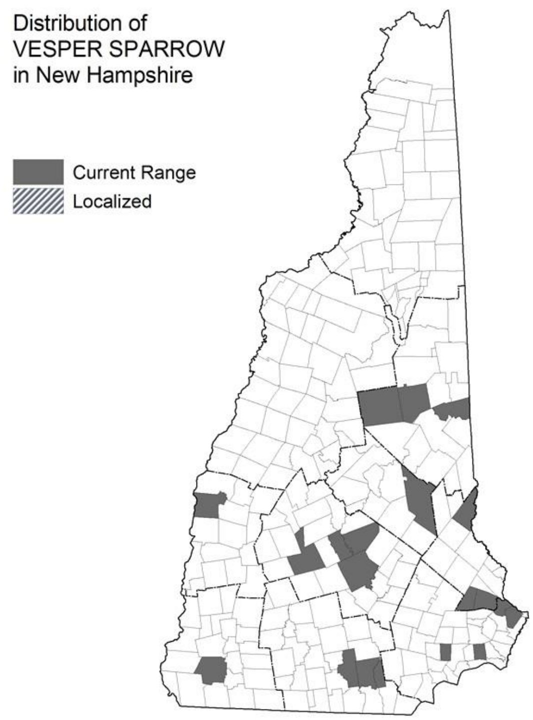
Vesper Sparrows breed across the United States and Canada, from British Columbia and California east to the Maritime Provinces and Chesapeake Bay, and winter in Mexico and the southern United States (Jones and Cornely 2002). In New Hampshire, the species was formerly widespread in suitable habitat south of the White Mountains, with scattered records in southern Coos County (Foss 1994). Now it appears limited to the Ossipee Pine Barrens (where rare), the Keene and Pease airports, and scattered locations in the Merrimack Valley. In the latter it is known from the Manchester and Concord airports, and agricultural areas along the river from Concord, Canterbury, and Boscawen.

Habitat

The breeding habitat of the Vesper Sparrow consists of dry, open grassy areas with patches of bare ground and elevated perching areas. Such habitat includes old fields, crop and hayfields, and airports (Jones and Cornely 2002). Like most other grassland birds, this species is area sensitive. Vickery et al. (1994) found higher occupancy in fields greater than 20 hectares. In parts of New England Vesper Sparrows also use larger openings in pine barrens, especially if adjacent to larger expanses of grassland.

NH Wildlife Action Plan Habitats

- Grasslands
- Pine Barrens



Distribution Map

Current Species and Habitat Condition in New Hampshire

Limited data, but strongly declining on BBS, Breeding Bird Atlases, and in anecdotal accounts.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

Some agricultural sites in the Merrimack Valley have conservation status, as does most of the suitable habitat in the Ossipee Pine Barrens. Airport sites are not protected in the conventional sense.

Habitat Management Status

Habitat management has not been implemented specifically for this species, although ongoing efforts directed towards habitats or other species is likely to benefit Vesper Sparrows. Included here is management of the Pease airfield for Upland Sandpipers and efforts to restore Pine Barrens in Concord and the Ossipee area.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and impacts from airport construction (Threat Rank: Medium)

Expansion of runways or addition of new infrastructure (e.g., hangers) has the potential to remove suitable grassland habitat at the more important sites for this species in the state.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because most Vesper Sparrow locations are in river valleys, they are proximal to urban areas and thus at risk for this threat. But in reality it is highly unlikely that development will impact this species in New Hampshire.

Mortality and nest disturbance resulting from frequency and timing of mowing (Threat Rank: Medium)

Mowing is generally considered the greatest threat to grassland birds because it either destroys nests outright or exposes them to greater predation risk. Frequency of mowing varies with location and land use. With respect to Vesper Sparrows, it is most frequent at airports, which are required to mow areas adjacent to runways and taxiways for safety reasons. At other sites, mowing is used primarily as a management tool to prevent succession (e.g., at landfills) or to maintain the open character of the site. Mowing for economic reasons (i.e., hay harvest) is not a significant threat at any of the sites currently used by Vesper Sparrows in New Hampshire.

Habitat degradation and disturbance from airport runway maintenance (Threat Rank: Medium)

This threat is separate from both mowing and construction, and pertains to human activity associated with existing infrastructure. Such activity includes paving, light installation, and other things that might result in vehicles and other equipment being parked off-runway in potential sparrow habitat.

Habitat degradation due to fire suppression and associated succession (Threat Rank: Medium)

In the absence of fire, pine barrens have fewer open areas and eventually become closed-canopy pine forests. Although Vesper Sparrows can persist in such areas for a time, densities are often lower than in more open portions of these habitats. See pine barrens habitat profile for more information.

Habitat degradation and conversion from a lack of field maintenance and associated succession (Threat Rank: Medium)

In the absence of periodic mowing, grassland sites revert to shrublands and eventually to forest. However, since most sites for Vesper Sparrows in New Hampshire are at airports, this is not in reality a significant threat to the species.

Habitat impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants are an increasing problem in grasslands elsewhere in the Northeast. Their impacts on grassland birds are poorly known, but could include reduced availability of nesting microhabitat (Scheiman et al. 2003), and/or altered insect communities. See the grassland habitat profile for more information.

List of Lower Ranking Threats:

Habitat impacts and mortality from insecticide use

Habitat degradation and species disturbance from overgrazing of grassland habitat

Habitat conversion to cropland or sod (excluding hay)

Actions to benefit this Species or Habitat in NH

Grassland bird monitoring

Objective:
monitor trends for rare grassland birds in NH

General Strategy:
Periodic surveys of key areas for grassland birds (e.g., focal areas, see grasslands habitat profile) are needed to assess trends in distribution and abundance because broad-scale surveys like the BBS fail to capture these species in sufficient numbers. Surveys need not be annual, but should employ consistent methodology among years.   See also the grassland and pine barrens habitat profiles for more detail on broad actions that may benefit Vesper Sparrows.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

In the absence of systematic surveys, data on Vesper Sparrow distribution in New Hampshire is largely limited to anecdotal accounts from birders. As a result, there may be locations in the state where the species occurs but from which it has not been reported.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Alina Pyzikiewicz, NHFG

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Appendix A: Birds

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Sora

Porzana carolina

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	Very High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Secretive marsh birds like the Sora have generally been considered conservation priorities because of known losses of wetland habitats, combined with often poor data on species' distribution, abundance, and trend. In the case of the Sora, repeated Breeding Bird Atlases in the Northeast have consistently documented increases in occupied range (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014), a trend corroborated by the Breeding Bird Survey (although this species is poorly-surveyed by the BBS, Sauer et al. 2014). In contrast to the broader trends mentioned above, records of Sora in New Hampshire appear to be in decline, and the species is not regularly recorded at some historically reliable locations.

Distribution

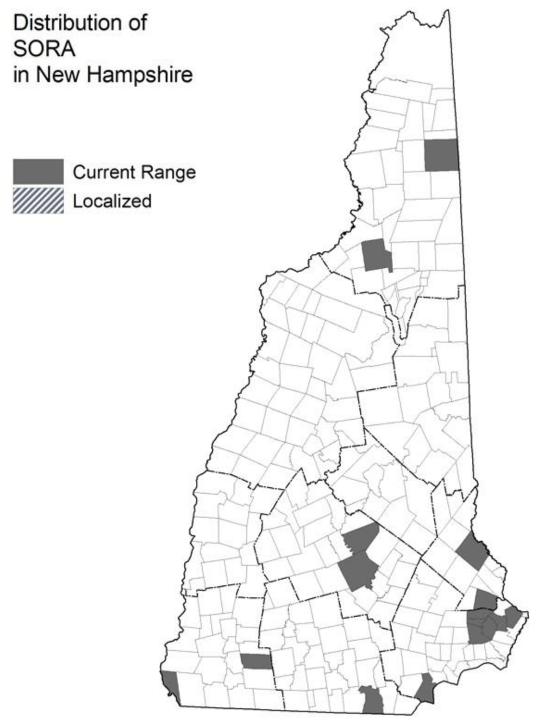
Breeds across southern Canada and the northern and western United States, and winters from the southern U.S. to northern South America (Melvin and Gibbs 2012). In New Hampshire, most breeding season records are from the south (Cheshire, Merrimack, Hillsborough, Strafford, and Rockingham counties), particularly from the coastal plain. The most consistently occupied sites elsewhere in the state since 1990 have been the wetlands around Cherry Pond and Lake Umbagog, although this pattern may reflect observer bias more than actual distribution. There is some indication that reports from parts of the species' NH range have declined, especially in the north and southwest, although there are no systematic data with which to evaluate this hypothesis.

Habitat

Soras breed in shallow or intermediate-depth freshwater wetlands with dominated by emergent vegetation such as cattails (*Typha*), sedges (*Carex, Cyperus*), burreeds (*Sparganium*) and bulrushes (*Scirpus*) (Melvin and Gibbs 2012).

NH Wildlife Action Plan Habitats

- Marsh and Shrub Wetlands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Stable or increasing across most of the Northeast, but possibly declining in New Hampshire.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES
- Marsh and shrub wetlands
- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

No information

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat degradation from the succession of artificial wetlands (Threat Rank: Medium)

Some of the more recent sites for Sora in southern NH have been in artificial wetlands such as unused ponds at wastewater treatment plants or reclaimed borrow pits. While such sites can provide suitable habitat for a number of years, unless vegetation is actively managed they eventually become overgrown to the point that they are no longer quality habitat. Because such sites lack dams or hydrological connections to other wetlands, controlling increased vegetation by regulating water levels is not possible, and the only other alternative – mechanical disturbance – is but expensive and potentially damaging.

Habitat degradation and species impacts from introduced or invasive plants (Threat Rank: Medium)

There are limited data on specific responses by Soras to invasive plants (see Whitt et al. 1999).

List of Lower Ranking Threats:

Habitat conversion and mortality from drawdowns or removal of dams

Habitat degradation from removal or management of vegetation

Habitat conversion from the direct filling of wetlands for development

Actions to benefit this Species or Habitat in NH

Marshbird Monitoring

Objective:
Assess population status of secretive marshbirds

General Strategy:
Conduct standardized wetland bird surveys at sites known to have supported Soras in recent decades. Any broad wetland bird monitoring project should include this species, and should ensure that observers can identify it.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

NH distribution data from NHBR/NH eBird

Data Quality

Many of the wetlands where Soras have been recorded in recent decades are not regularly surveyed, and the species may persist undetected.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Purple Martin

Progne subis

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S1
Regional Status	

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Aerial insectivores (here including nightjars, swifts, flycatchers, and swallows) have recently received increased conservation attention due to significant declines in several species (Hunt 2009, Nebel et al. 2010). Because all species share a common prey base of flying insects, there has been much speculation on a potential common cause for many of the declines. Much current research has been directed toward swifts and swallows in North America, resulting in greater knowledge of potential threats. Swifts and swallows have several ecological characteristics in common. All are highly aerial, and feed entirely on insects captured during sustained flight – often quite high in the air column. Threats identified for the group as a whole include changes in food supply, effects of insecticides on adults or young, loss of nesting locations, climate change. It should be noted that any of these factors could be affecting birds at any point in their annual cycle, and knowledge of their winter ecology is currently largely unknown. Like many aerial insectivores, populations of Purple Martin are in strong decline, although declines vary regionally. In NH, there were over 20 colonies during the Breeding Bird Atlas in 1980-85 (Foss 1994), but this number dropped to 10 or fewer by the early 2000s when the species was the subject of targeted monitoring (Hunt 2002, unpub. data). By 2013, there were only 3-4 known colonies, all of which contained five or fewer pairs. Large colonies in Moultonborough, Freedom, and Conway appear to have disappeared between 2004 and 2012, and the other historic colony in Laconia dropped from 12 pairs as recently as 2010 to only two in 2014 (Hunt, unpubl. data). This species shows a complex mix of trends in the BBS (Sauer et al. 2014), including significant declines in BCR 14 (-7-84%/year, 1966-2013) but increases in BCR 30 (+1.13%/year). But because the species is so highly colonial, BBS may not accurately reflect trends. Where Breeding Bird Atlas have been repeated at the northern edge of its breeding range, the species has shown a decrease in occupancy of 40-60% (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, Massachusetts Audubon Society 2014).

Distribution

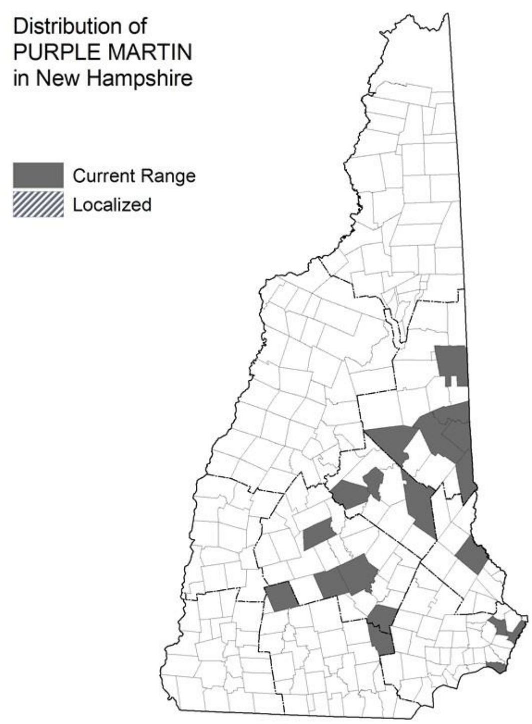
Most of the population occurs in the eastern half of the United States and in adjacent southern Canada, with local populations in the southwest (including Mexico) and along the Pacific coast north to British Columbia. It winters in South America east of the Andes, primarily in Brazil. In New Hampshire, colonies have historically been almost entirely south of the White Mountains, and concentrated from the Lakes Region south (Foss 1994). There have been extremely few nesting records from the Connecticut River watershed.

Habitat

The Purple Martin is unique among the native birds of eastern North American in that it has come to be almost entirely reliant on housing structures provided by people (Tarof and Brown 2013). The shift from loose colonies in natural cavities to concentrations in artificial ones had already begun prior to European settlement, through use of gourds by Native Americans. Colonies can occur in a wide variety of situations, although they are usually in open areas. Most New Hampshire colonies are close to water, and surrounding landscapes have included golf courses, lakeshores, farm fields, and salt marsh.

NH Wildlife Action Plan Habitats

- Developed Habitats
- Grasslands
- Salt Marshes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Declining in NH, both in terms of number of colonies on number of pairs at extant colonies.

Population Management Status

All colonies are in structures provided and maintained by people. Continued successful nesting generally requires that nesting structures are cleaned at least annually, and recommended management practices also include competitor exclusion and removal.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Of the three known colonies, only the one in Seabrook is subject to intensive management in the form of weekly nest checks, although the housing in Laconia and Wakefield is taken down and cleaned at the end of each summer.

Habitat Protection Status

Most nesting locations are probably on private property and thus not protected in the traditional sense of the term.

Habitat Management Status

See Population Management Status and Quality of Habitat.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Disturbance and mortality from spring cold snaps and intense storms (Threat Rank: Medium)

Because martins rely on flying insects, foraging success can be compromised during cold and/or wet periods when prey species are inactive, particularly in spring. Under such conditions adults may abandon nests, fail to sufficiently provision nestlings, or even starve. Major single-year drops in the number of colonies in New England occurred in 1903 (Forbush 1929), 1959 (Hebert 1959), and 1972 (Tate 1972). If such weather patterns become more frequent in the northern portion of the Purple Martin's breeding range, as has been predicted by some climate change models, the species may experience more such die-offs or years with minimal reproductive success. Because martins concentrate in extremely high numbers during migration, they may also be vulnerable to significant storm-related mortality at this time (Butler 2000).

Disturbance from lack of colony management (Threat Rank: Medium)

In addition to the need for competitor management, recommended management generally includes at least weekly monitoring. This can detect infestations of parasites (e.g., blowflies) that occur under certain conditions, as well as being an opportunity to remove competitors. There is extensive evidence that provision and maintenance of suitable housing can result in population recovery over relatively short time periods (Tarof and Brown 2013).

Disturbance from competition with non-native cavity nesters (Threat Rank: Medium)

Both European Starlings (*Sturnus vulgarus*) and House Sparrows (*Passer domesticus*) regularly use nesting cavities also favored by martins. These non-native species nest earlier than martins and can thus exclude them from some nest sites, and are also known to destroy martin nests or kill young chicks (Tarof and Brown 2013). Although these species have been known to coexist with healthy martin colonies (P. Hunt, pers. obs.), recommended management includes exclusion, trapping, and/or removal of eggs and young.

Species impacts from agricultural pesticide use causing prey declines (Threat Rank: Medium)

There is increasing evidence from studies on other species of aerial insectivores that increased use of insecticides is impacting prey availability (Evans et al. 2007, Ghilain and Bélisle. 2008, Nocera et al.

2012, Paquette et al. 2014). Although not documented in martins, some such studies have shown that swallows breeding in more heavily agricultural landscapes may exhibit reduced nestling growth rates.

List of Lower Ranking Threats:

Mortality from pesticide use in South America

Disturbance from agricultural pesticide use in North America

Disturbance and conversion of non-breeding roosts from work activities

Mortality from extreme weather that impacts migratory roosts

Disturbance and mortality from winter drought

Actions to benefit this Species or Habitat in NH

Purple Martin colony management

Primary Threat Addressed: Disturbance from lack of colony management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Enhance local Purple Martin productivity

General Strategy:
Implement more intensive management at existing colonies where it is not currently occurring (Laconia and Wakefield). This could include additional/alternative housing, social attraction, and competitor management, in addition to weekly monitoring

Political Location:
Belknap County, Carroll County, Rockingham County, Strafford County

Watershed Location:
Androscoggin-Saco Watershed, Pemi-Winni Watershed, Coastal Watershed

Purple Martin recruitment

Primary Threat Addressed: Disturbance from lack of colony management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Establish new Purple Martin colonies at recently-used locations

General Strategy:
At historic sites where colonies have recently disappeared, and at other high-potential sites, work with landowners and local volunteers to improve housing conditions and attempt to attract martins.

Political Location:
Belknap County, Carroll County, Rockingham County, Strafford County

Watershed Location:
Androscoggin-Saco Watershed, Pemi-Winni Watershed, Merrimack Watershed, Coastal Watershed

References, Data Sources and Authors

Data Sources
Trend data from BBS and Breeding Bird Atlases (citations above).

Data Quality
When martin surveys were promoted and coordinated at the statewide level (1959 to 1960, early 1980s, and early 2000s), data on martin distribution in New Hampshire were probably very accurate. The species' colonies are highly visible and the species is easily identified. However, as the number and size of colonies continues to decline, the chances of small colonies going undetected increases. This is evidenced by two of the three current colonies only becoming "known" in 2013, and 3 of the 10 colonies active in 2002-2004 were previously undocumented. Ironically, martins' penchant for nesting in residential areas and on golf courses probably decreases the chances of colonies being sighted, because lay birders do not frequent these areas.

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Pamela Hunt, NHA

2005 Authors:

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Bank Swallow

Riparia riparia

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	High

Photo by Jason Lambert

Justification (Reason for Concern in NH)

Aerial insectivores (here including nightjars, swifts, flycatchers, and swallows) have recently received increased conservation attention due to significant declines in several species (Hunt 2009, Nebel et al. 2010). Because all species share a common prey base of flying insects, there has been much speculation on a potential common cause for many of the declines. Much current research has been directed toward swifts and swallows in North America, resulting in greater knowledge of potential threats. Swifts and swallows have several ecological characteristics in common. All are highly aerial, and feed entirely on insects captured during sustained flight – often quite high in the air column. Threats identified for the group as a whole include changes in food supply, effects of insecticides on adults or young, loss of nesting locations, climate change. It should be noted that any of these factors could be affecting birds at any point in their annual cycle, and knowledge of their winter ecology is currently largely unknown. Like many aerial insectivores, populations of Bank Swallow are in strong decline. Based on BBS (Sauer et al. 2014) data the species has declined at 9.25% annually since 1966 in NH (-8.46% from 2003-2013). Regionally, declines are higher in the north (BCR 14: -10.59%) than the south (BCR 30: -4.09%) (see also Nebel et al. 2010). Repeated Breeding Bird Atlases have documented declines in occupancy of 30-45% (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013).

Distribution

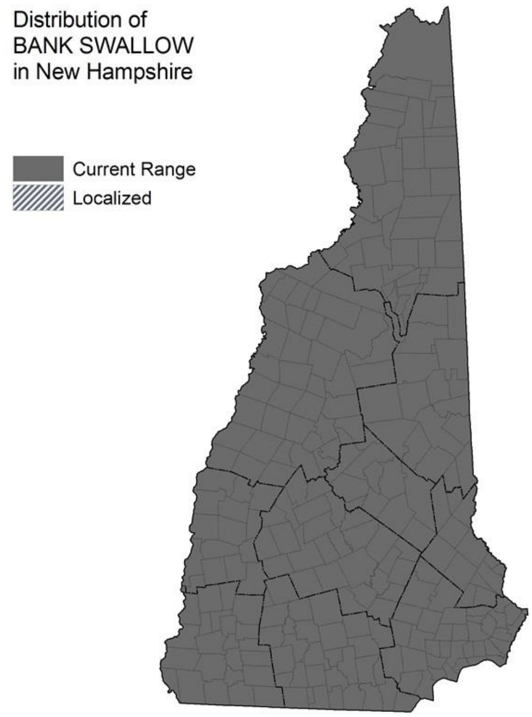
Holarctic in distribution. In North America breeds (generally) from Alaska and northern California (where rare) east to southern Labrador and Chesapeake Bay. Bulk of North American population winters in South America (south to northern Argentina), with smaller numbers in western Mexico (Garrison 1999). It is found statewide in NH, although scarce in the seacoast area where suitable habitat is rare (Foss 1994).

Habitat

Bank Swallows breed in exposed vertical banks along rivers, lakes, and oceans, where regular erosion by currents or wave action results in new substrate continually being exposed. They will also use exposed sand or dirt banks created in sand and gravel quarries and road cuts, and even dirt piles at construction sites. The largest colonies in New Hampshire have historically been on dynamic stretches of higher-order rivers such as the Connecticut, Merrimack, and Saco, and their larger tributaries. Some colonies in sand pits can also get quite large, although their persistence is often limited by ongoing extraction and nearby human activity

NH Wildlife Action Plan Habitats

- Large Warmwater Rivers
- Warmwater Rivers and Streams
- Coldwater Rivers and Streams
- Developed Habitats
- Grasslands
- Lakes and Ponds with Coldwater Habitat
- Marsh and Shrub Wetlands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant range wide population declines and some range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Comprehensive Shoreland Protection Act - NHDES
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable, depending on local river management or activity at gravel pits.

Habitat Protection Status

Highly variable.

Habitat Management Status

Habitat management has not been implemented for this species. If anything, much management activity along rivers (bank stabilization, dams) is a detriment to this species (see threats).

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Species disturbance and habitat impacts from mining (sand & gravel) (Threat Rank: High)

Although sand and gravel mining operations create new habitat for Bank Swallows, there are no guarantees that nesting swallows are protected during normal excavation activity at such sites. An entire colony may be destroyed if the portion of bank it is using is targeted for excavation, and unlike disturbances at natural river banks (e.g., floods), these disturbances may be more concentrated during the breeding season.

Habitat conversion and impacts from bank stabilization, altered erosional patterns and shoreline hardening (Threat Rank: High)

Bank Swallows nest primarily in river banks that have been exposed by erosion, and are adapted to shift colony locations within a local area as habitat is lost and becomes available elsewhere through natural processes. Structures such as dams or bank stabilization projects have the potential to alter natural erosional patterns and reduce overall habitat availability (Silver and Griffin 2009, Bank Swallow Technical Advisory Committee 2013), and such effects may be complicated by the more frequent and/or intense flooding events predicted by some climate change scenarios. Such extreme flood events can eliminate an entire breeding season's productivity if they occur in the summer, and destroy whole colonies at any time of year (Szép 2006). Although Bank Swallows are adapted to shifting habitats, increased frequency of habitat loss may result in additional stress to populations. Stabilization projects conducted during the breeding season are also likely to result in direct mortality of nests and young, and possibly even adults (Bank Swallow Technical Advisory Committee 2013).

Disturbance and mortality from winter drought (Threat Rank: Medium)

Considerable research in both Europe and North America has linked annual survival in several swallow species (including Bank) to long-term climate cycles such as El Niño and the North Atlantic Oscillation. In such cases, lower survival generally follows periods in these climate cycles where the winter grounds experience drought (Szép 1995, Robinson et al. 2008, Garcia-Pérez et al. 2014), and if drought increases as a result of climate change then one would expect such periods of low survival to become more frequent. There also appear to be carry-over effects in which productivity is higher in the breeding season following winters with more favorable conditions (Saino et al. 2003).

Species impacts from agricultural pesticide use causing prey declines (Threat Rank: Medium)

There is increased evidence from studies on other species of swallows that increased use of insecticides is impacting prey availability (Evans et al. 2007). Research in Canada has documented a variety of negative effects on Tree Swallows using heavily agricultural areas, including lower adult mass, lower clutch size, poor nestling condition and survival, and reduced annual return rates (Ghilain and Bélisle 2008, Paquette et al. 2014).

List of Lower Ranking Threats:

Mortality from pesticide use in South America

Disturbance from agricultural pesticide use in North America

Disturbance and mortality from spring cold snaps and intense storms

Actions to benefit this Species or Habitat in NH

Bank Swallow surveys

Objective:
Detailed information on colony locations

General Strategy:
There is still incomplete information on the locations and sizes of Bank Swallow colonies in New Hampshire. Successful prioritization and implementation of habitat management requires knowledge of where significant colonies – or habitat for such – are located. Encourage paddlers and birders to keep their eyes out for active colonies and report their locations.

Political Location:
Statewide

Watershed Location:

Bank Swallow habitat research

Objective:
Identify characteristics of high quality Bank Swallow habitat.

General Strategy:
Using data on colony locations, characterize river segments that have the highest potential for occupancy and prioritize them for conservation and/or appropriate management.

Political Location:
Statewide

Watershed Location:

Gravel pit Best Management Practices (BMPs)

Primary Threat Addressed: Species disturbance and habitat impacts from mining (sand & gravel)

Specific Threat (IUCN Threat Levels): Energy production & mining

Objective:
minimize impacts of sand and gravel operations on nesting Bank Swallows

General Strategy:
Develop BMPs for potential use in sand and gravel pits and promote them with pit operators/owners

Political Location:
Statewide

Watershed Location:

Bank stabilization assessment

Primary Threat Addressed: Habitat conversion and impacts from bank stabilization, altered erosional patterns and shoreline hardening

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Minimize impacts of bank stabilization projects on nesting Bank Swallows and their habitat

General Strategy:
Require bank stabilization projects to first assess the site – and adjacent areas – for signs of Bank Swallow nesting activity

Political Location:
Statewide

Watershed Location:

Bank Stabilization mitigation

Primary Threat Addressed: Habitat conversion and impacts from bank stabilization, altered erosional patterns and shoreline hardening

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
minimize impacts of bank stabilization projects on nesting Bank Swallows and their habitat

General Strategy:
Require mitigation for bank stabilization or similar projects, especially in Bank Swallow concentration areas

Political Location:
Statewide

Watershed Location:

Bank restoration

Primary Threat Addressed: Habitat conversion and impacts from bank stabilization, altered erosional patterns and shoreline hardening

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
Restore armored riverbanks to a condition suitable for nesting Bank Swallows

General Strategy:
Remove revetment from sections of rivers where it is feasible and has the potential to restore Bank Swallow habitat

Political Location:
Statewide

Watershed Location:

References, Data Sources and Authors

Data Sources
Trend data from BBS and Breeding Bird Atlases (citations above)

Data Quality
The highly colonial nature of this species potentially confounds BBS data because colonies can move in space between years. However, the declines indicated by BSS are corroborated by the more systematic data collected by Atlases.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

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American Woodcock

Scolopax minor

Photo by Jason Lambert

Federal Listing	N/A
State Listing	SGCN
Global Rank	G5
State Rank	S4
Regional Status	Very High

Justification (Reason for Concern in NH)

Woodcock numbers in New Hampshire tend to be stable and relatively strong compared to data from other portions of the eastern United States. Woodcock are most abundant in northern New Hampshire, where habitat is most suitable. Singing-ground Survey results for the Eastern Management Region in 2015 show a significant declining 10-year trend of -1.56% per year which is the second year in a row there has been a declining 10-year trend (Cooper and Rau 2015). Loss of early successional forest habitat is believed to be the cause of declines in recruitment and overall population status (Kelley et al. 2008, Dessecker and McAuley 2001).

Distribution

Breeding woodcock are relatively common throughout New Hampshire at elevations below 2,000 ft (610 m), although their numbers have declined since the 1960s in eastern New Hampshire (Lacaillade 1994). Singing ground survey data indicate that New Hampshire's highest woodcock concentrations occur in the west-central and southeast regions of the state and in northern Coos County (Lacaillade 1994). Historical records for woodcock are vague. Since the woodcock is a small game bird, it was probably not hunted until larger game began to disappear (Silver 1957). Fishermen introduced earthworms to the Umbagog Region around 1825 for bait; woodcock were believed to have appeared there shortly afterwards and were common by the late 1800s (Silver 1957). For more information on the abundance and distribution of habitat suitable for woodcock, see the Shrublands habitat profile.

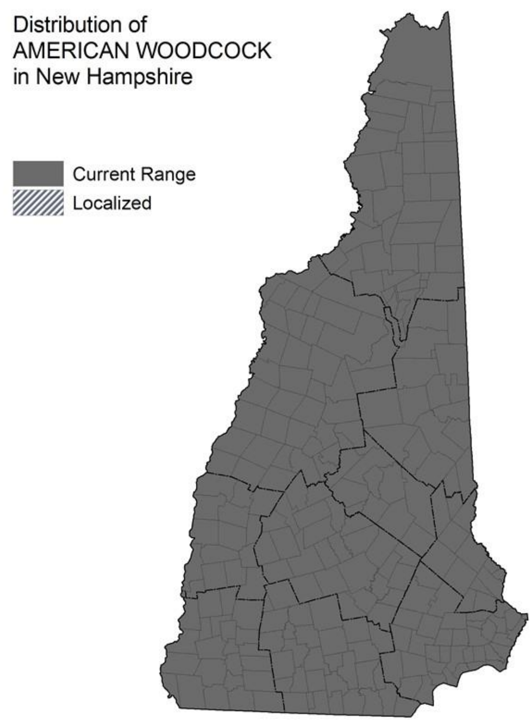
Habitat

Woodcock are an early successional species that use different habitats depending on activity, time of day, and season. Dense, shrub-dominated forests with moist soils are ideal habitats (Keppie and Whiting 1994). Moist soils ensure that earthworms, which comprise nearly 80% of woodcock diet, are near the soil surface and are available to foraging birds (Dessecker and McAuley 2001).
In spring, males need openings ("singing grounds") to perform courtship displays and attract females (Dwyer et al. 1988). Available nesting and rearing habitat determine the location of singing grounds rather than specific vegetation characteristics (Dessecker and McAuley 2001). Migrating and breeding woodcock favor areas of young aspen, birch, or alders and may also use overgrown fields, burned or recently logged areas, and wetlands (Lacaillade 1994). Nests and broods can be found in mixed-age forests, although young hardwood stands (especially aspen) are preferred (Mendall and Aldous 1943). During summer, young hardwoods to older stands with a dense understory, particularly alder, provide daytime cover for feeding (Dessecker and McAuley 2001). In northern breeding areas, conifer stands are used rarely, except during droughts when they may be critical for survival (Straw et al.

1994). Young hardwood stands on moist soils with dense shrubs are important in the fall and during migration.

NH Wildlife Action Plan Habitats

- Shrublands
- Marsh and Shrub Wetlands
- Appalachian Oak Pine Forest
- Hemlock Hardwood Pine Forest
- Northern Swamps
- Temperate Swamps



Distribution Map

Current Species and Habitat Condition in New Hampshire

The Singing-ground Survey indicates that New Hampshire's highest breeding concentrations occur in the west central and southeastern regions of the state and in northern Coos County (Lacaillade 1994). The Singing-ground Survey in the Eastern Region in 2015 was not significantly different than the 2014 level, however there was a significant declining 10 year trend (2005-2015) of -1.56% per year for two consecutive years (2014 and 2015). In the Eastern Region, the 2015 index was 2.45 singing-males per route (Cooper and Rau 2015).

For the wing-collection survey, the 2014 recruitment index in the Eastern Region (1.49 immatures/adult female) was 6.9% less than the 2013 index and 8.9% below the long term (1963-2013) regional average (Cooper and Rau 2015). New Hampshire's Breeding Bird Atlas reveals that woodcock are still well distributed throughout the state, and suggests that they are most common in the central and southeast regions (Lacaillade 1994).

Elsewhere in the Eastern region, population abundance indices suggest a long-term decline (Kelly 2004). Loss and degradation of wetlands have destroyed breeding, migration, and wintering habitat (Lacaillade 1994). Pesticides have affected the earthworm populations in many areas, decimating the woodcock's primary food source (Lacaillade 1994).

Population Management Status

Reliable annual population estimates, harvest estimates, and information on recruitment and distribution are essential for comprehensive woodcock management.

Regulatory Protection (for explanations, see Appendix I)

- Harvest permit - season/take regulations
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Refer to the Shrubland habitat profile for information on relative quality of habitat patches for American woodcock.

Habitat Protection Status

Since no habitat map was generated, the habitat patch protection status of young forest habitats in New Hampshire is unknown. However, given the ephemeral nature of young forest habitats, tree harvesting and other vegetation manipulation techniques will need to be employed to generate suitable habitat. This can occur on both public and private land.

Habitat Management Status

See the Shrubland habitat profile.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: Medium)

Direct loss of shrubland habitat occurs through the conversion of these lands for residential, industrial, and commercial purposes. Development patterns lead to fragmentation of remaining undeveloped habitats, creating smaller patches that may not sustain wildlife populations and promoting generalist predators that prey on shrubland-dependent wildlife (Barbour and Litvaitis 1993, Litvaitis 2005).

Young forest habitats are important to a large suite of animals, including American woodcock (DeGraaf et al. 2005). Wildlife that utilizes young forest habitat conditions benefited from the wave of early successional habitats that followed the peak of farm abandonment in the late 1800s. As forests matured the amount of early successional habitats declined, leading to declines in associated wildlife species. In parts of New Hampshire, especially the southern tier, the amount of young forest habitat of functional quality for wildlife may now be falling below historic levels as current landscape conditions are strikingly different than in pre-settlement times (Brooks 2003, Litvaitis 2003, DeGraaf et al. 2005). Remaining patches of forest are broken up or fragmented into isolated patches. Species with small home ranges (such as American woodcock) may be able to occupy the remaining habitat patches. However, even these animals may be hampered by the consequences of human land uses that surround small patches of habitat. Increases in generalist predators may reduce or even eliminate small populations of prey species (Barbour and Litvaitis 1993, Oehler and Litvaitis 1996). Over time, these small patches may contain fewer species than similarly sized patches that are surrounded by extensive forests (Litvaitis 2005).

Habitat degradation from forest maturation due to lack of management (Threat Rank: Medium)

Shrubland-dependent wildlife species require dense understory cover; their occurrence is influenced more by the height and density of vegetation than by specific plant communities (Litvaitis 2003). Hence populations of American woodcock and other young forest species shift in space and time in response to natural disturbances and human land uses (Litvaitis 2005). As more open land is converted to development there is less overall space for young forest-dependent species to shift into when natural forest succession or lack of active management makes their current habitat patch unsuitable. Proactive habitat management practices must be implemented at regular intervals to ensure a continuous supply of quality grouse habitat on the landscape.

The New England landscape has gone through dramatic changes over the last 350 years. In the mid 1800s, 75% of the arable land in central and southern New England was in pasture and farm crops. One hundred years later, New England was once again forested – a result of farm abandonment after richer farm fields opened up in the Midwest (DeGraaf et al. 2005). Today, about 80% of New Hampshire is forested again. However, the second growth forests lack the structural diversity including the range of seral stages present in pre-settlement forests (DeGraaf et al. 2005). The forests have matured, while natural disturbance processes, such as fire, have been disrupted, reducing the amount of early successional conditions (Litvaitis 2003, DeGraaf et al. 2005). The conversion of young forests to residential and commercial development combined with forest maturation (i.e., lack of disturbance) is reducing early successional habitat to levels at or below historical levels (Brooks 2003). Based on current trends and predictive models, New Hampshire's forested lands will continue to decline. Forest loss linked to population growth indicates the conversion of another 225,000 acres in the years out to 2030, dropping New Hampshire forest land to 78.5% of total land area (Sunquist 2010).

List of Lower Ranking Threats:

Species impacts from extreme weather and shifting migrating patterns and timing.

Actions to benefit this Species or Habitat in NH

Protect large blocks of forest suitable for forest management and the creation of young forest stands

Primary Threat Addressed: Habitat conversion due to development and impacts from fragmentation

Specific Threat (IUCN Threat Levels): Residential & commercial development

Objective:

Permanently protecting large blocks of forest suitable for forest management and the creation of young forest stands, especially in the south, will provide an opportunity to manage for natural early successional forests.

General Strategy:

Fee simple acquisition of priority forest areas by NHFG or other partners will enable these agencies to manage for the range of wildlife species that depend on them, including American woodcock. Conservation easements can be used to ensure long-term management of these habitat types by private landowners. Given the pace of development and loss of open space in New Hampshire, this conservation action should receive priority, especially in the southern part of the state. Once lands are permanently protected the decision cannot be reversed, however, management decisions to benefit priority wildlife species can be adapted as needed. The ephemeral nature of early successional forests makes it difficult to permanently protect them. The best approach may be to identify large blocks of forest that provide opportunity for forest management. The New Hampshire Land and Community Heritage Investment Program is a critical resource for maintaining and protecting large forest blocks, if new funds become available. Although permanent land conservation is typically more expensive than other conservation measures, this action may be required to sustain young forest-dependent wildlife.

Political Location:
Statewide

Watershed Location:
Statewide

Create and maintain young forest habitat

Primary Threat Addressed: Habitat degradation from forest maturation due to lack of management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:

Provide adequate young forest habitat conditions to sustain populations of American woodcock and other young forest-dependent wildlife.

General Strategy:

Since young forest habitats are relatively short-lived (20 to 25 years in most cases), periodic management is needed to maintain this habitat type. Managing forest vegetation for a specific height and density should encourage many early successional species, depending on spatial scale and landscape context. Creating small patches of young forest habitats in a developing landscape may not yield desired results because of competing pressures of predation, disturbance, and the effect of fragmentation on wildlife movement. Managed habitats should be positioned near existing patches of shrubland, wetland, or a beaver flowage to maintain landscape-scale connectivity. Protection and maintenance of scrub-shrub wetlands will be important for maintaining woodcock populations in New Hampshire. This can be done by maintaining natural establishment, occupancy, and abandonment of beaver flowages. In some instances, regeneration of alder stands may be necessary. Initially, the size of timber harvests would be larger than natural disturbances to offset the shortfall in early-successional habitat that currently exists (for example 4-10 ha) (Litvaitis 2005). As forests mature, management efforts (especially timber harvests) could then be patterned after canopy gaps (Runkle 1991) or modified to specific silviculture practices of a region (Seymour et al. 2002) if other forms of early-successional habitats (e.g. native shrublands and beaver impoundments) are adequately represented. Large forested blocks suitable for forest management will first need to be identified. If in public owner-ship, then resource managers can manage the habitat. If on private lands, then an education and outreach program could be directed at landowners to maintain diverse habitats on their lands, including early successional habitats. UNH Cooperative Extension and the New Hampshire Coverts Program have an extensive network of landowners interested in wildlife and could be valuable partners in developing the means to educate landowners and facilitate forest management on private lands. NHFG can work with its state and federal partners to develop management plans on public lands that pro-mote a variety of forested stages including blocks of young forests, and developing an education campaign on the importance of maintaining a suite of forested conditions including young forest habitats.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

The primary source of information was the annual woodcock report compiled by the USFWS for those states that conduct annual singing ground surveys. Information was gleaned from this document through literature reviews, research projects conducted in the region, and available databases. Sources of information include journal articles, websites, GIS data, and white papers.

Data Quality

The quality of population data for woodcock is very good, however, confirmed breeding records are difficult to obtain due to the species' inconspicuous nesting behavior (Lacaillade 1994). Singing ground surveys have been conducted since 1968 and summarized annually. Woodcock are managed on the basis of 2 regions or populations, Eastern and Central (Kelley 2004). There is a wing-collection survey of hunters that provides age-specific data used to assess reproductive success (Kelley 2004). The ratio of immature birds per adult female in the harvest provides an index to recruitment of young into the population (Kelley 2004). Many studies on brood ecology, early successional habitat, and influence of hunting have been completed in the Northeast.
The extent and quality of data for woodcock population information are quite good. However, information on habitat abundance and distribution is lacking.

2015 Authors:
Jessica Carloni, NHFG

2005 Authors:
Julie Robinson, NHFG; Jim Oehler, NHFG

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Bay-breasted Warbler

Setophaga castanea

Photo by Len Medlock

Federal Listing	N/A
State Listing	
Global Rank	S5
State Rank	S4
Regional Status	Very High

Justification (Reason for Concern in NH)

Populations of the Bay-breasted Warbler have been in decline in the United States based on data from the Breeding Bird Survey (Sauer et al. 2014). The long-term trend (1966-2013) for New Hampshire is -5.48%/year, while that for BCR 14 is -1.62%/year (but a non-significant positive trend since 2003). In contrast, populations to the north in Canada have been stable or show non-significant increases (e.g., 6.59%/year in Quebec for 2003-2013). Data from repeated Breeding Bird Atlases support these trends, with increases in occupancy in Ontario (Cadman et al. 2007) and declines in New York (McGowan and Corwin 2008). The species' rarity in Vermont (Renfrew 2013) makes interpretation of Atlas data from that state difficult. Bay-breasted Warbler is considered a Regional SGCN in USFWS Region 5, and is on the Partners in Flight Watch List.

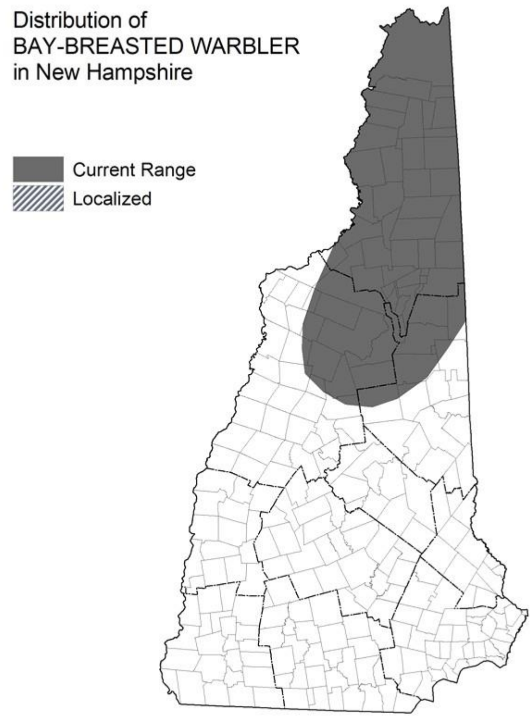
Distribution

Breeds across boreal Canada from northeast British Columbia to Newfoundland and Nova Scotia, and south to the extreme northern portions of Minnesota, Michigan, New York, and New England (Venier et al. 2011). It winters in Panama and northwestern South America. In New Hampshire it breeds from the White Mountains north (Foss 1994).

Habitat

Bay-breasted Warblers breed in coniferous-mixed boreal forest, usually in mature stands containing spruce and/or fir, and often near water (Venier et al. 2011). Generally occurs at lower elevations, although small numbers will use suitable habitat higher up mountain slopes. A key – although not required – habitat element is the presence of spruce budworm (*Chloristoneura fumiferana*). Along with Tennessee and Cape May Warblers, this is one of three species that are generally considered "budworm specialists," in that they can increase in density very rapidly during a budworm outbreak, and even produce larger clutches (Venier et al. 2009). Budworm populations are highly cyclic in nature, and large outbreaks only occur at roughly 40-year intervals (Boulanger and Arseneault 2004), and these fluctuations may be responsible for much of the variation seen in population data for Bay-breasted Warblers.

NH Wildlife Action Plan Habitats



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant declines in the southern portion of its range (see Justification), but increasing in eastern Canada. A new budworm outbreak in southeastern Quebec (Natural Resources Canada 2015) is expanding south, and likely to move into Maine and New Brunswick within 10 years (Rankin 2013). Bay-breasted Warblers are already anecdotally more common as migrants in southern New Hampshire, a pattern consistent with increasing populations associated with the Quebec budworm outbreak.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown, but since spruce budworm has been largely absent from the state for decades, most habitat is probably or relatively low quality at present.

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion from harvest practices that result in conversion of softwood to hardwood (Threat Rank: High)

Soil and other environmental conditions over extensive acreage in northern New Hampshire create the potential to support either spruce-fir or northern hardwood-conifer forest. Historical harvesting practices in some areas have resulted in conversion of former spruce-fir sites to northern hardwood-conifer forest, in turn reducing habitat for this species. See also the lowland spruce-fir forest habitat profile.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. This threat is ranked as "moderate" largely because it was ranked this way lowland spruce-fir habitat. In reality, many of the areas used by Bay-breasted Warblers are probably at relatively low risk due to protected status or remote locations. See also the lowland spruce-fir forest habitat profile.

Habitat degradation from harvest practices that prevent much of the forest from reaching later successional stages (Threat Rank: Medium)

Extensive, heavy cutting in recent decades has substantially reduced the distribution of mature spruce-fir forest in New Hampshire. Mahaffey (2014) reports that softwoods are being harvested far in excess of growth in the Androscoggin Valley-Mahoosuc Region of northern NH, which is further evidence of the imbalance of softwood age classes on private ownerships in NH. Note also that budworm outbreaks generally reach higher densities in older forest, and thus older forest is likely to support more Bay-breasted Warblers in such situations. See also the lowland spruce-fir forest habitat profile.

List of Lower Ranking Threats:

Habitat impacts and disturbance from control of insect pests (spruce budworm) that reduces prey

Habitat impacts and disturbance from acid deposition that can reduce prey

Disturbance from noise associated with recreational activity

Habitat impacts from road fragmentation

Habitat conversion and degradation from agriculture on winter grounds

Habitat degradation from habitat shifting and changes in species composition

Habitat conversion due to development on winter grounds

Actions to benefit this Species or Habitat in NH

See actions for Lowland Spruce Fir Forest.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality

Because of low densities, especially in recent years, New Hampshire data on this species during the breeding season are extremely limited.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Cerulean Warbler

Setophaga cerulea

Federal Listing	N/A
State Listing	SC
Global Rank	G4
State Rank	S1
Regional Status	Very High

Photo by Dennis Skillman

Justification (Reason for Concern in NH)

The Cerulean Warbler has been declining across its range at -2.91%/year, and in the Northeast (USFWS Region 5) at -2.14%/year (Sauer et al. 2014). The New Hampshire population has always been quite small, and Cerulean Warblers may have disappeared from their only reliable breeding site – Pawtuckaway State Park – after 2012. Cerulean Warbler is considered an SGCN in all states where it occurs, as well as an RSGCN in USFWS Region 5. It is also on the Partners in Flight Watch List and the focus of a working group dedicated to range-wide and full life cycle conservation of the species.

Distribution

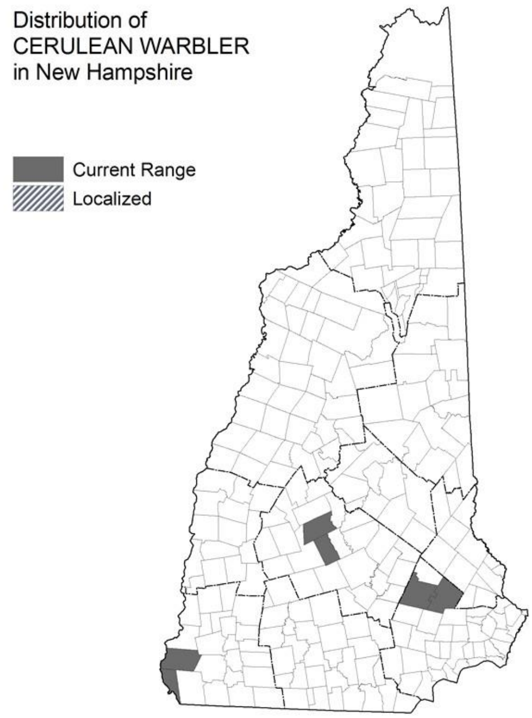
The Cerulean Warbler currently breeds across much of the Midwest and Appalachians from Minnesota and Arkansas to North Carolina and New York, although its distribution is highly patchy in much of this range. It is rare in New England, where it occurs in small isolated populations in Connecticut, Massachusetts, Vermont, and New Hampshire. It winters in the highland of northwestern South America from Venezuela to (rarely) Bolivia. Populations in the northeastern United States expanded somewhat during the 1980s (McGowan and Corwin 2008, MassAudubon 2014), including scattered breeding season records in New Hampshire (Foss 1994). It was first recorded breeding in the state in 1995 at Pawtuckaway State Park (Deerfield/Nottingham), where a maximum of four singing males have been reported. Birds were reliable at Pawtuckaway from the early 1990s through 2010, but there is only one record – from late May 2012 – since that time and the species may have disappeared from the site. Other sites with multiple records include Mount Wantastiquet (Hinsdale), where birds were reported in 1987, 1991, 2010, and 2012; and near the Blackwater River (Salisbury/Webster), with records from 1988, 1989, and 1998.

Habitat

During the breeding season, cerulean warblers occupy two different types of hardwood forest: floodplain and upland. Most of the global population occurs in the latter, particularly in the Appalachians, where the species occurs primarily in productive hardwood forests on north or east-facing slopes (Buehler et al. 20130). Within these forests, birds prefer areas with scattered large trees, canopy gaps or other disturbances, and a relatively open mid-story layer. Similar structural features are selected in floodplain forests. Most records of the species in New Hampshire are from upland hardwood forests. The small population at Pawtuckaway State Park occupies a mixed red oak/red maple/white pine forest (New Hampshire Division of Parks and Lands, unpublished data) that occurs at relatively high elevation (400 to 900 ft) on variable slopes. Mount Wantastiquet in Hinsdale and Chesterfield is another steep, upland hardwood site (35% grade).

NH Wildlife Action Plan Habitats

- Appalachian Oak Pine Forest
- Floodplain Habitats



Distribution Map

Current Species and Habitat Condition in New Hampshire

Has always been rare and local in NH, and possibly extirpated from the site that has hosted the majority of records.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

unknown

Habitat Protection Status

Both Pawtuckaway and Wantastiquet are protected and managed by the NH Department of Resources and Economic Development.

Habitat Management Status

Habitat is not managed for this species in New Hampshire.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. This threat is ranked as "moderate" largely because it was ranked this way for one or more of the habitats used by Cerulean Warblers. In reality the sites recently occupied by this species are probably at relatively low risk due to protected status.

Habitat impacts from road fragmentation (Threat Rank: Medium)

Given the New Hampshire sites for Cerulean Warbler, this threat is likely lower for the species than for the habitat as a whole. Cerulean Warblers also prefer canopy gaps, and while those are not directly analogous to roads, this preference may make roads less of a fragmenting feature than for other species.

Habitat degradation from insect pests (introduced species) (Threat Rank: Medium)

Introduced insects have the potential to alter forest tree species composition. However, the specific effects of such changes to habitat on Cerulean Warblers are unknown. See also the Appalachian oak-pine habitat profile.

Disturbance (parasitism) and mortality from subsidized or introduced predators (Threat Rank: Medium)

Although Brown-headed Cowbirds (*Molothrus ater*) are known to parasitize Cerulean Warblers, the incidence of parasitism is highly variable, and its overall population impacts unclear (Buehler et al. 2013).

List of Lower Ranking Threats:

Habitat impacts and disturbance from acid deposition that can reduce prey

Disturbance from noise associated with recreational activity

Habitat conversion and degradation from timber harvest

Habitat conversion and fragmentation from tower and turbine development

Habitat conversion and degradation from agriculture on winter grounds

Actions to benefit this Species or Habitat in NH

Cerulean Warbler Surveys

Objective:

Assess population status

General Strategy:

Birders in suitable habitat in southern New Hampshire should be familiar with this species and its songs, and report it if detected. This action includes periodic surveys of Pawtuckaway, Wantastiquet, and possibly the Blackwater River to determine current status and population size See the Appalachian oak-pine forest habitat profile for more specific actions that may benefit this species.

Political Location:

Statewide

Watershed Location:

Statewide

See the Appalachian oak-pine forest habitat profile for more specific actions that may benefit this species.

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Pawtuckaway State Park is frequently visited by birders, so there is high confidence that the recent absences from that site are real, although much of the park is not thoroughly surveyed most years. Wantastiquet is only occasionally visited, so it is unclear how regular the species is there, and the Blackwater River has almost no regular birding activity. Because of their very low density in the state, it is certainly possible that Cerulean Warblers occur elsewhere in suitable habitat but have not been discovered. Detection is complicated by the similarity of the song to those of other species, including Northern Parula, Black-throated Blue Warbler, and American Redstart.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

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Prairie Warbler

Setophaga discolor

Photo by Pamela Hunt

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S4
Regional Status	Very High

Justification (Reason for Concern in NH)

Populations of many shrubland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Across its range as a whole, the Prairie Warbler has been declining at 2%/per year since 1966 (but only –0.8%/year for 2003-2013), with the corresponding rates for BCR 30 (where most of NH's Prairie Warblers occur) at -4 and -3, respectively (Sauer et al. 2014). But in NH it shows a significant increase of 2.73%/year since 1966, and a non-significant increase of 3.18%/year since 2003. This apparent increase at the northern edge of its range was also found during repeated Breeding Bird Atlases (McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014), and the species is now found farther north in NH than was documented during the NH Atlas in the early 1980s (Foss 1994).

Distribution

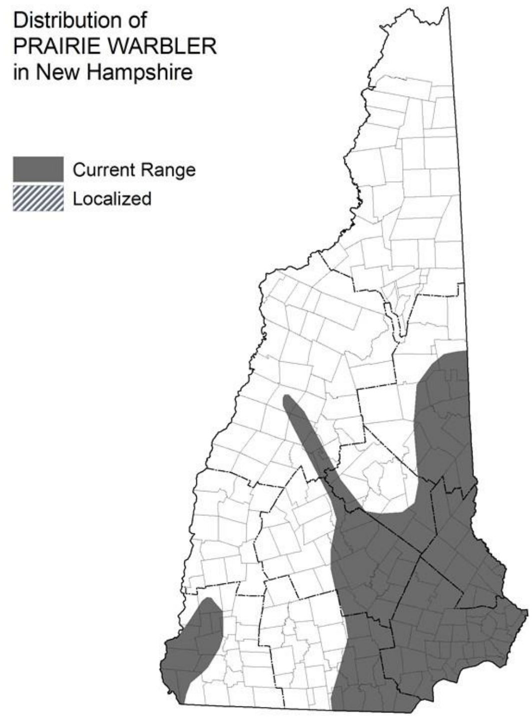
The Prairie Warbler breeds in the eastern U.S. from Wisconsin and Maine south. It winters in Florida and the Greater Antilles. In New Hampshire it occurs entirely south of the White Mountains, with the bulk of the population in the southeast. It has expanded north to Conway and west to Cheshire County since the early 1980s, and even occurs locally and irregularly in southern Grafton County.

Habitat

Like all shrubland birds, this species occurs in habitats dominated by shrubs or young trees, sometimes interspersed with mature trees (e.g., pine barrens) or open bare or grassy areas. Typical examples in New Hampshire include regenerating timber harvests, power line rights-of-way, shrubby old fields and edges, and pine barrens. From a bird perspective, such habitats can be subdivided into those dominated by shrubs vs. dominated by saplings. The former – sometimes referred to as "scrub-shrub" – is more typical of abandoned old fields, utility rights-of-way, and open areas within pine barrens. Such habitats often persist for relatively long periods without the need for additional management. Saplings, on the other hand, are typical of areas subject to timber harvest, and rarely retain early successional characteristics beyond 15-20 years. These are also regularly referred to as "young forest." Prairie Warblers are rare in the latter habitat, and tend to reach their highest densities in pine barrens or other areas with scattered short conifers (Hunt 2013).

NH Wildlife Action Plan Habitats

- Shrublands
- Pine Barrens



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant population declines rangewide, but increases and northward range expansion at the northern edge of its range (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable – see shrubland and pine barrens habitat profiles

Habitat Protection Status

Highly variable – see shrubland and pine barrens profiles

Habitat Management Status

Habitat management has not been implemented specifically for this species, although management does occur for other species (American Woodcock, New England Cottontail) that often use the same habitats. See also shrubland and pine barrens habitat profiles.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by shrubland birds are already embedded in developed landscapes (e.g., right-of-way, old fields) or viewed as "undesirable" or "waste" habitats, they may be more vulnerable to this threat.

Habitat degradation and conversion due to natural succession or lack of active management (Threat Rank: High)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used, and as a result forest maturation is generally considered the most significant threat facing birds that use shrublands and young forests. See shrubland habitat profile for more information.

Habitat degradation due to fire suppression and associated succession (Threat Rank: Medium)

In the absence of fire, pine barrens have fewer open areas eventually become closed-canopy pine forests. Although many shrubland birds can persist in such areas for a time, densities are often lower than in more open and shrub-dominated habitats. See pine barrens habitat profile for more information.

Habitat degradation from aspects of right-of-way management (Threat Rank: Medium)

Rights-of-way need to be maintained as short vegetation so as to reduce risks associated with trees and powerlines. As a result these corridors are regularly treated by mechanical (rarely chemical) means to remove or cut back vegetation. In general, such practices create habitat suitable for shrubland birds, although in extreme cases a site may be rendered unsuitable for 1-2 years large areas of vegetation are completely removed. If management occurs during the breeding season, reproductive success will be reduced. See also shrubland habitat profile.

Habitat and species impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants, particularly shrubs, have been demonstrated to have several negative effects on birds using shrubland habitats. Insect prey (particularly caterpillars) are usually less common on non-native shrubs (Burghardt et al. 2008, Fickenscher et al. 2014), while data on the nutritional value of fruit are more equivocal (e.g., Davis 2011). In some cases, birds experience lower reproductive success in non-native shrubs, although there is considerable variation (Rodewald et al. 2010, Schlossberg and King 2010), and local predator communities play an important role as well. In all cases, the effects of invasives on shrubland birds depend to a large extent on their relative abundance. If plant diversity is high, the negative effects are diluted and less likely to impact bird populations. However, if the habitat tends toward a monoculture, reduced insect supplies and/or higher predation may reduce reproductive success to the extent that the habitat becomes a sink.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

Many predators (e.g., skunks, raccoons, feral cats) occur in relatively high densities in developed landscapes, often because of direct association with humans or food that is provided either intentionally or unintentionally. Most early successional birds nest on or near the ground, and as a result are more susceptible to nest predation. The problem is compounded because much early successional habitat is near human population centers.

List of Lower Ranking Threats:

Habitat degradation from sand and gravel pit reclamation practices that make habitat unsuitable

Actions to benefit this Species or Habitat in NH

Research on response to management

Primary Threat Addressed: Habitat degradation and conversion due to natural succession or lack of active management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
To best conserve this and other shrubland birds, there is a recognized need for information on how it responds to management implemented for other early successional species.

General Strategy:
Collect standardize data on occupancy and abundance of Prairie Warblers at sites managed for New England Cottontail, American Woodcock, Karner Blue Butterfly, and other species. Combine these data with data on habitat availability at the state and regional scale, to estimate actual or potential population size, which in turn could be compared to population objectives that also need to be developed.

Political Location:
Statewide

Watershed Location:
Statewide

See also the pine barrens and shrublands profiles for habitat actions that could benefit this species.

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality
Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

Appendix A: Birds

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

Burghardt, K. T., D. W. Tallamy, and W. G. Shriver. 2008. Impact of native plants on bird and butterfly biodiversity in suburban landscapes. Conservation Biology 23:219-224.

Davis, M. 2011. Do native birds care whether their berries are native or exotic? No. Bioscience 61:501-502.

Fickenscher, J. L., J. A. Litvaitis, T. D. Lee, and P. C. Johnson. 2014. Insect responses to invasive shrubs: implications to managing thicket habitats in the northeastern United States. Forest Ecology and Management. 322:127-135.

Hunt, P.D. 2013. Bird use of pine barrens and other shrubland habitats in New Hampshire: 2010-2012. Report to NH Fish and Game Department, Nongame and Endangered Species Program. New Hampshire Audubon, Concord.

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Renfrew, R.B. 2013 (ed.). The Second Atlas of Breeding Birds in Vermont. University Press of New England, Hanover, NH.

Rodewald, A. D., D. P. Shustack, and L. E. Hitchcock. 2010. Exotic shrubs as ephemeral ecological traps for nesting birds. Biological Invasions 12:33-39.

Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version

Schlossberg, S., and D. I. King. 2010. Effects of invasive woody plants on avian nest site selection and nesting success in shrublands. Animal Conservation 13:286-293.

Cape May Warbler

Setophaga tigrina

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S3
Regional Status	High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Populations of the Cape May Warbler declined across the species' range from 1966 to 2013 (-3.1%/year on BBS, Sauer et al. 2014), but in the last ten years (2003-2013) show near-significant increases (2.9%/year). For BCR 14, the long-term trend is a non-significant -1.04%/year, and the recent trend essentially stable. Trends for Maine and New Brunswick are significantly negative for 1966-2013, and more negative but not significant for 2003-2013. In Quebec, both trends are significantly positive, at 2.93%/year and 6.47%/year. Data from repeated Breeding Bird Atlases support these trends, with a stable distribution in Ontario (Cadman et al. 2007) and declines in New York and Vermont (McGowan and Corwin 2008, Renfrew 2013). Cape May Warbler is considered a Regional SGCN in USFWS Region 5.

Distribution

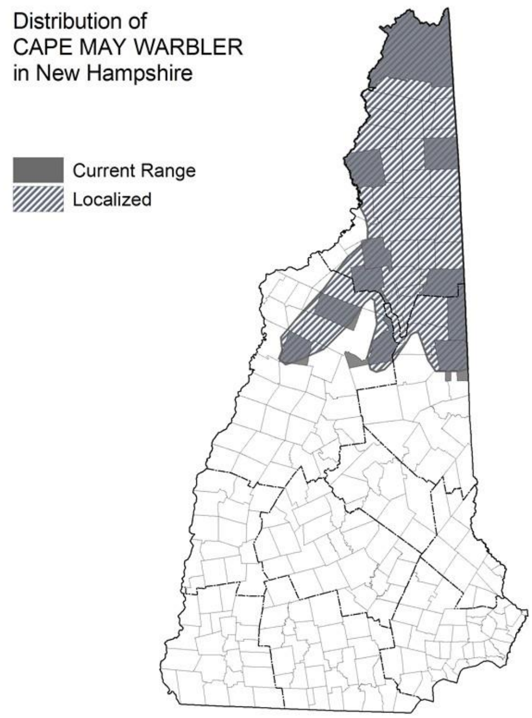
Breeds across boreal Canada from northeast British Columbia to Nova Scotia, and south to the extreme northern portions of Minnesota, Wisconsin, Michigan, New York, and New England (Baltz and Latta 1998). It winters in the Caribbean Basin, primarily in the Bahamas and Greater Antilles. In New Hampshire it breeds from the White Mountains north (Foss 1994).

Habitat

Cape May Warblers breed in intermediate-aged or mature boreal forests dominated by spruce or fir, including forested wetlands (Baltz and Latta 1998). A key – although not required – habitat element is the presence of spruce budworm (*Chloristoneura fumiferana*). Along with Tennessee and Bay-breasted Warblers, this is one of three species that are generally considered “budworm specialists,” in that they can increase in density very rapidly during a budworm outbreak, and even produce larger clutches (Venier et al. 2009). Budworm populations are highly cyclic in nature, and large outbreaks only occur at roughly 40-year intervals (Boulanger and Arseneault 2004), and these fluctuations may be responsible for much of the variation seen in population data for Cape May Warblers.

NH Wildlife Action Plan Habitats

- Lowland Spruce-Fir Forest
- Northern Swamps



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant declines in the southern portion of its range (see Justification), but increasing in eastern Canada. A new budworm outbreak in southeastern Quebec (Natural Resources Canada 2015) is expanding south, and likely to move into Maine and New Brunswick within 10 years (Rankin 20130. Cape May Warblers are already anecdotally more common as migrants in southern New Hampshire, a pattern consistent with increasing populations associated with the Quebec budworm outbreak.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Unknown, but since spruce budworm has been largely absent from the state for decades, most habitat is probably or relatively low quality at present.

Habitat Protection Status

Highly variable

Habitat Management Status

Habitat management has not been implemented for this species

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion from harvest practices that result in conversion of softwood to hardwood (Threat Rank: High)

Soil and other environmental conditions over extensive acreage in northern New Hampshire create the potential to support either spruce-fir or northern hardwood-conifer forest. Historical harvesting practices in some areas have resulted in conversion of former spruce-fir sites to northern hardwood-conifer forest, in turn reducing habitat for this species. See also the lowland spruce-fir forest habitat profile.

Habitat conversion due to development (Threat Rank: Medium)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. This threat is ranked as "moderate" largely because it was ranked this way lowland spruce-fir habitat. In reality, many of the areas used by Cape May Warblers are probably at relatively low risk due to protected status or remote locations. See also the lowland spruce-fir forest habitat profile.

Habitat degradation from harvest practices that prevent much of the forest from reaching later successional stages (Threat Rank: Medium)

Extensive, heavy cutting in recent decades has substantially reduced the distribution of mature spruce-fir forest in New Hampshire. Mahaffey (2014) reports that softwoods are being harvested far in excess of growth in the Androscoggin Valley-Mahoosuc Region of northern NH, which is further evidence of the imbalance of softwood age classes on private ownerships in NH. Note also that budworm outbreaks generally reach higher densities in older forest, and thus older forest is likely to support more Cape May Warblers in such situations. See also the lowland spruce-fir forest habitat profile.

List of Lower Ranking Threats:

Habitat impacts and disturbance from control of insect pests (spruce budworm) that reduces prey

Habitat impacts and disturbance from acid deposition that can reduce prey

Disturbance from noise associated with recreational activity

Habitat impacts from road fragmentation

Habitat conversion and degradation from agriculture on winter grounds

Habitat degradation from habitat shifting and changes in species composition

Habitat conversion due to development on winter grounds

Actions to benefit this Species or Habitat in NH

See Lowland Spruce-Fir habitat actions

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above).
NH distribution data from NHBR/NH eBird

Data Quality

Because of low densities, especially in recent years, New Hampshire data on this species during the breeding season are extremely limited.

2015 Authors:

Pamela Hunt, NHA

2005 Authors:

Literature

Baltz, M.E. and S.C. Latta. 1998. Cape May Warbler (*Setophaga tigrina*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.bnaproxy.birds.cornell.edu/bna/species/332 doi:10.2173/bna.332

Boulanger, Y., and D. Arseneault. 2004. Spruce budworm outbreaks in eastern Quebec over the last 450 years. Canadian Journal of Forest Research 34: 1035–1043.

Cadman et al. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Naturalists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

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Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015 USGS Patuxent Wildlife Research Center, Laurel, MD.

Venier, L.A., J.L.Pearce, D.R. Fillman, D.K. McNicol, and D.A. Welsh. 2009. Effects of spruce budworm (*Chloristoneura fumiferana* (Clem.)) outbreaks on boreal mixed-wood bird communities.

Field Sparrow

Spizella pusilla

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S3
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Populations of many shrubland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Field Sparrow populations in New Hampshire have declined at 8.46% annually since 1966 (-7.77% from 2003-2013). These trends are similar in regional data: BCR 14 = -6.76%/year, BCR 30 = -5.26%/year. There have also been declines of 25-45% based on repeated Breeding Bird Atlases in the northeast (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014).

Distribution

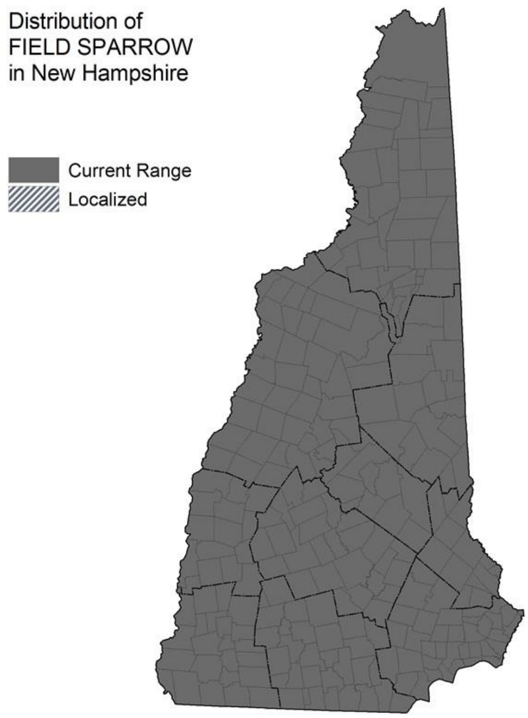
The Field Sparrow breeds across the U.S. east of the Great Plains, and winters in the southeastern United States. It occurs throughout New Hampshire although it generally less common and more local from the White Mountains north.

Habitat

Like all shrubland birds, this species occurs in habitats dominated by shrubs or young trees, sometimes interspersed with mature trees (e.g., pine barrens) or open bare or grassy areas. Typical examples in New Hampshire include regenerating timber harvests, power line rights-of-way, shrubby old fields and edges, and pine barrens. From a bird perspective, such habitats can be subdivided into those dominated by shrubs vs. dominated by saplings. The former – sometimes referred to as “scrub-shrub” – is more typical of abandoned old fields, utility rights-of-way, and open areas within pine barrens. Such habitats often persist for relatively long periods without the need for additional management. Saplings, on the other hand, are typical of areas subject to timber harvest, and rarely retain early successional characteristics beyond 15-20 years. These are also regularly referred to as “young forest.” Field Sparrows are rare in the latter habitat (Hunt 2013).

NH Wildlife Action Plan Habitats

- Shrublands
- Pine Barrens



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant population declines and limited range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable – see shrubland and pine barrens habitat profiles

Habitat Protection Status

Highly variable – see shrubland and pine barrens profiles

Habitat Management Status

Habitat management has not been implemented specifically for this species, although management does occur for other species (American Woodcock, New England Cottontail) that often use the same habitats. See also shrubland and pine barrens habitat profiles.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by shrubland birds are already embedded in developed landscapes (e.g., right-of-way, old fields) or viewed as "undesirable" or "waste" habitats, they may be more vulnerable to this threat.

Habitat degradation and conversion due to natural succession or lack of active management (Threat Rank: High)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used, and as a result forest maturation is generally considered the most significant threat facing birds that use shrublands and young forests. See shrubland habitat profile for more information.

Habitat degradation due to fire suppression and associated succession (Threat Rank: Medium)

In the absence of fire, pine barrens have fewer open areas eventually become closed-canopy pine forests. Although many shrubland birds can persist in such areas for a time, densities are often lower than in more open and shrub-dominated habitats. See pine barrens habitat profile for more information.

Habitat degradation from aspects of right-of-way management (Threat Rank: Medium)

Rights-of-way need to be maintained as short vegetation so as to reduce risks associated with trees and powerlines. As a result these corridors are regularly treated by mechanical (rarely chemical) means to remove or cut back vegetation. In general, such practices create habitat suitable for shrubland birds, although in extreme cases a site may be rendered unsuitable for 1-2 years large areas of vegetation are completely removed. If management occurs during the breeding season, reproductive success will be reduced. See also shrubland habitat profile.

Habitat and species impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants, particularly shrubs, have been demonstrated to have several negative effects on birds using shrubland habitats. Insect prey (particularly caterpillars) are usually less common on non-native shrubs (Burghardt et al. 2008, Fickenscher et al. 2014), while data on the nutritional value of fruit are more equivocal (e.g., Davis 2011). In some cases, birds experience lower reproductive success in non-native shrubs, although there is considerable variation (Rodewald et al. 2010, Schlossberg and King 2010), and local predator communities play an important role as well. In all cases, the effects of invasives on shrubland birds depend to a large extent on their relative abundance. If plant diversity is high, the negative effects are diluted and less likely to impact bird populations. However, if the habitat tends toward a monoculture, reduced insect supplies and/or higher predation may reduce reproductive success to the extent that the habitat becomes a sink.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

Many predators (e.g., skunks, raccoons, feral cats) occur in relatively high densities in developed landscapes, often because of direct association with humans or food that is provided either intentionally or unintentionally. Most early successional birds nest on or near the ground, and as a result are more susceptible to nest predation. The problem is compounded because much early successional habitat is near human population centers.

List of Lower Ranking Threats:

Habitat degradation from sand and gravel pit reclamation practices that make habitat unsuitable

Actions to benefit this Species or Habitat in NH

Research on response to management

Objective:
To best conserve this and other shrubland birds, there is a recognized need for information on how it responds to management implemented for other early successional species.

General Strategy:
Collect standardize data on occupancy and abundance of Field Sparrows at sites managed for New England Cottontail, American Woodcock, Karner Blue Butterfly, and other species. Combine these data with data on habitat availability at the state and regional scale, to estimate actual or potential population size, which in turn could be compared to population objectives that also need to be developed.

Political Location:
Statewide

Watershed Location:
Statewide

See also shrubland and pine barrens habitat profiles

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality
Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

Burghardt, K. T., D. W. Tallamy, and W. G. Shriver. 2008. Impact of native plants on bird and butterfly biodiversity in suburban landscapes. Conservation Biology 23:219-224.

Cadman et al. 2007. Atlas of the Breeding Birds of Ontario, 2001-2005. Bird Studies Canada, Environment Canada, Ontario Field Naturalists, Ontario Ministry of Natural Resources, and Ontario Nature, Toronto, xxii + 706 pp.

Davis, M. 2011. Do native birds care whether their berries are native or exotic? No. Bioscience 61:501-502.

Fickenscher, J. L., J. A. Litvaitis, T. D. Lee, and P. C. Johnson. 2014. Insect responses to invasive shrubs: implications to managing thicket habitats in the northeastern United States. Forest Ecology and Management. 322:127-135.

Hunt, P.D. 2013. Bird use of pine barrens and other shrubland habitats in New Hampshire: 2010-2012. Report to NH Fish and Game Department, Nongame and Endangered Species Program. New Hampshire Audubon, Concord.

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Renfrew, R.B. 2013 (ed.). The Second Atlas of Breeding Birds in Vermont. University Press of New England, Hanover, NH.

Rodewald, A. D., D. P. Shustack, and L. E. Hitchcock. 2010. Exotic shrubs as ephemeral ecological traps for nesting birds. Biological Invasions 12:33-39.

Sauer, J.R., J.E. Hines, J.E. Fallon, K.L. Pardieck, D.J. Ziolkowski, Jr., and W.A. Link. 2014. The North American Breeding Bird Survey, Results and Analysis 1966 - 2013. Version 01.30.2015 USGS Patuxent Wildlife Research Center, Laurel, MD.

Schlossberg, S., and D. I. King. 2010. Effects of invasive woody plants on avian nest site selection and nesting success in shrublands. Animal Conservation 13:286-293.

Roseate Tern

Sterna dougallii

Federal Listing	E
State Listing	E
Global Rank	G4
State Rank	S1
Regional Status	Very High

Photo by Len Medlock

Justification (Reason for Concern in NH)

Since records were first taken in 1870, the roseate tern has dwindled somewhat in the region (USFWS 1988). This population nested from Nova Scotia to Virginia in the late nineteenth century but has been lost from all south of Long Island's south shore. The roseate tern was listed under the Endangered Species Act in 1987. At the time of listing, there were approximately 3,000 pairs nesting on 21 islands (10 islands with over 10 pairs) in the Northeast. Since then, restoration efforts have had a limited effect; populations continue to fluctuate around 3,200 pairs. There was a 4% per year decline in population from 2000-2007, but it has stabilized since 2007 (Nisbet 2014). The long-term population trajectory has alternated between long periods of increasing numbers and shorter periods of decline (Nisbet and Spendelow 1999). There have been recent large declines in southern New England and Long Island. Most sites on Long Island's south shore have been lost, and a significant Long Island Sound colony is greatly reduced (USFWS 1998, Kress and Hall 2004). In contrast, the cold water Gulf of Maine roseate population has been steady during this period. The Seavey Island roseate tern colony grew from 1 pair in 2001 to a peak of 112 pairs in 2004 to 76 in 2014 (NHFG and NHA unpublished data). Thus, it is important to evaluate these smaller, cold-water populations for their potential to aid in recovery goals. About 90% of the entire northeastern population currently nests on 3 islands: Great Gull Island in NY, and Bird and Ram Islands in MA; leaving the entire population increasingly vulnerable. Preservation of populations adapted to variable climates is critical in a time of global climate change. The concentration of roseate terns in several large colonies, due to predation and loss of nesting sites, is the primary threat to the species (USFWS Roseate Tern Recovery Plan). Expanding gull populations have taken over many of the offshore islands that once supported terns, and other islands have been lost to erosion. Roseates were forced to nest at inshore islands where the habitat quality was lower and the risk of predation from multiple predators was higher. In the northeastern United States, eggs, chicks and adults are eaten by 11 avian, 10 mammalian, 1 reptile, and 2 ant species (Nisbet 1989). Additional limiting factors may include inadequate foraging resources, competition for nest sites, contaminant impacts, imbalanced sex ratio, and insufficient funds to adequately protect existing colonies. Inclement weather may also harm northeastern roseate tern populations. Little is known about factors affecting the population on its wintering grounds (Gochfeld et al. 1998). In managing for roseate terns the needs of other coastal island species including common tern, Arctic Tern, common eider, black guillemot and purple sandpiper are also addressed.

Distribution

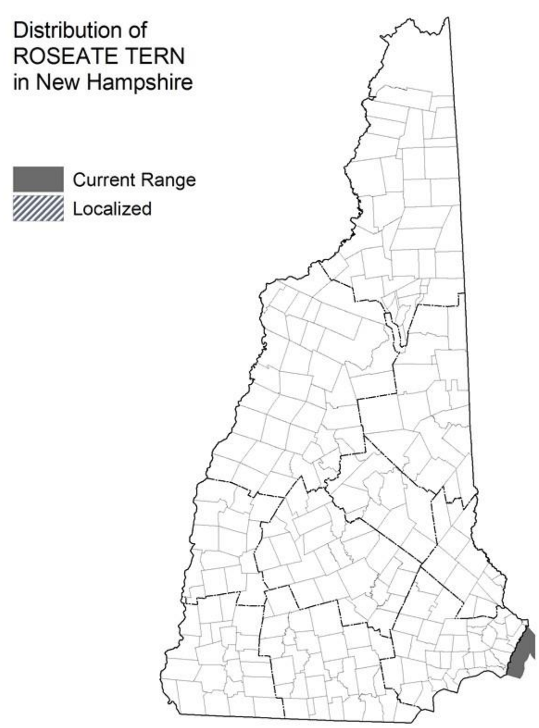
In New Hampshire, the only current nesting of roseate terns occurs at Seavey Island, Isles of Shoals. The island has been intensively managed for terns since 1997. One pair of roseate terns successfully nested on Seavey Island in 2001 and the population quickly grew to a peak of 112 pairs in 2004 and has since decreased to 76 pairs in 2014 (NHFG unpublished data).

Habitat

Roseate terns nest on small rocky or sandy islands, barrier beaches, salt marshes, and rarely on the mainland (USFWS 1989, Kress and Hall 2004). Most colonies are close to shallow-water foraging areas with sandy bottoms, bars, or shoals (Gochfeld et al. 1998). In the Northeast, roseate terns nest within common tern colonies (Nisbet 1989, USFWS 1998). Within these mixed colonies, roseate terns usually select habitat with dense vegetation or the protection of rocks and driftwood (Burger and Gochfeld 1988). They will also use artificial nest sites (e.g., boxes and half-buried tires) (Spendelow 1982). Roseate terns forage over shallow sandbars, shoals, inlets, or schools of predatory fish, often in mixed flocks with other terns (Safina 1990, Shealer and Burger 1993, 1995). Roseates feed on at least 15 species of small marine fish but prefer sand lance (*Ammodytes spp*.) (Gochfeld et al. 1998, Kress and Hall 2004). Feeding studies at New Hampshire's Seavey Island have documented sand lance (*Ammodytes spp*.), white hake (*Urophycis tenius*), and Atlantic herring (*Clupea harengus*) as key forage species (NHA and NHFG unpublished data 2006-2007). Foraging distance is variable (300 m^2 to 30 km^2) and depends on local prey availability. Roseate terns will travel farther than common terns to feed (Gochfeld et al. 1998, Kress and Hall 2004).

NH Wildlife Action Plan Habitats

- Coastal Islands
- Salt Marshes



Distribution Map

Current Species and Habitat Condition in New Hampshire

The only New Hampshire population of roseate terns occurs on Seavey Island, Isles of Shoals. This population has been intensively monitored since 2001 when the first pair nested. In 2004 a peak of 112 pairs nested and has declined from that level to 76 in 2014 (table 1). Productivity has averaged 1.00 chicks per pair between 2001 and 2014. This remains slightly below the northeastern average of more than 1.1 chicks per pair. Less than 1 chick per pair is considered low but can be seen in small or newly formed colonies (Nisbet 1989, Gochfeld et al. 1998). Roseate terns have not nested on any other islands at the Isles of Shoals since the late 1940s. The last known breeding on Lunging Island was in 1944 (Borror and Holmes 1990). Anecdotal evidence from Duck Island describes tern breeding in the “thousands”. Both Lunging and Duck Island are potential breeding habitat but support large herring and great black-backed gull colonies.

The potential for roseate tern recolonization outside the Isles of Shoals is low. Inshore tern colonies contend with predation, disturbance, and the attendant disruptions of nesting habitats. Few inshore islands have the dense vegetation or rocky outcrops that roseates prefer to nest in. In addition, roseates only nest in common tern colonies of significant size. The largest common tern colony outside of Seavey Island rarely supports more than 12 pairs.

The objective for recovery in this species is to increase the Northeast nesting population to a minimum of 5,000 pairs with at least 6 large colonies (over 200 pairs) with high productivity (at least 1.0 fledged young per pair). A secondary objective is to expand the number of roseate tern breeding colonies to 30 or more sites. At present, there are only 4 sites larger than 200 pairs and they all experience fluctuating productivity. The concentration of nearly all the roseate (100%), Arctic (100%), and common turns (98%) at one site in New Hampshire puts tern populations at great risk.

Population Management Status

The Seavey Island roseate, common and Arctic tern colony is managed intensively. Biologists live on the island throughout the breeding season, controlling predators, monitoring colony productivity, and implementing public outreach. Visitation is restricted from 1 May to 1 September to minimize disturbance. Managers encouraged roseate terns to recolonize Seavey Island by using tern attractants and controlling gull populations. Gull control at Seavey Island consisted of dogs (late April), pyrotechnics, regular circumnavigation of the island beginning 30 minutes before sunrise and continuing until 30 minutes after sunrise, and the placement of a large rock in any gull nest cups (NHA and NHFG unpublished reports 1997-2003). Tern attraction techniques included the placement of decoys in suitable habitat along with the broadcast of tern colony sounds (Kress 1983). Common terns nested at this site in the first year of restoration efforts (1997).

Gull predation continues, but is dealt with successfully. Resident tern biologists intervene throughout the breeding season, and specialist predatory gulls are removed from the island. During summer, tern biologists regulate visitation and guide educational visits from Shoals Marine Lab, Star Island, and various other conservation organizations.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)

Quality of Habitat

Seavey Island provides the best habitat for roseate terns in New Hampshire. The quality of foraging habitat and prey availability on Seavey Island is largely unknown. Duck Island and Lunging Island still have good potential for tern nesting, though the presence of gulls makes colonization problematic.

Smuttynose Island once supported one of the largest gull concentrations at the Isles of Shoals, and the presence of raccoons and gulls makes this site unsuitable for tern nesting. A large gull colony exists on Appledore Island, where a research station is operated from April to October. However, rats, muskrats, raccoons, and human disturbance make this island unsuitable for terns.

Habitat Protection Status

Seavey Island was deeded to the State of New Hampshire after the White Island Light was automated in 1987. White and Seavey Islands have been managed by the Department of Resources and Economic Development (DRED) Parks and Recreation Division as part of Odiorne State Park since 1993. A Memorandum of Agreement on tern restoration exists between DRED – Parks Division and the NHFG. Seavey Island is managed by NHFG as an endangered species nesting area and is afforded both state and federal protection under endangered species law.
The Coastal Islands National Wildlife Refuge purchased Duck Island in July 2003. This island will be managed for its wildlife resources, protected as a seabird colony, posted for closure during the breeding season, and evaluated for habitat management and restoration (B. Benedict, USFWS, personal communication). Privately owned Lunging Island is not protected beyond current shoreline and wetland regulations. Smuttynose Island is privately owned but was protected in August of 2001 by a conservation easement held by the Coastal Islands National Wildlife Refuge. This conservation easement allows the refuge to manage the site for wildlife resources (B. Benedict, USFWS, personal communication). Islands in the Piscataqua River, and Great and Little Bays are not suitable for roseate terns because of their proximity to the mainland.

Habitat Management Status

Seavey Island is managed for terns through the NHFG and NHA Tern Restoration partnership. Restoration efforts from 1997 to 2004 have focused on intensive management to eliminate gull nesting and to control predation, and have allowed re-colonization by common terns. There has been a shift in the Seavey Island vegetation from yarrow and seaside goldenrod to tall dense grasses. Although the height of the grass makes the habitat more suitable for roseate terns, the density can cause problems for movement of both adults and chicks as the season progresses.
In 2005, approximately 100 feet of boardwalk were laid through the grassy area to give more structure and opening to the nesting habitat, and to allow biologists access to this part of the island. Other islands identified in 'Relative Quality of Habitat' as having the potential for tern recolonization need to have baseline habitat assessments. If determined to be suitable for restoration efforts, a habitat restoration plan would need to be developed and implemented.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality from predator overpopulation (Threat Rank: High)

Herring gulls and great black-backed gulls are major predators on terns and other small seabirds. The protection of all seabirds, changes in human land use along coastal islands, the fishing industry, and the use of open landfills caused gull populations to exponentially increase in the twentieth century. Gulls prey on tern eggs and chicks and displace them from prime nesting habitats (Foss 1994). Gulls were partly to blame for the extirpation of roseate terns from New Hampshire, but initiation of active

gull control on Seavey Island has allowed for the recolonization of this species.
Nearshore tern colonies are vulnerable to predators such as rats, raccoons, skunk, and fox. Increased development and human use of coastal areas has allowed for an abundance of potential tern predators (USFWS 1998, Kress and Hall 2004). Great horned owl and black-crowned night heron will fly many kilometers to feed on tern chicks and adults. Other avian predators seen at Seavey Island include peregrine falcon, northern harrier, snowy owl, and cattle egret. With 100% of the roseate terns in New Hampshire nesting at Seavey Island this species is vulnerable to predation.

More effective control of municipal and fishing wastes is helping to control gull populations. However, the New Hampshire seacoast still has a large open landfill located in Rochester, about 46 kilometers from the Isles of Shoals. This landfill supports large numbers of gulls during the winter. The Isles of Shoals remains an active fishing area, and there is evidence that discarded lobster bait and other fishing wastes subsidize local gull populations (Goodale 2000). Lack of gull control has been shown to sharply increase predation and disturbance of nesting terns (Donehower 2003). Although non-lethal gull control has successfully removed nesting gulls from Seavey Island, gull predation continues at this site and is particularly intense during the fledging period.
Nocturnal predators such as the great horned owl and black-crowned night herons prey on terns and may cause colony desertion (Nisbet 1999). A great horned owl killed significant numbers of roseate adults in the 2 largest roseate colonies in Buzzard’s Bay, Massachusetts. Black-crowned night heron predation has been documented on Stratton Island, Maine and on Falkner Island, Connecticut. The Stratton Island colony grew from 1 pair in 1995 to 127 pairs in 2001 after black-crowned night herons were controlled. The Falkner Island population fell from 135 pairs in 1997 to 37 pairs in 2004 after black-crowned night heron appeared.
Since 2000, mink have invaded 5 common and roseate tern colonies, resulting in dramatic loss of common and roseate terns and the abandonment of tern colonies from Ship Island, Stratton Island, and Jenny Island. Mink killed every roseate chick on Brothers Island (Canada) in 2 consecutive years. Boats have brought predators (rats and raccoons) to Star, Smuttynose, and Appledore Islands in the Isles of Shoal, causing widespread nesting failure.

Species impacts from competition (with gulls for nesting islands) (Threat Rank: High)

Gulls displace terns from prime nesting habitats (Foss 1994). Gulls continue to nest on all the other islands at the Isles of Shoals, making them unsuitable for terns.

Duck and Lunging Islands were noted to support high numbers of breeding terns in the mid-1800 and 1900s (Jackson 1947, Borror and Holmes 1990), but Lunging Island was abandoned because of displacement by herring gulls (Drury 1973, Erwin 1979). The presence of open landfills and lobster and other fishery waste have also contributed to growing gull populations in seacoast NH (Goodale 2000) and other coastal areas (Kadlec and Drury 1968, Drury 1973, Nisbet 1978, Oro et al. 1995, Chapdelaine and Rail 1997). The near extirpation of terns caused by the gathering of birds for the feather trade provided gulls with more nesting habitat leading to an increase in large gulls (herring (*Larus argentatus*) and great black-backed gulls (*Larus marinus*) (Brown and Nettleship 1984, Buckley and Buckley 1984) which prey on tern eggs and young (Nisbet 2002).

Species impacts from oil spills (Threat Rank: High)

Portsmouth Harbor services large passenger and container ships presenting the possibility of an oil spill occurring near the Isles of Shoals where common terns nest or within the Piscataqua River where they forage. Roseate terns could also be affected by oil spills during migration or on their wintering grounds.

Seabirds are particularly susceptible to both internal and external oil exposure after oil spills at sea (Leighton 1993), and their foraging habits, preening behavior, and resting requirements lead to frequent contact with surface oil (Haney et al. 2014). Mortality occurs as a consequence of spills of petroleum oils. Birds are affected by oil in the following ways: external contamination of feathers, contamination of eggs which are lethal to the embryo in very small doses, and ingestion of oil while preening. Oils on feathers is the single most devastating effect of oil on birds as the feathers lose their water repellency, insulation, and flight capabilities. Death results from combinations of hypothermia, starvation, and drowning (Leighton 1993).

Disturbance from restoration and maintenance of lighthouse and associated buildings (Threat Rank: Medium)

Species impacts from sea level rise and altered food chains (Threat Rank: Medium)

Climate change will likely warm sea surface temperatures and oceanic circulation, leading to changes in nutrient cycling and marine productivity (Tyrell 2005). Many other activities threaten coastal marine habitat in the Gulf of Maine (for a review, see Tyrell (2005). There is some indication that primary productivity patterns in the GOM have shifted in both magnitude and phenology (NEFSC 2013) which would have harmful effects on all trophic levels in the system. Mills et al. (2013) reported that 2012 was the largest, most intense warming event in the Northwest Atlantic in 30 years and was distinctly evident in the GOM where the 2012 sea surface temperature (SST) anomaly was 2°C above the 1982–2011 average, and over a degree warmer than the next highest anomaly. This level of warming is close to the mean SST change projected to occur near the end of the century (Meehl et al. 2007). These changes presumably have important impacts on the foraging ecology and ultimately success of terns nesting at White and Seavey Islands. Given roseate terns have a more specialized diet; they could be more vulnerable to altered food chains.

In 2011 on Petit Manan Island, Maine, common terns delivered 40% butterfish (*Poronotus triacanthus*) to their chicks versus 10% herring, one of the preferred prey species; butterfish is a deep bodied fish difficult for chicks to consume. This pattern has been observed recently at other regional breeding sites and is reversed from typical years when herring was the dominate fish in chick diets (Steeves 2011). In 2012 when water-temperature was the warmest on record in the Gulf of Maine in the last 30 years (Mills et al. 2013), Atlantic puffins (*Fratercula arctica*) at Petit Manan Island fed their chicks significantly larger butterfish than in previous years, perhaps signaling a response to an earlier phenology of ecosystem processes, and subsequently, more advanced spring butterfish growth (National Audubon Society 2012).

Habitat conversion and species disturbance from wind tower and turbine development (Threat Rank: Medium)

Habitat may be converted around the Isles of Shoals for a potential wind turbine site. The construction would disturb terns nesting on White and Seavey Island and may cause movement issues around the turbines. Wind turbines located in their migratory routes could also pose a threat.

Wind farms can be fatal to birds through direct contact with towers or blades (Drewitt and Langston 2006, Arnett at al. 2008). Breeding site selection can also be affected (Pearce-Higgins et al. 2009, Douglas et al. 2011), as well as flight routes (Desholm and Kahlert 2005, Larsen and Guillemette 2007), and foraging behavior (Larsen and Madsen 2000). Offshore wind farms can affect sedimentation patterns and prey species composition (Percival 2001) and may act as a barrier to seasonal and local migrations (Exo et al. 2003). Currently no wind development projects are proposed for the Isles of Shoals where common terns nest; however Cape Wind is attempting to build a wind farm off the coast of Cape Cod, Massachusetts.

Species impacts from reduced prey availability due to overfishing (Threat Rank: Medium)

According to the United Nations Food and Agriculture Organization, more than 70% of the worldwide marine fish stocks are either fully exploited or depleted (FAO Report 2004). In the North Atlantic, the American Fisheries Society has identified 82 species at risk of extinction including Atlantic salmon, Atlantic halibut, and a number of species of sharks, skates, sturgeons, and groupers. Fishing can change the abundance of exploited species and degrade marine habitat (e.g., trawling) (Collie et al. 1997).
Point and non-point source runoff from agricultural and developed coastal areas can negatively impact estuarine and sub-tidal areas that support food webs in coastal and offshore waters.

Changes in prey availability affect the growth and survival of chicks and the condition of adults (Safina et al. 1988, Nisbet et al. 1995). Prey availability may also impact the size and distribution of colony sites (Nisbet 1999). However, the correlation of reduced prey availability and common and roseate tern productivity has not been firmly established. Other seabirds, including terns, have shown very significant impacts from changes in prey availability. In Britain, breeding failure and diminished adult survival in Arctic terns was linked to changes in fish prey availability due to commercial fisheries activities (Suddaby and Ratcliffe 1997 in Kress and Hall 2004).
In 2004, disappearance of sand eels devastated Scottish seabird colonies; 1,200 guillemot nests on the isle of Shetland failed completely, 24,000 Arctic tern nests were almost entirely empty, and the world’s largest colony of great skuas produced only a few chicks. Scientists believe that the sand eels are disappearing because the cold-water plankton that these fish depend on no longer flourishes in these coastal areas. The North Sea has warmed 3.6°F over the last 20 years, shifting the phytoplankton blooms northward or earlier in the season (Schulman 2005).

Disturbance from recreation and tourism (Threat Rank: Medium)

Nearly one-third of the population in the United States (over 75 million people) and Canada (over 9 million people) live within a day’s drive of the Gulf of Maine. Vast areas of coastal and offshore marine habitat have been lost or degraded in the last three centuries. The northeastern roseate tern population is restricted to a small number of islands and many historic nesting islands been lost to occupation by gulls. Degradation and disturbance in these areas would all have a negative impact on roseate tern success. Little is known of critical habitat (foraging, staging, and wintering) for roseate terns. Nisbet (2002) cites the need for increased research into winter habitat where it is believed the highest mortality occurs.

Critical habitats for common terns and roseate terns should be identified and protected. Seavey Island is important because most of New Hampshire’s common terns and all of its roseate terns nest there. Yet scientists do not know basic information such as the location of foraging or staging areas. The 2 known staging areas in the Northeast are in highly developed areas of the coast and may be vulnerable (Casco Bay, Maine and South Beach, Massachusetts).

List of Lower Ranking Threats:

Species impacts from mercury toxicity

Species impacts from various diseases (cholera, botulism, salmonella) Mortality

from unregulated take on winter grounds

Habitat degradation from aquaculture contamination

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Continue intensive monitoring of roseate terns on Seavey Island

Objective:
Continue intensive monitoring of roseate terns on Seavey Island

General Strategy:
Continue to monitor productivity. Use established methods as outlined by the Roseate Tern Recovery Plan to determine productivity on a yearly basis. Characterize roseate tern breeding habitat on Seavey Island. Determine the habitat parameters in preferred nesting habitat. Evaluate the need for vegetation management to maintain and/or increase roseate habitat on Seavey Island. Identify and characterize preferred foraging habitat/sites. Evaluate vulnerability of principal foraging sites to human related over-use issues. Assess available foraging resources by conducting foraging studies. Establish protocol to study the relationship of prey availability and productivity. Identify prey availability during the courtship and egg-laying stage to determine impacts on clutch size. Identify inter-annual and inter-colony variation in prey and the potential effects on productivity. Develop understanding of how foraging effort affects reproduction.

Political Location:
Statewide

Watershed Location:
Statewide

Conduct monitoring of roseate terns in New Hampshire

Objective:
Conduct monitoring and research of roseate terns in New Hampshire.

General Strategy:
Distribution research should include the following: Continue intensive monitoring of roseate terns on Seavey Island and characterize breeding habitat; evaluate other islands at the Isles of Shoals for suitable tern habitat, especially historic sites (Lunging and Duck Islands); identify priority habitats and potential restoration sites; document significant foraging and staging areas; understand movement patterns of the roseate tern within the Gulf of Maine using the marked known aged population; evaluate annual interchange of birds between GOM and “warm water” group; research migration routes; and research winter habitat use and distribution. Conduct habitat assessments at the other historical Isles of Shoals islands. Assess potential impacts of an oil spill near Seavey Island. • Identify important staging areas for Gulf of Maine roseate terns and the proportion of the population aggregating at staging/roosting areas. Conduct staging area counts through re-sighting of banded GOM birds, and determine the proportion of the population aggregating at staging/roosting areas. Build baseline information of the use of staging sites by NH and ME roseate terns. Determine if pre-migratory staging areas are a vulnerable population bottleneck.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources

Basic natural history information in this profile was largely gathered from the literature. Information on habitat and distribution was gathered from scientific literature, recovery conservation plans, technical field reports, published literature, NHA and NHFG Seavey Island data, New Hampshire Bird Records data, Gulf of Maine Seabird Working Group (GOMSWG) and Roseate Tern Recovery Team (RTRT) discussion and minutes. Information on habitat and distribution was gathered from scientific literature, recovery conservation plans, technical field reports, published literature, NHA and NHFG data, GOMSWG, and Roseate Tern Recovery Team (RTRT) discussion and minutes.

Data Quality

Roseate terns have been closely monitored in the region for more than 20 years. The Seavey Island roseate tern population has been intensively studied since recolonization in 2001. In New Hampshire, a census is conducted at all current and recently occupied tern-nesting sites during June. Roseate tern foraging habitat is largely unknown in New Hampshire. In 2004, a brief study suggested that some foraging occurs near Seavey Island, but critical foraging areas remain undocumented. Few data exist on staging areas for roseate terns before or after the breeding period, or on migration and wintering habitat. Seavey Island has been monitored intensively since 1997. Census and productivity numbers have been determined since roseate terns began nesting in 2001. Chick provisioning data were collected in 2005 and 2006. Baseline habitat data for roseate tern nesting sites were also collected in 2004. It will be important to expand on these data to determine the habitat parameters in preferred nesting areas.

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Common Tern

Sterna hirundo

Photo by Jessica Carloni

Federal Listing	N/A
State Listing	T
Global Rank	G5
State Rank	S2
Regional Status	Very High

Justification (Reason for Concern in NH)

The common tern is a species of regional concern and is designated as threatened in New Hampshire. In the Northeast, common tern success is necessary for the recolonization of roseate terns. The common tern colony on Seavey Island should be maintained to successfully manage roseate terns. Managing for common terns will also address the needs of other coastal island species including Arctic Tern, common eider, black guillemot, and purple sandpiper. Efforts to restore the northeastern common tern population began in the 1970s but have been more organized since 1984, when the Gulf of Maine Tern Working Group was formed. Although common tern restoration efforts have been successful in increasing the number of breeding pairs, the number of islands that support tern colonies remains low. After near extirpation in the late 1800s from mass killings for feathers to decorate women's hats, the Gulf of Maine now supports over 20,000 pairs of common terns at 47 sites (Drury 1973, 1974, Kress and Hall 2004). However, 75% of the population nests on 13 islands, leaving them vulnerable to predation, oil spills, and catastrophic weather (Kress and Hall 2004). The primary limiting factor for common terns is the loss of nesting sites and predation that led to concentrated colonies in a small number of suitable sites (Kress and Hall 2004, Nisbet 2002). Gull populations took over many of the offshore islands that had supported terns, and other habitats were lost to erosion. This resulted in common terns nesting at marginal inshore islands where the habitat quality was low and the risk of predation was high. Regionally, the species is in jeopardy due to predation and loss of suitable nesting habitat. In the northeastern United States, gulls, great horned owls, black crowned night heron, coyote, mink, and rats eat eggs, chicks, and adults. Reduced prey abundance, competition for nest sites, contaminants, human disturbance, inclement weather, and insufficient funds to protect colonies also contribute (Nisbet 2002). Little is known about factors affecting the population on its wintering grounds (Kress and Hall 2004, Nisbet 2002). Common tern nesting is required for successful recolonization of roseate terns in the Northeast. The Seavey Island roseate tern colony largely depends on the protection and success of the common tern colony. Greater than 85% of the entire northeastern population of roseate terns currently nests on four islands from Buzzard's Bay to Long Island, New York, making the entire population vulnerable.

Distribution

Historically, common terns bred on several islands at the Isles of Shoals. Anecdotal evidence suggests that common terns nested in high numbers at Duck Island in the mid-1880s (Borror and Holmes 1990). Jackson and Allen (1931) noted that common terns bred on Lunging Island as early as 1922 and the colony grew rapidly to 1,000 pairs by 1928. Jackson (1947) estimated that 1,500 to 2,000 pairs continued to nest there until 1938, and smaller numbers persisted at this site until the late 1940s. This site was abandoned before 1955 (Taber 1955), apparently because of displacement by herring gulls (Drury 1973, Erwin 1979). Herring and great black-backed gulls continue to nest at this location. F.B. White (1929) discovered a common tern colony on the mainland coast in Seabrook near the bridge over the Hampton Harbor Inlet. This colony, which fluctuated in size during the 9 years White observed it, apparently peaked in 1929 with at least 118 nests (White 1929). The year of its abandonment is unknown, but existing records indicate the presence of a single nest with eggs in 1953.

Several islands in the Great Bay estuary, including Nannie, Hen, Goat, and the two Footman Islands, have supported nesting terns in recent decades. These colonies apparently peaked around 1970 with approximately 12 pairs on the Footman Islands and 30-40 pairs on Nannie Island (Art Borror, personal communication). Hen Island has supported 1 to 20 pairs of common terns from 1989 to 2014. The Footman Islands have sporadically supported small numbers of nesting pairs in the last 30 years. Nannie Island has not had any documented breeding in recent years. All of these inshore islands have been subjected to significant predator pressures as well as human disturbance. Tern nesting activity on the salt marshes of the Hampton Harbor estuary dates back to at least 1964. Approximately 50 pairs nested in the salt marsh in the 1970s and 1980s. These numbers have continued to decline and fewer than 25 pairs remain. Heavy predation and flooding have caused very low productivity in most years. This population is unlikely to survive under current conditions. Although the year of origin for the Back Channel colony is unknown, New Castle residents recall tern activity dating back at least 50 years. Past nesting has occurred on Pest and Leach's Islands as well as on 3 small islands known as the Back Channel Islands. Numbers fluctuated from 15 to 20 pairs in the early 1960s to only 1 pair in 1971, and back up to 44 pairs in 1982 (Foss 1982). This colony continued to decline through the 1980s and early 1990s due to predation and disturbance. This site was abandoned in 1998 after the Seavey Island colony was established.

In 1997, NHFG and the New Hampshire Audubon (NHA) began a project to restore terns to the Isles of Shoals. They worked with the New Hampshire Coastal Program, the Department of Resources and Economic Development (DRED) Parks Division, Wildlife Services of the USDA, Shoals Marine Laboratory, Isles of Shoals Steamship Company, the Gulf of Maine Seabird Working Group (GOMSWG) and the United States Fish and Wildlife Service (USFWS) to complete the first year of this project using nonlethal means of gull control, along with decoys and sound to attract breeding terns back to the Isles of Shoals. In 1997, a small colony of six pairs raised and fledged six young at this site. This colony has continued to show significant growth, with breeding pairs climbing from 6 pairs in 1997 to 2873 pairs in 2014 (figure 1). Regionally, the distribution of the common tern is unchanged since the first records in 1870 (Nisbet 2002), although the numbers have fluctuated widely. Common terns nest from North Carolina to Newfoundland and west through the Great Lakes into northwestern Canada (Kress and Hall 2004). Currently, the estimated number of nesting pairs in this entire region is 82,000 (Nisbet 2002).

In New Hampshire, 99% of common terns currently nest on Seavey Island, Isles of Shoals. Seavey Island is part of a cluster of islands known as the Isles of Shoals (see Coastal Islands profile). The Shoals are located approximately 9 km from Rye Beach and 13 km from the mouth of the Piscataqua River (figure 1). Seavey Island is approximately 1.5 hectares in size, with rugged granite outcroppings pocketed with herbaceous vegetation. Seavey Island is connected to White Island by a cobble tombolo at low tide. The predominant plant species found in the Seavey Island nesting areas include grasses, yarrow (*Achillea millefolium*), seaside goldenrod (*Solidago sempervirens*), black mustard (*Brassica nigra*) and dodder (*Cuscuta gronovii*) (De Luca et al. 1998).

Other nesting sites in New Hampshire include the rocky islands at the Isles of Shoals, small inshore islands in Great and Little Bays and along the Piscataqua River, and the extensive thatched areas in the Hampton-Seabrook salt marshes. In the salt marsh, they build shallow nests atop the mats of dead thatch. On Seavey Island and the tern islands in Great Bay they create shallow grass and stick cups atop the rock and/or vegetation.

Habitat

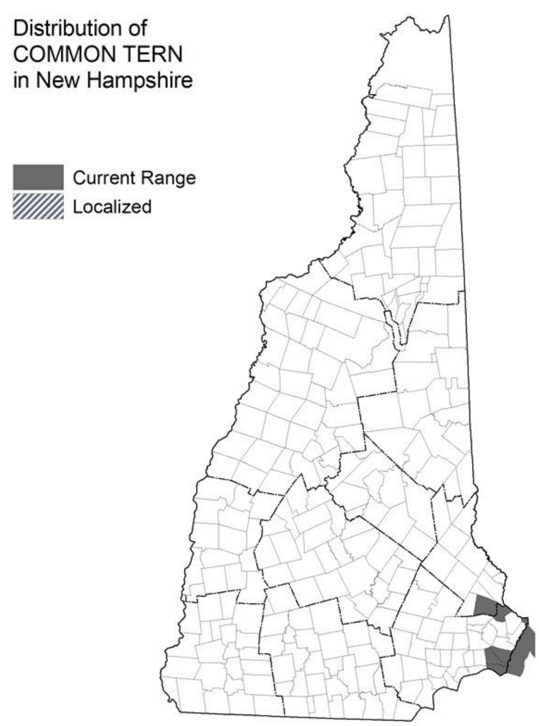
Common terns nest on rocky islands, barrier islands, and salt marshes that are close to feeding areas and that provide protection from predators. Common terns nest in the open, on bare ground, or on vegetation, and rarely under cover (but often adjacent to vegetation) (Kress and Hall 2004). On average, nest sites have more than 90% visibility from above (Burger and Gochfeld 1988). A preliminary study of nest site parameters for the New Hampshire Seavey Island colony in 1998 showed that 54% of the nests were located at the rock-vegetation interface, 24% were located on rock and 22% were located in the vegetation.

Common terns feed primarily on juvenile marine fish, but will also eat aquatic and terrestrial invertebrates (Hall 1999, De Luca et al. 1998-2002). Foraging success depends on the abundance and depth of the prey, tidal height, wind speed, and sea surface conditions (Hall 1999). Common terns have a broader diet than roseate and arctic terns and seem to adapt to changing prey availability more readily (Safina et al. 1990). At Seavey Island, Isles of Shoals, feeding data collected from 1998 to 2014 identified more than 30 food items. Juvenile white hake (*Urophycis tenius*) was the dominant prey delivered to chicks, totaling 39% of all feedings with the exception of 2001, 2009, 2010 and 2012, when Atlantic herring (*Clupea harengus*) was delivered to chicks with the highest frequency. Other prey items include: sandlance (*Ammodytes americanus*), butterfish (*Peprilus triacanthus*), bluefish (*Pomatomus saltatrix*), and euphasiids and insects.

Although no formal study of foraging locations has been conducted, the rate and timing of observed feedings highlight the importance of the waters that immediately surround the Isles of Shoals. Foraging has also been consistently observed in the Hampton and Seabrook harbors, Rye Harbor, and at the mouth of the Piscataqua River.

NH Wildlife Action Plan Habitats

- Coastal Islands
- Salt Marshes



Distribution Map

Current Species and Habitat Condition in New Hampshire

Productivity on Seavey Island has fluctuated from a high of 1.71 chicks per pair in 1999 to a low 0.47 chicks per pair in 2006 (table 1). Smaller clutch sizes in 2003 and 2004 may have resulted from cool weather and rough seas. It will be important to follow productivity trends and address low productivity if it persists.

The Isles of Shoals population is home to all of New Hampshire's roseate and Arctic terns, and to more than 98% of common terns. This concentration at one site in New Hampshire makes this population very vulnerable to any form of disturbance or catastrophic event. The potential for tern recolonization at any of the identified conservation units outside the Isles of Shoals is low. Predation, disturbance, and the attendant issues of marginal habitat significantly threaten inshore colonies of terns.

Common terns have not nested on any other islands at the Isles of Shoals since the late 1940s. Anecdotal evidence from Duck Island makes the possibility of common and roseate tern breeding high, with numbers of terns described in the "thousands". Both Lunging and Duck Island are potential tern breeding habitat but currently support large herring and great black-backed gull colonies. In 2004, common tern colonies were confirmed at two remaining "mainland" sites—Hen Island in Newington and the Hampton salt marsh. The only nesting site with confirmed productivity was at Hen Island in Little Bay. This colony has had approximately 12 pairs since the early 1990s. Productivity has varied but averaged about 1 chick per pair for most years. Although a few birds still attempt to nest in the Hampton salt marsh, they fledge few chicks. Encroachment, predation, human disturbance, and flooding all threaten the salt marsh terns.

Population Management Status

The Seavey Island tern nesting colony is intensively managed. Biologists live on the island during the breeding season to control predators, monitor the productivity of the colony, and implement public outreach. Seavey Island is also posted from 1 May to 1 September to minimize disturbance. Common terns were re-colonized at this site using techniques that included nonlethal gull control and tern attraction techniques. Nonlethal gull control at Seavey Island included the presence of a dog during the latter half of April, pyrotechnics, regular circumnavigation of the island beginning 30 minutes before sunrise and continuing until 30 minutes after sunrise, and the placement of a large rock in any gull nest cups (NHA and NHFG unpublished reports 1997-2014). Tern attraction techniques included the placement of decoys in suitable habitat along with the broadcast of tern colony sounds (Kress 1983). Six common terns nested at this site in the first year of restoration efforts (1997).

Resident tern biologists are able to continue active gull control through the breeding season. Specialist predatory gulls can be removed from the island. Gull control data clearly show that changes in the intensity of direct intervention can affect the success of the colony. Although it is difficult to land on Seavey Island, the summer months allow for increased boat traffic and visitation to the Isles of Shoals. Tern biologists act as stewards and can help regulate any visitation. Educational visits from Shoals Marine Lab, Star Island, and various other conservation organizations foster the conservation of this seabird colony.

There has not been any systematic identification or monitoring of critical foraging resources for the common tern. It is important to understand variation in prey use and the effects on breeding success. In addition, little is known of staging area usage before and after breeding season.

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Nest parameters on Seavey Island were recorded in 1998 to develop habitat and vegetation profiles for common tern nest sites on Seavey Island. Ongoing studies will evaluate the capacity of the island to support more nesting pairs and to document habitat changes, leading to more effective habitat and vegetation management.
The quality of foraging habitat and prey availability near Seavey Island is largely unknown. Foraging studies will determine how prey availability and foraging effort affect productivity. The productivity level of the Seavey Island colony in 2014 (0.78 chicks per nest) was below the level considered productive in the Northeast (more than 1.1 chicks per nest). There was significant disturbance to the colony by a juvenile peregrine falcon and decreases in productivity will have to be analyzed further. The 2 other historic nesting sites for common terns at the Isles of Shoals are Duck Island and Lunging Is-land. These islands have good potential for tern nesting, yet each support large numbers of nesting gulls. The presence of raccoons and gulls make tern nesting impractical on Smuttynose Island, though the island once hosted one of the largest gull populations at the Isles of Shoals. Appledore Island is unsuitable for terns because of large populations of gulls, rats, muskrats, raccoon, and humans.
The Hen Island tern colony in Great Bay, which has averaged 12 pairs since 1989, has been disrupted by rats, Canada geese, great horned owl, and humans. A small but persistent tern colony remains in the Hampton salt marsh, though it has been plagued by flooding, predation and human disturbance. Efforts to protect this habitat may improve the potential for nesting.

Habitat Protection Status

- White and Seavey Islands have been managed by the Department of Resources and Economic Development (DRED)-Parks and Recreation Division as part of Odiorne State Park since 1993. A Memorandum of Agreement on tern restoration exists between DRED – Parks Division and NHFG. Seavey Island is managed by NHFG as an endangered species nesting area and is afforded both state and federal protection under endangered species law.
- The Coastal Islands National Wildlife Refuge purchased Duck Island in July 2003. This island will be managed for its wildlife resources, protected as a seabird colony, posted for closure during the breeding season, and evaluated for habitat management and restoration (B. Benedict, USFWS, personal communication).
- There is no protection at privately owned Lunging Island beyond current shoreline and wetland regulations.
- Smuttynose Island is privately owned but was protected in August 2001 by a conservation easement held by the Coastal Islands National Wildlife Refuge. This conservation easement allows the refuge to manage the site for wildlife resources (B. Benedict, USFWS, personal communication).
- The Town of Newington owns Hen Island. Since the early 1990s, the town has worked with NHFG and NHA to close the island during the breeding season. The proximity of the island to the mainland has subjected Hen Island terns to disruption by rats, Canada geese, great horned owl, and humans.

Habitat Management Status

Seavey Island is managed for terns through the NHFG and NHA Tern Restoration partnership. Restoration efforts between 1997 and 2004 focused on eliminating gull nesting and controlling predation, which al-lowed some re-colonization by common terns. There has been a gradual shift in the Seavey Island vegetation from yarrow and seaside goldenrod to tall dense grasses. Although the height of the grass makes the habitat more suitable for roseate terns, the density can cause problems for movement of adults and chicks. In 2005, approximately 100 feet of boardwalk was laid through

the grassy area to give more structure and opening to the nesting habitat, and to allow biologists access to this part of the island.
It will be important to continue the common tern nest site analysis to evaluate habitat suitability, and to have baseline data from which to make management decisions regarding habitat improvement. Other islands identified in 'Relative Quality of Habitat Patches' as having the potential for tern recolonization need to have baseline habitat assessments. If determined to be suitable for restoration efforts, a habitat restoration plan would need to be developed and implemented.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality from predator overpopulation (Threat Rank: High)

Herring gulls and great black-backed gulls are major predators on terns and other small seabirds. The protection of all seabirds, changes in human land use along coastal islands, the fishing industry, and the use of open landfills caused gull populations to exponentially increase in the twentieth century (figure 2). Gulls prey on tern eggs and chicks and displace them from prime nesting habitats (Foss 1994). Gulls were partly to blame for the extirpation of roseate terns from New Hampshire, but initiation of active gull control on Seavey Island has allowed for the recolonization of this species. Nearshore tern colonies are vulnerable to predators such as rats, raccoons, skunk, and fox. Increased development and human use of coastal areas has allowed for an abundance of potential tern predators (USFWS 1998, Kress and Hall 2004). Great horned owl and black-crowned night heron will fly many kilometers to feed on tern chicks and adults. Other avian predators seen at Seavey Island include peregrine falcon, northern harrier, snowy owl, and cattle egret. With 99% of the common terns and 100% of the roseate terns in New Hampshire nesting at Seavey Island this species is vulnerable to predation.

More effective control of municipal and fishing wastes is helping to control gull populations. However, the New Hampshire seacoast still has a large open landfill located in Rochester, about 46 kilometers from the Isles of Shoals. This landfill supports large numbers of gulls during the winter. The Isles of Shoals remains an active fishing area, and there is evidence that discarded lobster bait and other fishing wastes subsidize local gull populations (Goodale 2000). Lack of gull control has been shown to sharply increase predation and disturbance of nesting terns (Donehower 2003). Although non-lethal gull control has successfully removed nesting gulls from Seavey Island, gull predation continues at this site and is particularly intense during the fledging period.
Nocturnal predators such as the great horned owl and black-crowned night herons prey on terns and may cause colony desertion (Nisbet 1999). A great horned owl killed significant numbers of roseate adults in the 2 largest roseate colonies in Buzzard's Bay, Massachusetts. Black-crowned night heron predation has been documented on Stratton Island, Maine and on Falkner Island, Connecticut. The Stratton Island colony grew from 1 pair in 1995 to 127 pairs in 2001 after black-crowned night herons were controlled. The Falkner Island population fell from 135 pairs in 1997 to 37 pairs in 2004 after black-crowned night heron appeared.
Since 2000, mink have invaded 5 common and roseate tern colonies, resulting in dramatic loss of common and roseate terns and the abandonment of tern colonies from Ship Island, Stratton Island, and Jenny Island. Mink killed every roseate chick on Brothers Island (Canada) in 2 consecutive years.

Boats have brought predators (rats and raccoons) to Star, Smuttynose, and Appledore Islands in the Isles of Shoal, causing widespread nesting failure.

Species impacts from competition (with gulls for nesting islands) (Threat Rank: High)

Gulls displace terns from prime nesting habitats (Foss 1994). Gulls continue to nest on all the other islands at the Isles of Shoals, making them unsuitable for terns.

Duck and Lunging Islands were noted to support high numbers of breeding terns in the mid-1800 and 1900s (Jackson 1947, Borror and Holmes 1990), but Lunging Island was abandoned because of displacement by herring gulls (Drury 1973, Erwin 1979). The presence of open landfills and lobster and other fishery waste have also contributed to growing gull populations in seacoast NH (Goodale 2000) and other coastal areas (Kadlec and Drury 1968, Drury 1973, Nisbet 1978, Oro et al. 1995, Chapdelaine and Rail 1997). The near extirpation of terns caused by the gathering of birds for the feather trade provided gulls with more nesting habitat leading to an increase in large gulls (herring (*Larus argentatus*) and great black-backed gulls (*Larus marinus*)) (Brown and Nettleship 1984, Buckley and Buckley 1984) which prey on tern eggs and young (Nisbet 2002).

Mortality and habitat degradation from oil spills (Threat Rank: High)

Portsmouth Harbor services large passenger and container ships presenting the possibility of an oil spill occurring near the Isles of Shoals where common terns nest or within the Piscataqua River where they forage. Common terns could also be affected by oil spills during migration or on their wintering grounds.

Seabirds are particularly susceptible to both internal and external oil exposure after oil spills at sea (Leighton 1993), and their foraging habits, preening behavior, and resting requirements lead to frequent contact with surface oil (Haney et al. 2014). Mortality occurs as a consequence of spills of petroleum oils. Birds are affected by oil in the following ways: external contamination of feathers, contamination of eggs which are lethal to the embryo in very small doses, and ingestion of oil while preening. Oils on feathers is the single most devastating effect of oil on birds as the feathers lose their water repellency, insulation, and flight capabilities. Death results from combinations of hypothermia, starvation, and drowning (Leighton 1993).

Disturbance from restoration and maintenance of lighthouse and associated buildings (Threat Rank: Medium)

A historic lighthouse and other buildings on White Island require maintenance. Heavy machinery could disturb nesting terns. Increased human traffic to conduct maintenance could also disturb terns and or cause accidental egg damage.

Current mitigation tactics include timing construction when terns are absent from the island and if the maintenance is absolutely necessary when terns are present, the bird's response would be

Species impacts from sea level rise and altered food chains (Threat Rank: Medium)

Climate change will likely warm sea surface temperatures and oceanic circulation, leading to changes in nutrient cycling and marine productivity (Tyrell 2005). Many other activities threaten coastal marine habitat in the Gulf of Maine (for a review, see Tyrell (2005)). There is some indication that primary productivity patterns in the GOM have shifted in both magnitude and phenology (NEFSC 2013) which would have harmful effects on all trophic levels in the system. Mills et al. (2013)

reported that 2012 was the largest, most intense warming event in the Northwest Atlantic in 30 years and was distinctly evident in the GOM where the 2012 sea surface temperature (SST) anomaly was 2°C above the 1982–2011 average, and over a degree warmer than the next highest anomaly. This level of warming is close to the mean SST change projected to occur near the end of the century (Meehl et al. 2007). These changes presumably have important impacts on the foraging ecology and ultimately success of terns nesting at White and Seavey Islands.

In 2011 on Petit Manan Island, Maine, common terns delivered 40% butterfish (*Poronotus triacanthus*) to their chicks versus 10% herring, one of the preferred prey species; butterfish is a deep bodied fish difficult for chicks to consume. This pattern has been observed recently at other regional breeding sites and is reversed from typical years when herring was the dominate fish in chick diets (Steeves 2011). In 2012 when water-temperature was the warmest on record in the Gulf of Maine in the last 30 years (Mills et al. 2013), Atlantic puffins (*Fratercula arctica*) at Petit Manan Island fed their chicks significantly larger butterfish than in previous years, perhaps signaling a response to an earlier phenology of ecosystem processes, and subsequently, more advanced spring butterfish growth (National Audubon Society 2012).

Habitat conversion and species disturbance from wind tower and turbine development (Threat Rank: Medium)

Habitat may be converted around the Isles of Shoals for a potential wind turbine site. The construction would disturb terns nesting on White and Seavey Island and may cause movement issues around the turbines. Wind turbines located in their migratory routes could also pose a threat.

Wind farms can be fatal to birds through direct contact with towers or blades (Drewitt and Langston 2006, Arnett at al. 2008). Breeding site selection can also be affected (Pearce-Higgins et al. 2009, Douglas et al. 2011), as well as flight routes (Desholm and Kahlert 2005, Larsen and Guillemette 2007), and foraging behavior (Larsen and Madsen 2000). Offshore wind farms can affect sedimentation patterns and prey species composition (Percival 2001) and may act as a barrier to seasonal and local migrations (Exo et al. 2003). Currently no wind development projects are proposed for the Isles of Shoals where common terns nest; however Cape Wind is attempting to build a wind farm off the coast of Cape Cod, Massachusetts.

Species impacts from reduced prey availability due to overfishing (Threat Rank: Medium)

According to the United Nations Food and Agriculture Organization, more than 70% of the worldwide marine fish stocks are either fully exploited or depleted (FAO Report 2004). In the North Atlantic, the American Fisheries Society has identified 82 species at risk of extinction including Atlantic salmon, Atlantic halibut, and a number of species of sharks, skates, sturgeons, and groupers. Fishing can change the abundance of exploited species and degrade marine habitat (e.g., trawling) (Collie et al. 1997). Point and non-point source runoff from agricultural and developed coastal areas can negatively impact estuarine and sub-tidal areas that support food webs in coastal and offshore waters.

Changes in prey availability affect the growth and survival of chicks and the condition of adults (Safina et al. 1988, Nisbet et al. 1995). Prey availability may also impact the size and distribution of colony sites (Nisbet 1999). However, the correlation of reduced prey availability and common and roseate tern productivity has not been firmly established. Other seabirds, including terns, have shown very significant impacts from changes in prey availability. In Britain, breeding failure and diminished adult survival in Arctic terns was linked to changes in fish prey availability due to commercial fisheries activities (Suddaby and Ratcliffe 1997 in Kress and Hall 2004). In 2004, disappearance of sand eels devastated Scottish seabird colonies; 1,200 guillemot nests on the isle of Shetland failed completely, 24,000 Arctic tern nests were almost entirely empty, and the world's largest colony of great skuas produced only a few chicks. Scientists believe that the sand eels are disappearing because the cold-water plankton that these fish depend on no longer flourishes in these coastal areas. The North Sea has warmed 3.6°F over the last 20 years, shifting the phytoplankton blooms northward or earlier in the season (Schulman 2005).

Disturbance from recreation and tourism (Threat Rank: Medium)

Nearly one-third of the population in the United States (over 75 million people) and Canada (over 9 million people) live within a day's drive of the Gulf of Maine. Vast areas of coastal and offshore marine habitat have been lost or degraded in the last three centuries. The northeastern common tern population is restricted to a small number of islands and many historic nesting islands been lost to erosion or are occupied by gulls. Degradation and disturbance in these areas would all have a negative impact on common tern success. Little is known of critical habitat (foraging, staging, and wintering habitat) of common or roseate terns. Nisbet (2002) cites the need for increased research into winter habitat where it is believed the highest mortality occurs.

Critical habitats for common terns and roseate terns should be identified and protected. Seavey Island is important because most of New Hampshire's common terns and all of its roseate terns nest there. Yet scientists do not know basic information such as the location of foraging or staging areas. The 2 known staging areas in the Northeast are in highly developed areas of the coast and may be vulnerable (Casco Bay, Maine and South Beach, Massachusetts).

List of Lower Ranking Threats:

Species impacts from mercury toxicity

Mortality from various diseases (cholera, botulism, salmonella) Mortality

from unregulated take on winter grounds

Habitat degradation from aquaculture contamination

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Manage and monitor the Seavey Island colony, Restoration and Management

Primary Threat Addressed: Mortality from predator overpopulation

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

Objective:
The objective of continued intensive management at Seavey Island is to increase and secure both the common and roseate tern populations.

General Strategy:

Political Location: **Watershed Location:**

Manage and monitor the Seavey Island colony, Restoration and Management

Primary Threat Addressed: Species impacts from competition (with gulls for nesting islands)

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

Objective:
The objective of continued intensive management at Seavey Island is to increase and secure both the common and roseate tern populations.

General Strategy:
Resident biologists act as stewards for the Seavey tern colony and can enforce the closure of this island during the breeding season, as well as providing annual population and productivity estimates.Active management occurs annually during the breeding season from 21 April to 31 August. Active management through the breeding season allows for an immediate response or change in response to all the threats identified above (predation, human disturbance, disease and oil spill). Although there are no established recovery criteria for common terns in the northeast region, a productivity rate in the range of 1.1–1.8 chicks per nest is considered adequate to sustain population growth. The primary objective of the Northeast region roseate tern recovery program is to promote an increase in breeding population size, distribution, and productivity to warrant reclassification to threatened status and eventual delisting. The criteria for recovery include a minimum of 6 large colonies (> 200 pairs) with high productivity (at least 1.0 fledged young/nest) for 5 consecutive years. Successful management and monitoring at Seavey Island would maintain productivity of the common tern colony and expand the roseate population to the level cited above and maintain this level for at least 5 years. Implementation will require the cooperation of the two major partners in the Tern Restoration Project (NHFG and NHA) as well as other cooperators and supporters including the USFWS, DRED, USDA – Wildlife Services, NHCP, Shoals Marine Lab, Roseate Tern Recovery Team (RTRT) and GOMSWG. Collaboration will occur with state and federal partners working with terns in other northeastern states including Maine, Massachusetts, Connecticut and New York, as well as with international partners in Canada. Important guidance for establishing monitoring protocols will be provided by the New Hampshire Tern Management Team along with the methodologies outlined by the Roseate Tern Recovery Plan and the Tern Management Handbook.

Political Location:

Watershed Location:

Develop predator management plan, Restoration and Management

Primary Threat Addressed: Mortality from predator overpopulation

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

Objective:
The objective of continued and more effective management of predator concentrations is to increase and secure common and roseate tern populations, while minimizing mortality and movement.

General Strategy:
A proactive management plan should exist to better respond to predation from a suite of predators including gulls, great horned owl, black-crowned night heron, and mammalian predators such as mink, raccoons, and rats. Minimizing predator impacts will help.

Political Location: **Watershed Location:**

Identify and protect important staging and foraging areas for common and roseate terns, Habitat Protection

Primary Threat Addressed: Mortality from predation (mammals, snowy owls, peregrine falcon)

Specific Threat (IUCN Threat Levels): Invasive & other problematic species, genes & diseases

Objective:
The objective of identifying and protecting tern foraging and staging areas is to maintain breeding colonies and minimize mortality.

General Strategy:
The productivity of the Seavey Island common and roseate terns will be monitored annually using established methods outlined in the Roseate Tern Recovery Plan, The Tern Management Handbook and through the regional roseate tern metapopulation study (Nisbet 1990). An all island census will also be conducted annually during the census window of June 12-20 as established by the regional tern working group (GOMSWG). Downward trends in either colony census numbers or productivity estimates need to be addressed immediately. The desired ecological response to protection of foraging and staging areas is to increase the likelihood that common and roseate terns will successfully breed, reach target levels of productivity, and increase in population numbers on Seavey Island. Successful management will be indicated by a positive growth rate and the achievement of recovery objectives (US-FWS Roseate Recovery Plan). Coordination with land protection specialists from local, state and federal agencies to maximize the potential for successful protection of identified foraging and staging areas. The protection of these habitats may require the innovative protection strategies such as those outlined in the GOMC Marine Protected Areas Project. Federal and state partners from the NHCP, the Coastal Islands Wildlife Refuge, the Great Bay Refuge, and the Great Bay National Estuarine Research Reserve would be important partners. It is likely that areas will be identified across state boundaries and necessitates coordination with Maine and/or Massachusetts partners.

Political Location: **Watershed Location:**

Develop regional partnerships, Restoration and Management

Primary Threat Addressed: Mortality and habitat degradation from oil spills

Specific Threat (IUCN Threat Levels): Pollution / Industrial & military effluents / Oil spills

Objective:
The Tern Restoration Project will benefit from collaboration with other organizations that are focused on resource conservation and management in the Gulf of Maine.

General Strategy:
NHCP provides the leadership in coordinating local communities, state and federal agencies in the planning and policy issues needed to balance the preservation of New Hampshire’s natural resources with the social and economic needs of the coastal region. The Gulf of Maine Council brings together partners from Massachusetts, New Hampshire, Maine, and the Canadian provinces of New Brunswick and Nova Scotia (www.gulfofmaine.org). The Gulf of Maine Habitat Conservation Subcommittee is

working with partners in the region to develop and advance marine habitat conservation strategies.

Political Location: **Watershed Location:**

Monitor prey availability during the tern nesting season and protect land for nesting habitat

Primary Threat Addressed: Species impacts from reduced prey availability due to overfishing

Specific Threat (IUCN Threat Levels): Biological resource use / Fishing & harvesting aquatic resources / Unintentional effects: large scale (species being assessed is not the target) [harvest]

Objective:
Further research is needed to assess the role of commercial fisheries on prey availability for seabird colonies.

General Strategy:
It is important to support research and policies that help to reduce negative impacts on nursery areas for prey items such as herring, hake and other fish stocks that are important food for seabirds. Some of the key partners could coordinate with the NHFG Department Marine Resources Division and the Shoals Marine Laboratory to monitor prey availability. An established monitoring program coupled with the chick provisioning studies taking place on Seavey Island would allow seabird biologists and fisheries managers to collaborate on actions that could benefit seabird restoration.

Political Location: **Watershed Location:**

Strengthen and expand outreach efforts on seabird conservation

Primary Threat Addressed: Disturbance from recreation and tourism

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Improve public outreach and education on seabird restoration issues in New Hampshire and the Gulf of Maine

General Strategy:
The development of classroom curriculum and teacher resources will capture an important audience. A tern restoration web page will foster stewardship, increased understanding and appreciation for seabird conservation issues. A web page addition would reach a large, broad audience and expand educational opportunities manifold. These efforts lay the groundwork for increased awareness and understanding of coastal issues that impact seabird islands, and promote stewardship for coastal resources. Improve public outreach and education on seabird restoration issues in New Hampshire and the Gulf of Maine through the following mediums: • Further develop and implement outreach and education to Isles of Shoals users including the Shoals Marine Lab, Star Island, Seacoast Science Center, and island visitors • Further develop and implement an outreach program and educational materials for passengers aboard charter vessels in and around the Isles of Shoals including the Uncle Oscar, ISSCO ferry and the Granite State • Develop a tern restoration presentation and curriculum to be included in the coastal ecology unit presented to middle and high school students aboard the Granite State • Further develop and implement a teacher workshop that highlights the tern

restoration project and seabird conservation issues • Develop a seabird conservation curriculum that can be used in classroom presentations. Use roseate terns as an example of a successful restoration model • Create a Tern Restoration/Seabird Conservation Page with live streaming tern video from Seavey Island on the NHA/NHFG Web pages.

Political Location:

Watershed Location:

Threat Assessment and Condition Research

Objective:

Conduct threat assessment and condition assessment research for common terns in New Hampshire.

General Strategy:

Threats to common terns and their breeding habitat are well documented in management and conservation plans. The threat posed by reduced prey availability still needs research and monitoring to deter-mine the correlation with tern productivity. Direct threats to foraging and staging areas are unclear until these areas have been identified. Threat assessment research should consider the following: Assess the effects of tern predators and evaluate means of controlling those species in different critical habitats and at different times of the year; determine laughing gull impacts on common and roseate tern nesting success; assess and monitor of the effects of aquaculture, fishing practices, and other stressors on terns, tern predators, and habitats; identify and protect (if feasible) critical habitats such as foraging, staging, and wintering areas; and identify seasonal and spatial variation in prey (composition and abundance) and potential effects on colony productivity.

Political Location:

Statewide

Watershed Location:

Statewide

Monitor the common tern population

Objective:

Continue to monitor and further assess common tern populations in New Hampshire.

General Strategy:

Monitoring research should include continued intensive monitoring of common terns on Seavey Island, using established methods as outlined by the GOMSWG and the Roseate Tern Recovery Plan to determine productivity; and continued monitoring of the mainland colonies to assess condition and the potential for protection. Further assessment may include conducting habitat assessments at the other historic Isles of Shoals islands; identifying and characterizing preferred foraging habitat and evaluating vulnerability of principal foraging sites to human disturbance; assessing seasonal prey availability and how it relates to tern productivity; assessing potential effects of an oil spill near Seavey Island; identifying the location and use of staging and roosting areas for common and roseate terns; determining if pre-migratory staging areas constitute a vulnerable population bottleneck; and identifying important wintering areas.

Political Location:

Statewide

Watershed Location:

Statewide

References, Data Sources and Authors

Data Sources

Basic natural history information in this profile was largely gathered from the literature cited. Information on habitat and distribution was gathered from scientific literature, recovery conservation plans, technical field reports, published literature, NHA and NHFG Seavey Island data, New Hampshire Bird Records data, Gulf of Maine Seabird Working Group (GOMSWG) and Roseate Tern Recovery Team (RTRT) discussion and minutes. Information on habitat and distribution was gathered from scientific literature, recovery conservation plans, technical field reports, published literature, NHA and NHFG data, GOMSWG and Roseate Tern Recovery Team (RTRT) discussion and minutes.

Data Quality

Common terns have been followed closely since the formation of the Gulf of Maine Tern Working Group in 1984. Regionally, common tern breeding colonies have been managed and intensively monitored for more than 20 years. The Seavey Island common tern population has been intensively studied since recolonization in 1997. In New Hampshire, all current and recently occupied tern-nesting sites are surveyed annually during June. Historical habitat at the Isles of Shoals was surveyed in 1977, 1985 and 1995, and an all-island census on White and Seavey Islands has been conducted annually since 2005. Habitat parameters were identified at common tern nests on Seavey Island in 1998. This pilot study produced baseline data for the development of habitat and vegetation profiles of common tern nest sites. The update and continuation of this study, along with the generation of vegetation profiles, will help in the development of a habitat management plan. Common tern foraging habitat is largely unknown in New Hampshire, though sightings between 1998 and 2001 suggest that common terns forage close to Seavey Island. It will be important to identify critical foraging areas for this species and to explore staging areas in nearby waters. Little is known about common tern migration and wintering habitat. Large winter concentrations have been identified in Suriname, Trinidad, Brazil, and Argentina (Hays et al. 1997, 1999). It is important to identify and assess common tern wintering habitat. Census and productivity surveys have been conducted since common terns began nesting in 1997. Chick provisioning data was collected from 1998 to 2014, and baseline habitat data for common tern nesting sites was collected in 1998. The habitat on Lunging and Duck Island needs to be evaluated through nest censuses and a vegetation/habitat profiles.

2015 Authors:

Jessica Carloni, NHFG

2005 Authors:

Diane De Luca, NHA

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Least Tern

Sternula antillarum

Federal Listing	N/A
State Listing	E
Global Rank	G4
State Rank	S1
Regional Status	Very High

Photo by Stacy Peterson

Justification (Reason for Concern in NH)

Least tern nesting colonies are sensitive to disturbance and as a result are declining in number in some areas of their range (NatureServe 2015). Although large colonies nest in Massachusetts and Maine, there is limited habitat in New Hampshire for colonies to form. Two pairs of least terns nested in New Hampshire in 2015, the first documented nesting in the state since the 1950's.

Distribution

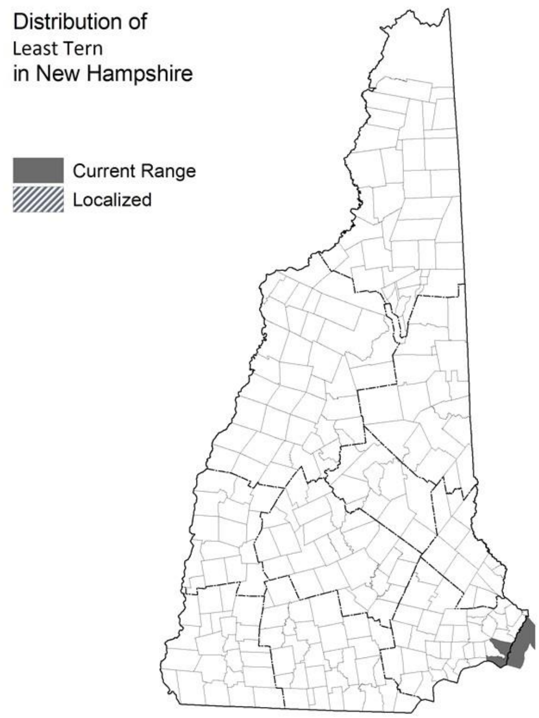
Prior to documented nesting in 2015, least terns have been rare and non-breeding in the state since the 1950's. New Hampshire Audubon recorded 2 to 10 pairs nesting in Seabrook from 1953 to 1960. Although least terns are common in many parts of their range in North America, their preferred nesting habitat is also prime coastal real estate prone to development and human recreation (Thompson et al. 1997).

Habitat

Least terns use open beaches and vegetation-free islands for nesting. Although they may nest in areas with a substrate of larger stones, they prefer sand, shell, or gravel substrates high above the tide line. Like other terns, least terns tend to nest in colonies and are most productive at locations where colonies have been successful in previous years (Thompson et al. 1997). Unlike other terns, least terns tend to nest in areas attached to the mainland (Kress and Hall 2004).

NH Wildlife Action Plan Habitats

- Dunes



Distribution Map

Current Species and Habitat Condition in New Hampshire

While several hundred pairs annually nest in Maine and several thousand in Massachusetts, nesting least terns had been absent from NH since the 1950's until nesting was documented in 2015.

Population Management Status

Least tern habitat overlaps with that of Piping Plovers and management strategies are similar. In NH, most potential least tern habitat is protected with symbolic fencing used for Piping Plovers. No specific management techniques have been used to protect nests (e.g., electric fencing).

Regulatory Protection (for explanations, see Appendix I)

- Endangered Species Conservation Act (RSA 212-A)
- Migratory Bird Treaty Act (1918)
- BCR or PIF priority species

Quality of Habitat

In New Hampshire there are only three known habitat patches that provide suitable nesting grounds for least terns. Each patch is subject to intensive recreational use during the breeding season and the high human densities have contributed to high predator densities.

Habitat Protection Status

All potential least tern breeding areas coincide with Piping Plover habitats that are protected under Federal Threatened and Endangered Species Laws. Coastal sand dune systems are protected under the Federal Coastal Zone Management Act (1972) and NH RSA 482-A pertaining to Fill and Dredge in Wetlands. Refer to the Dune habitat profile for more information.

Habitat Management Status

All potential least tern breeding areas coincide with Piping Plover breeding areas that are protected with symbolic fencing.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Mortality and disturbance from human recreation (walkers, OHRVs) (Threat Rank: High)

Nests that are established outside of fenced-off areas are difficult to detect and vulnerable to being crushed by vehicles. Soon after hatching, chicks are very mobile, moving between intertidal zones and dunes and along the length of beaches. This errant nature, combined with the chicks' inability to fly, leaves them particularly vulnerable to motorized vehicles.

No mortality of least tern chicks has been documented in NH. Beachgoers and vehicles have been documented as causing Piping Plover chick mortality in NH (which occupy the same habitat and are similarly vulnerable to people and vehicles).

Mortality from subsidized or introduced predators (Threat Rank: High)

The high human density surrounding the potential breeding areas in NH provides an attractive habitat for several potential predators. Foxes, striped skunks, crows, gulls, common grackles, and domestic dogs and domestic and feral cats have all been documented near potential breeding areas. Predators may cause adults to flush from nests and may prey on eggs, chicks or adults.

No evidence of nest or chick predation for least terns has been observed in NH. Predation of Piping Plover eggs, chicks and adults which breed in similar habitat has been documented.

Habitat conversion due to shoreline stabilization (Threat Rank: Medium)

Artificial dunes may not function in the same manner as natural dunes. They are often built as continuous ridges and may be too steep to serve as least tern nesting sites. Beach renourishment may create habitat in the short term but it may promote dune growth and increased vegetation reducing the long term suitability of nesting habitat.

Deposits from harbor dredging are placed on Hampton and Seabrook every 5-7 years. Although the specifications on the location and slope of the material are set forth by the USFWS to minimize impacts to Piping Plovers there is the potential for an overall reduction in habitat over the long term.

Mortality from increased storm intensity and frequency (Threat Rank: Medium)

Climate models predict an increase in the frequency and intensity of coastal storms. Inclement weather can disrupt bird migrations and make breeding and nesting sites inhospitable, forcing birds into marginal habitats. Least terns that nest along the foredune are vulnerable to tidal overwash from abnormally high tides.

The loss of least tern nests has not been documented from increasing storms. However, Piping Plover that occupy the same habitat have lost several nests to tidal overwash.

Habitat degradation from naturally increasing dune vegetation that reduces available nesting habitat (Threat Rank: Medium)

Least terns typically nest amongst sparse vegetation along gently sloping foredunes, blowouts, and sand spits. Increases in vegetation may reduce the habitat quality or eliminate potential nesting habitat.

The dunes at Hampton Beach State Park and Seabrook beach have grown substantially in height and width since the initiation of Piping Plover protection efforts in 1997 (Brendan Clifford, personal observation). With this growth and increases in dune vegetation the available nesting habitat has diminished for Piping Plovers and least terns.

List of Lower Ranking Threats:

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Monitor Piping Plover breeding areas for the presence of least terns

Primary Threat Addressed: Mortality and disturbance from human recreation (walkers, OHRVs)

Specific Threat (IUCN Threat Levels): Human intrusions & disturbance

Objective:
Document and protect least tern nests

General Strategy:
Monitoring for the presence of least terns will be conducted during monitoring efforts for Piping Plovers. In the event a colony becomes established the appropriate nest-protection measures may be implemented (e.g., electric fencing, predator removal).

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

References, Data Sources and Authors

Data Sources

Information on least tern habitat, population distribution and status was collected from scientific literature, least tern management plans and New Hampshire Fish and Game data. Information on habitat protection and management was obtained from NHFG Piping Plover monitoring data.

Data Quality

Although least terns have been extensively studied throughout their breeding range, and although data regarding their biology and behavior is extensive, little is known about their demography and associations between wintering areas and breeding populations. Locally, the extent and quality of data on the distribution of the species is limited. Potential breeding areas for least terns overlap with that of Piping Plovers (which have been annually monitored since 1997)

2015 Authors:

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2005 Authors:

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Literature

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Eastern Meadowlark

Sturnella magna

Photo by Len Medlock

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	Very High

Justification (Reason for Concern in NH)

Populations of most grassland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Eastern Meadowlark populations in New Hampshire have declined at 8.33% annually since 1966 (8.25%/year from 2003-2013). These trends are similar in regional data: BCR 14 = -7.07%/year, BCR 30 = -6.9%/year. There have also been declines of 25-75% based on repeated Breeding Bird Atlases in the northeast (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014).

Distribution

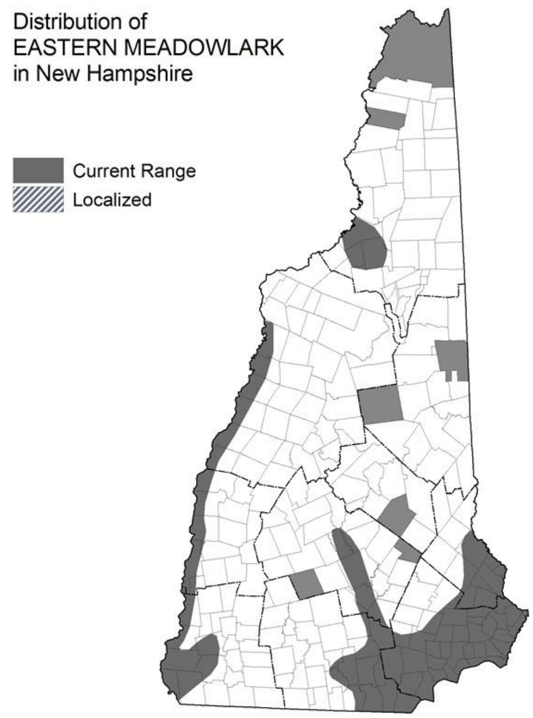
Eastern Meadowlarks breed in the eastern half of the United States and southern Canada, west to central Arizona, and south through Mexico and Central America to northern South America (Jaster et al. 2012). A separate subspecies also occurs in Cuba. The species winters through most of this range, although it withdraws from Canada and the northern tier of states in the U.S. In New Hampshire, meadowlarks occur statewide, but populations are extremely local. Concentrations occur near the Seacoast and in parts of the Merrimack and Connecticut River valleys, including the latter north of the White Mountains. This current distribution is significantly reduced from that documented during the Breeding Bird Atlas in the early 1980s (Foss 1994). Recent resurveys (2013) of sites in the Upper Valley documented meadowlarks in roughly the same locations where they were present in 1997-99 (Hunt and Sydoriak, unpubl. data).

Habitat

Eastern Meadowlarks breed in a variety of grassland habitats, including natural grasslands, hayfields, pastures, abandoned grassy fields, and airports (Jaster et al. 2012). Occupied areas can have a wide range of vegetation, including long and/or short grasses, areas of bare ground, or small clumps of shrubs. Territories often contain prominent singing perches such as trees and fence posts. Meadowlarks preferentially breed in larger fields, usually over 5 ha, although the minimum size varies geographically (Heckert 1994, Vickery et al. 1994).

NH Wildlife Action Plan Habitats

- Grasslands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant population declines and range retraction in the Northeast, including New Hampshire (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

No information

Habitat Protection Status

Highly variable – see grasslands habitat profile.

Habitat Management Status

Habitat management has not been implemented specifically for this species.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion and impacts from airport construction (Threat Rank: Medium)

Expansion of runways or addition of new infrastructure (e.g., hangers) has the potential to remove suitable grassland habitat at some of the more important sites for this species in the state.

Habitat degradation and disturbance from airport runway maintenance (Threat Rank: Medium)

This threat is separate from both mowing and construction, and pertains to human activity associated with existing infrastructure. Such activity includes paving, light installation, and other things that might result in vehicles and other equipment being parked off-runway in potential meadowlark habitat.

Habitat degradation and conversion to cropland or sod (excluding hay) (Threat Rank: Medium)

Many of the existing sites for Eastern Meadowlarks in New Hampshire are in river valleys, where they are subject to agricultural conversion from hayfields, which are suitable for meadowlarks, to row crops or sod, which generally are not. See the grassland habitat profile for more details.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: Medium)

As a more widely distributed grassland bird, the Eastern Meadowlark is subject to direct habitat loss as fields are lost or fragmented due to development. The species' area sensitivity makes it potentially more vulnerable to this threat than other species in this group.

Habitat impacts from invasive or introduced plants (Threat Rank: Medium)

Non-native plants are an increasing problem in grasslands elsewhere in the Northeast. Their impacts on grassland birds are poorly known, but could include reduced availability of nesting microhabitat (Scheiman et al. 2003), and/or altered insect communities. See the grassland habitat profile for more information.

Mortality and disturbance to nests due to the frequency and timing of mowing (Threat Rank: Medium)

Mowing is generally considered the greatest threat to grassland birds because it either destroys nests outright or exposes them to greater predation risk. Frequency of mowing varies with location and land use. Airports are required to mow areas adjacent to runways and taxiways for safety reasons, while in active hayfields mowing is an economic activity. To maximize both quality and quantity of hay, farmers may harvest as many as 3-4 times a season, a frequency which generally does not allow for successful reproduction by grassland birds (Bollinger et al. 1990). Mowing at airports may be less detrimental since smaller areas are generally mowed, although mowing usually occurs more frequently.

Habitat degradation and conversion from a lack of field maintenance and associated succession (Threat Rank: Medium)

In the absence of periodic mowing, grassland sites revert to shrublands and eventually to forest. However, since most sites for Eastern Meadowlarks in New Hampshire are at airports or active hayfield, this is not in reality a significant threat to the species.

List of Lower Ranking Threats:

Habitat degradation and species disturbance from overgrazing of grassland habitat

Habitat impacts and mortality from insecticide use

Actions to benefit this Species or Habitat in NH

Grassland bird monitoring

Objective:
Monitor trends for rare grassland birds in NH

General Strategy:
Periodic surveys of key areas for grassland birds (e.g., focal areas, see grasslands habitat profile) are needed to assess trends in distribution and abundance because broad-scale surveys like the BBS fail to capture these species in sufficient numbers. Surveys need not be annual, but should employ consistent methodology among years. Because Eastern Meadowlarks remain more common than most grassland birds, there is less need for careful systematic surveys, but periodic surveys are recommended to determine if the species continues to decline in peripheral areas. For more information see the grassland habitat profile.

Political Location:
Statewide

Watershed Location:
Statewide

Location Description:
For key areas, see grasslands habitat profile

Landowner outreach and conservation implementation

Primary Threat Addressed: Mortality and disturbance to nests due to the frequency and timing of mowing

Specific Threat (IUCN Threat Levels): Agriculture & aquaculture

Objective:
minimize mortality and nest loss from haying operations

General Strategy:
Provide landowners of important grasslands information on practices that benefit wildlife in this habitat. Specific actions include outreach about appropriate management practices (delayed mowing,

etc.), cost-share programs, and other options for land protection and/or management. In a study conducted in the Connecticut River Valley of New Hampshire and Vermont, 64% of farmers and 92% of other grassland landowners were unaware of the financial assistance available for managing grassland habitats (Sydoriak 2014).

Political Location:
Statewide

Watershed Location:
Statewide

Location Description:
statewide, although focused on grassland focal areas (see grasslands habitat profile)

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality
Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known, although the species' apparent decline in Coos County warrants more careful investigation.

2015 Authors:
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2005 Authors:
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Literature

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Brown Thrasher

Toxostoma rufum

Photo by Pamela Hunt

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S3
Regional Status	Very High

Justification (Reason for Concern in NH)

Populations of many shrubland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Based on BBS data (Sauer et al. 2014), Brown Thrasher populations in New Hampshire have declined at 9.25% annually since 1966 (-8.6% from 2003-2013). These trends are similar in regional data: BCR 14 = -4.4%/year, BCR 30 = -4.52%/year. There have also been declines of 25-45% based on repeated Breeding Bird Atlases in the northeast (Cadman et al. 2007, McGowan and Corwin 2008, Renfrew 2013, MassAudubon 2014).

Distribution

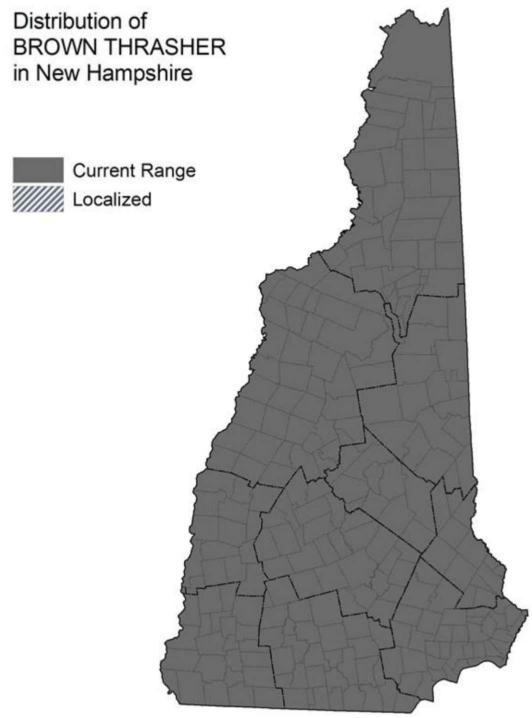
The Brown Thrasher breeds across the U.S. and southern Canada east of the Great Plains, and winters in the southeastern United States. It occurs throughout New Hampshire although it is rare and highly local from the White Mountains north.

Habitat

Like all shrubland birds, this species occurs in habitats dominated by shrubs or young trees, sometimes interspersed with mature trees (e.g., pine barrens) or open bare or grassy areas. Typical examples in New Hampshire include regenerating timber harvests, power line rights-of-way, shrubby old fields and edges, and pine barrens. From a bird perspective, such habitats can be subdivided into those dominated by shrubs vs. dominated by saplings. The former – sometimes referred to as “scrub-shrub” – is more typical of abandoned old fields, utility rights-of-way, and open areas within pine barrens. Such habitats often persist for relatively long periods without the need for additional management. Saplings, on the other hand, are typical of areas subject to timber harvest, and rarely retain early successional characteristics beyond 15-20 years. These are also regularly referred to as “young forest.” Brown Thrashers are rare in the latter habitat (Hunt 2013), and generally occur at lower densities in all habitats when compared to other shrubland birds.

NH Wildlife Action Plan Habitats

- Shrublands
- Pine Barrens



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant population declines and limited range retraction (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable – see shrubland and pine barrens habitat profiles

Habitat Protection Status

Highly variable – see shrubland and pine barrens profiles

Habitat Management Status

Habitat management has not been implemented specifically for this species, although management does occur for other species (American Woodcock, New England Cottontail) that often use the same habitats. See also shrubland and pine barrens habitat profiles.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by shrubland birds are already embedded in developed landscapes (e.g., right-of-way, old fields) or viewed as "undesirable" or "waste" habitats, they may be more vulnerable to this threat.

Habitat degradation and conversion due to natural succession or lack of active management (Threat Rank: High)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used, and as a result forest maturation is generally considered the most significant threat facing birds that use shrublands and young forests. See shrubland habitat profile for more information.

Habitat degradation from aspects of right-of-way management (Threat Rank: Medium)

Rights-of-way need to be maintained as short vegetation so as to reduce risks associated with trees and powerlines. As a result these corridors are regularly treated by mechanical (rarely chemical) means to remove or cut back vegetation. In general, such practices create habitat suitable for shrubland birds, although in extreme cases a site may be rendered unsuitable for 1-2 years large areas of vegetation are completely removed. If management occurs during the breeding season, reproductive success will be reduced. See also shrubland habitat profile.

Habitat degradation due to fire suppression and associated succession (Threat Rank: Medium)

In the absence of fire, pine barrens have fewer open areas eventually become closed-canopy pine forests. Although many shrubland birds can persist in such areas for a time, densities are often lower than in more open and shrub-dominated habitats. See pine barrens habitat profile for more information.

Habitat and species impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants, particularly shrubs, have been demonstrated to have several negative effects on birds using shrubland habitats. Insect prey (particularly caterpillars) are usually less common on non-native shrubs (Burghardt et al. 2008, Fickenscher et al. 2014), while data on the nutritional value of fruit are more equivocal (e.g., Davis 2011). In some cases, birds experience lower reproductive success in non-native shrubs, although there is considerable variation (Rodewald et al. 2010, Schlossberg and King 2010), and local predator communities play an important role as well. In all cases, the effects of invasives on shrubland birds depend to a large extent on their relative abundance. If plant diversity is high, the negative effects are diluted and less likely to impact bird populations. However, if the habitat tends toward a monoculture, reduced insect supplies and/or higher predation may reduce reproductive success to the extent that the habitat becomes a sink.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

Many predators (e.g., skunks, raccoons, feral cats) occur in relatively high densities in developed landscapes, often because of direct association with humans or food that is provided either intentionally or unintentionally. Most early successional birds nest on or near the ground, and as a result are more susceptible to nest predation. The problem is compounded because much early successional habitat is near human population centers.

List of Lower Ranking Threats:

Habitat degradation from sand and gravel pit reclamation practices that make habitat unsuitable

Actions to benefit this Species or Habitat in NH

Research on response to management

Primary Threat Addressed: Habitat degradation and conversion due to natural succession or lack of active management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
To best conserve this and other shrubland birds, there is a recognized need for information on how it responds to management implemented for other early successional species.

General Strategy:
Collect standardize data on occupancy and abundance of Brown Thrashers at sites managed for New England Cottontail, American Woodcock, Karner Blue Butterfly, and other species. Combine these data with data on habitat availability at the state and regional scale, to estimate actual or potential population size, which in turn could be compared to population objectives that also need to be developed.

Political Location:
Statewide

Watershed Location:
Statewide

See also shrubland and pine barrens habitat profiles

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality
Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:
Pamela Hunt, NHA

2005 Authors:

Literature

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Willet

Tringa semipalmata

Federal Listing	N/A
State Listing	SC
Global Rank	G5
State Rank	S3
Regional Status	Very High

Photo by Pamela Hunt

Justification (Reason for Concern in NH)

Birds that breed in salt marsh are widely recognized as conservation priorities by virtue of their specialized habitat needs, in combination with known high threats to salt marsh habitat.

Distribution

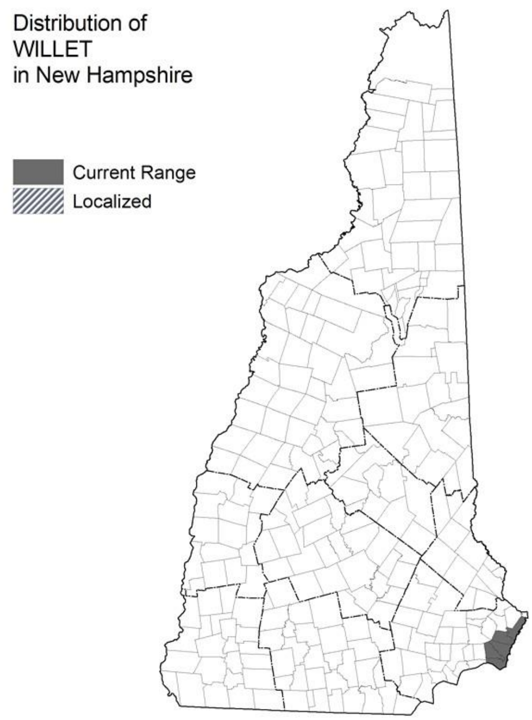
There are two subspecies (perhaps species) of Willet. The “Western Willet” breeds in freshwater marshes and prairie potholes in the Great Basin and across the northern Great Plains. The “Eastern Willet” along the Atlantic coast from eastern Canada south and west to northeastern Mexico, and also in the Caribbean from the Bahamas to northern Leeward Islands. The species winters in coastal habitats from California and Virginia south to northern South America (Lowther et al. 2001). In New Hampshire, Willets are restricted to salt marshes along the immediate coast from Rye to Seabrook.

Habitat

In the east (see Distribution), Willets breed almost exclusively in salt marshes, particularly in high marsh in areas of pools and pans (Lowther et al. 2001). Salt marshes used by Willets tend to be more extensive than those used by salt marsh sparrows, suggesting some area sensitivity. In a study in Connecticut, the smallest marsh used by this species was roughly 140 hectares in area (Benoit and Askins 2002). Willets may also nest on barrier beaches and islands, but have not been recorded doing this in New Hampshire. Other details on habitat specifics have not been extensively researched. In non-breeding season, frequents beaches, mudflats, and saltmarshes.

NH Wildlife Action Plan Habitats

- Salt Marshes
- Estuarine
- Dunes



Distribution Map

Current Species and Habitat Condition in New Hampshire

There is currently little information with which to evaluate the population size or trends of salt marsh bird species in New Hampshire. A study of the Hampton-Seabrook estuary in 2007 (McKinley and Hunt 2008) suggests that it may support approximately 25-30 pairs of Willets. Fewer than 10 pairs of Willets are likely along the rest of the coast, with the majority of these at Awcomin Marsh in Rye.

Although there are point count data for New Hampshire salt marshes dating back to the late 1990s, these are not sufficient for trend analysis. Analysis at the regional scale (USFWS Region 5) indicates stable populations since the 1990s (M. Correll, pers. comm.). Based on trends in salt marsh distribution, it is likely that the net loss of habitat and extensive ditching (see Eberhardt and Burdick 2009) have resulted in fewer birds than were historically present. Populations of Willets along the Atlantic Coast were severely reduced by market hunting and egg collecting in the late 1800s (Lowther et al. 2001), but gradually recovered during the 20th century, recolonizing New Hampshire by the 1980s.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Fill and Dredge in Wetlands - NHDES

- Marsh and shrub wetlands
- Migratory Bird Treaty Act (1918)

Quality of Habitat

There is extensive variation across salt marshes in NH their suitability for salt marsh birds. Most coastal marshes have been subject to tidal restrictions and/or extensive ditching, both of which appear to reduce habitat quality. There are limited data with which to evaluate habitat quality in NH for Willets. See also salt marsh habitat profile

Habitat Protection Status

The remaining salt marshes in NH are largely protected from development by wetlands regulations, and some parcels are additionally under conservation ownership by public and private entities.

Habitat Management Status

Habitat is not specifically managed for this species, although broader salt marsh restoration efforts would potentially benefit it, depending on project size and landscape context. See the salt marsh habitat profile for further detail.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to sea level rise (Threat Rank: High)

Rising sea levels will flood salt marshes and convert them to more open water habitats. In some cases, marsh will migrate inland, although rates and locations for such migration are poorly known. It is likely that existing human infrastructure will limit the extent to which marshes will migrate, resulting in a net loss of this already limited habitat in coastal New Hampshire. Species that nest in salt marsh will this have less available habitat, and that which remains may be degraded and/or more vulnerable to flooding (see flooding threat) or other disturbance. See the salt marsh habitat profile for more information.

Habitat impacts from tidal restriction (Threat Rank: High)

Dams and channelize streams alter the normal flows of tides in salt marsh habitats, often resulting in conversion to freshwater marshes (e.g., above dams), invasion by non-native plants, or altered sedimentation patterns. The resulting habitat changes generally reduce an area's suitability for nesting salt marsh birds. See the salt marsh habitat profile for more information.

Disturbance from increased nest flooding (Threat Rank: Medium)

Birds nesting in salt marsh are vulnerable to nest flooding during extreme high tides. To the extent that habitat alteration, human response to sea level rise, and increased storm frequency may affect tidal heights, these species should be considered additionally vulnerable to reduced reproductive success in addition to overall habitat loss.

Disturbance from human activities (walking, running dogs, shellfish harvest) (Threat Rank: Medium)

Disturbance results from recreational use of beaches or other habitats that shorebirds need for roosting and feeding during migration. People, pets, or vehicles using these habitats regularly flush birds, causing them to both expend energy in avoidance flights and reduce energy intake via foraging. Studies of shorebird behavior combined with physiological models suggest that repeated disturbance can reduce individual birds' chances of successfully completing migration (Harrington and Drilling 1996, Burger et al. 2007).

Habitat degradation from mosquito ditching (Threat Rank: Medium)

Historic ditching in salt marshes was used in attempts to control mosquito populations, and generally resulted in significant impacts to habitat conditions and salt marsh function. Although detailed data are lacking for Willets, a study of breeding birds in the Hampton-Seabrook Estuary, McKinley and Hunt (2008) documented significantly higher populations of Saltmarsh Sparrows in the least-ditched portion of marsh, a pattern also seen elsewhere in the Northeast (Reinert et al. 1981). See the salt marsh habitat profile for more information.

Disturbance from mercury toxicity (Threat Rank: Medium)

Relatively high levels of methylmercury have been documented in salt marsh sparrows (Schriver et al. 2006), which are believed the result of the high proportion of spiders in this species' diet. Because Willets feed primarily on benthic invertebrates, their mercury exposure may be different, although data are lacking. Mercury is known to interfere with neurological function and may ultimately reduce reproductive success, although there have been no studies to date on its effects in salt marsh birds.

List of Lower Ranking Threats:

Habitat degradation and disturbance from oil spills

Habitat degradation due to invasive or introduced plants

Habitat conversion and degradation from human climate change response

Habitat degradation from dredging and the dumping of spoils

Mortality from unregulated hunting in the Caribbean

Habitat impacts from road fragmentation

Habitat conversion and degradation from storm-altered deposition patterns

Disturbance from phenology shifts

Species impacts from siltation, acidification, fresh-water inputs, and increased temperatures

Habitat conversion due to development

Actions to benefit this Species or Habitat in NH

Salt Marsh Bird Monitoring

Objective:
Collect more detailed data on population trend to evaluate species status, and information on habitat use, to help prioritize conservation actions.

General Strategy:
More detailed data on population trend will allow for better evaluation of this species' current status (and recent trends) and perhaps serve as an indicator of the effects of ongoing stressors such as sea level rise. More detailed information on habitat use – in the context of current condition and future sea level rise – are needed to better prioritize conservation actions. Continue monitoring locations surveyed by SHARP in 2010-14 into the future and contribute these data to a regional data set. See the Salt Marsh habitat profile for additional actions that may benefit this species.

Political Location:
Rockingham County

Watershed Location:
Coastal Watershed

References, Data Sources and Authors

Data Sources
NHBR/NH eBird

Data Quality
Because salt marsh birds live in habitats that are difficult to access, there is little in the way of long term data than could be used to assess trends. That problem has been solved through the implementation of a regional monitoring program (SHARP). SHARP has also provided data on smaller peripheral populations within the state, although some historic sites may still not have been surveyed recently.

2015 Authors:
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2005 Authors:
Megan McElroy, UNH; Kimberly Babbitt, UNH

Literature

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Golden-winged Warbler

Vermivora chrysoptera

Photo by USFWS.

Federal Listing	N/A
State Listing	SC
Global Rank	G4
State Rank	S2
Regional Status	Very High

Justification (Reason for Concern in NH)

The Golden-winged Warbler has been undergoing a significant population decline and range shift in the Northeast since at least the 1980s (Confer et al. 2011). From 1966 to 2013, BBS data indicate a range-wide decline of -2.3%/year, although from 2003-2013 the trend is a non-significant 0.2%/year (Sauer et al. 2014). The latter likely reflects stable to increasing populations in the north and west, where the bulk of the current population occurs. In the northeastern United States, the declines have been dramatic: -10.82%/year in BCR 30 and -7.78%/year in USFWS Region 5. It is now almost extirpated from New England (Renfrew 2013, MassAudubon 2014), and occupancy declined by over 50% in New York (McGowan and Corwin 2008). The last breeding records for New Hampshire are from the 1990s, and there have been only seven records in the state (including migrants) since 2000. Golden-winged Warbler is considered an SGCN in all states where it occurs, as well as an RSGCN in USFWS Region 5. It is also on the Partners in Flight Watch List and the focus of a working group dedicated to range-wide and full life cycle conservation of the species.

Distribution

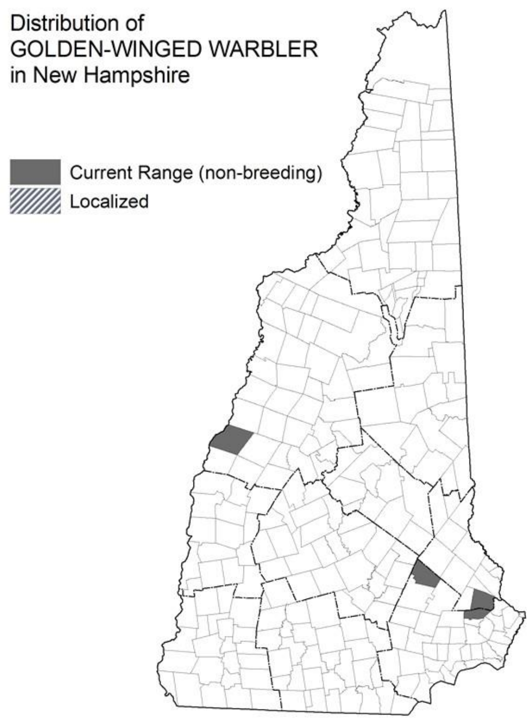
The Golden-winged Warbler currently breeds across much of the Midwest (southern Manitoba and northern Minnesota to western New York) and discontinuously in the Appalachians from northern Georgia to western Massachusetts (where extremely rare) (Confer et al. 2011). It winters on the Caribbean slope (primarily) of Central America from Guatemala to Panama, and in northwestern South America. It apparently colonized New Hampshire in the early 20th century, where it was generally limited to the extreme southeastern portion of the state (Foss 1994). During the 1990s it began to disappear from this region while showing up more regularly elsewhere. The last reliable locations through the 1990s were in Durham and Hanover, with the latter hosting the last confirmed nesting in the state in 1993. Since 2000 there have been only three breeding season records (late May through July, none since 2006), and there have been only four additional records of migrants. Given this long absence from the state and increasing distance from possible source populations, the Golden-winged Warbler is best considered extirpated from New Hampshire.

Habitat

Like all shrubland birds, this species occurs in habitats dominated by shrubs or young trees. Specific habitat features tied to Golden-winged Warbler occupancy include dense shrubs, a significant herb component, and scatter taller trees (Confer et al 2011). These conditions are often present on regenerating clear cuts, especially if a few trees are retained, and also appear to benefit from fire. The species also breeds locally in swamps with dense shrubs and scattered trees. In New Hampshire, most breeding-season records have been in abandoned fields or clearcuts in an early stage of succession and along powerlines.

NH Wildlife Action Plan Habitats

● Shrublands



Distribution Map

Current Species and Habitat Condition in New Hampshire

Generally declining, but some increases at extreme northwest edge of range. Extirpated from New Hampshire.

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

● Migratory Bird Treaty Act (1918)

Quality of Habitat

Not relevant; species no longer occurs in the state.

Habitat Protection Status

Not relevant; species no longer occurs in the state.

Habitat Management Status

Not relevant; species no longer occurs in the state, and is unlikely to occur even if appropriate habitat management were implemented.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by shrubland birds are already embedded in developed landscapes (e.g., right-of-way, old fields) or viewed as "undesirable" or "waste" habitats, they may be more vulnerable to this threat.

Habitat degradation and conversion due to natural succession or lack of active management (Threat Rank: High)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used, and as a result forest maturation is generally considered the most significant threat facing birds that use shrublands and young forests. See shrubland habitat profile for more information.

Habitat degradation from aspects of right-of-way management (Threat Rank: Medium)

Rights-of-way need to be maintained as short vegetation so as to reduce risks associated with trees and powerlines. As a result these corridors are regularly treated by mechanical (rarely chemical) means to remove or cut back vegetation. In general, such practices create habitat suitable for shrubland birds, although in extreme cases a site may be rendered unsuitable for 1-2 years large areas of vegetation are completely removed. If management occurs during the breeding season, reproductive success will be reduced. See also shrubland habitat profile.

Habitat and species impacts from introduced or invasive plants (Threat Rank: Medium)

Non-native plants, particularly shrubs, have been demonstrated to have several negative effects on birds using shrubland habitats. Insect prey (particularly caterpillars) are usually less common on non-native shrubs (Burghardt et al. 2008, Fickenscher et al. 2014), while data on the nutritional value of fruit are more equivocal (e.g., Davis 2011). In some cases, birds experience lower reproductive success in non-native shrubs, although there is considerable variation (Rodewald et al. 2010, Schlossberg and King 2010), and local predator communities play an important role as well. In all cases, the effects of invasives on shrubland birds depend to a large extent on their relative abundance. If plant diversity is high, the negative effects are diluted and less likely to impact bird populations. However, if the habitat tends toward a monoculture, reduced insect supplies and/or higher predation may reduce reproductive success to the extent that the habitat becomes a sink.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

Many predators (e.g., skunks, raccoons, feral cats) occur in relatively high densities in developed landscapes, often because of direct association with humans or food that is provided either intentionally or unintentionally. Most early successional birds nest on or near the ground, and as a result are more susceptible to nest predation. The problem is compounded because much early successional habitat is near human population centers.

List of Lower Ranking Threats:

None.

Actions to benefit this Species or Habitat in NH

See shrublands habitat profile for actions

References, Data Sources and Authors

Data Sources

Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality

Detection of Golden-winged Warblers is complicated by hybridization with Blue-winged, which has resulted in a complex array of songs sung by parent species, hybrids, and introgressed individuals (Confer et al/ 2011). It is generally considered impossible to conclusively identify a Golden-winged Warbler by song alone in New England, meaning that all non-seen birds cannot be assigned to species.

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2005 Authors:

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Blue-winged Warbler

Vermivora cyanoptera

Photo by Len Medlock.

Federal Listing	N/A
State Listing	N/A
Global Rank	G5
State Rank	S4
Regional Status	Very High

Justification (Reason for Concern in NH)

Populations of many shrubland birds are in strong decline, both in the Northeast and sometimes across larger portions of their continental ranges. For this reason, most species were included in the Northeast list of SGCN, with those that occur regularly in NH retained for the NH WAP revision. Across its range as a whole, the Blue-winged Warbler has been experiencing non-significant declines of less than 1%/year since 1966 (Sauer et al. 2014). Declines appear strongest in the east, and in BCR 30 (where most of NH's Blue-winged Warblers occur) are significantly negative (roughly -2%/year). Repeated Breeding Bird Atlases in the northeast have documented range expansion to the north (McGowan and Corwin 2008, Renfrew 2013), or filling in of previously unoccupied areas (MassAudubon 2014). In New Hampshire, there are not enough BBS data to determine a trend, but the species is now found farther north and west than was documented during the NH Atlas in the early 1980s (Foss 1994).

Distribution

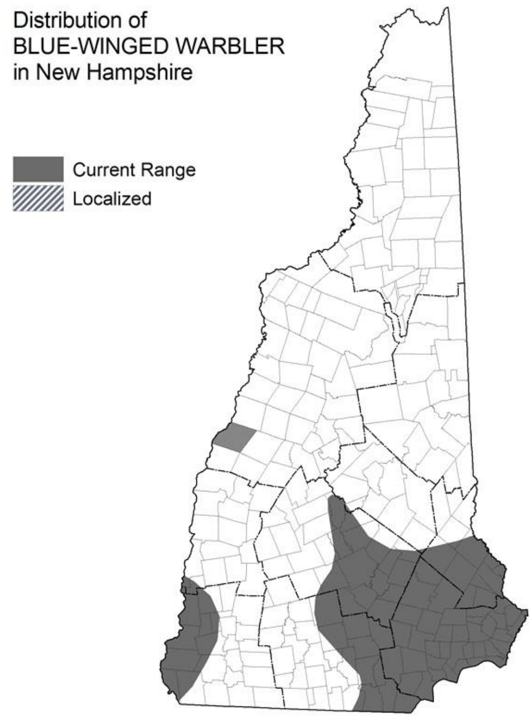
The Blue-winged Warbler breeds in the eastern U.S. from Minnesota and Maine south to Arkansas and Georgia. It winters along the Caribbean slope of Central America from southern Mexico to Panama (Gill et al. 2001). In New Hampshire it occurs primarily south and east of Concord of the White Mountains, with scattered records in the southern Connecticut River Valley. Within this distribution it is very locally distributed, with most records coming from southern Strafford and eastern Rockingham counties.

Habitat

Like all shrubland birds, this species occurs in habitats dominated by shrubs or young trees, sometimes interspersed with mature trees (e.g., pine barrens) or open bare or grassy areas. Typical examples in New Hampshire include regenerating timber harvests, power line rights-of-way, shrubby old fields and edges, and pine barrens. From a bird perspective, such habitats can be subdivided into those dominated by shrubs vs. dominated by saplings. The former – sometimes referred to as "scrub-shrub" – is more typical of abandoned old fields, utility rights-of-way, and open areas within pine barrens. Such habitats often persist for relatively long periods without the need for additional management. Saplings, on the other hand, are typical of areas subject to timber harvest, and rarely retain early successional characteristics beyond 15-20 years. These are also regularly referred to as "young forest." Prairie Warblers are rare in the latter habitat, and tend to reach their highest densities in pine barrens or other areas with scattered short conifers (Hunt 2013).

NH Wildlife Action Plan Habitats

- Shrublands
- Pine Barrens



Distribution Map

Current Species and Habitat Condition in New Hampshire

Significant population declines rangewide, but increases and northward range expansion at the northern edge of its range (see Justification).

Population Management Status

Management is not currently in place for this species.

Regulatory Protection (for explanations, see Appendix I)

- Migratory Bird Treaty Act (1918)

Quality of Habitat

Highly variable – see shrubland and pine barrens habitat profiles

Habitat Protection Status

Highly variable – see shrubland and pine barrens habitat profiles

Habitat Management Status

Habitat management has not been implemented specifically for this species, although management does occur for other species (American Woodcock, New England Cottontail) that often use the same habitats. See also shrubland and pine barrens habitat profiles.

Threats to this Species or Habitat in NH

Threat rankings were calculated by groups of taxonomic or habitat experts using a multistep process (details in Chapter 4). Each threat was ranked for these factors: Spatial Extent, Severity, Immediacy, Certainty, and Reversibility (ability to address the threat). These combined scores produced one overall threat score. Only threats that received a "medium" or "high" score have accompanying text in this profile. Threats that have a low spatial extent, are unlikely to occur in the next ten years, or there is uncertainty in the data will be ranked lower due to these factors.

Habitat conversion due to development and impacts from fragmentation (Threat Rank: High)

Ongoing residential and commercial development results in permanent loss of habitats for wildlife. Because many of the habitats used by shrubland birds are already embedded in developed landscapes (e.g., right-of-way, old fields) or viewed as "undesirable" or "waste" habitats, they may be more vulnerable to this threat.

Habitat degradation and conversion from natural succession or a lack of active management (Threat Rank: High)

In the absence of disturbance or management, the early successional and edge habitats preferred by this species generally revert to closed forest systems that are not heavily used, and as a result forest maturation is generally considered the most significant threat facing birds that use shrublands and young forests. See shrubland habitat profile for more information.

Habitat and species impacts from invasive or introduced plants (Threat Rank: Medium)

Non-native plants, particularly shrubs, have been demonstrated to have several negative effects on birds using shrubland habitats. Insect prey (particularly caterpillars) are usually less common on non-native shrubs (Burghardt et al. 2008, Fickenscher et al. 2014), while data on the nutritional value of fruit are more equivocal (e.g., Davis 2011). In some cases, birds experience lower reproductive success in non-native shrubs, although there is considerable variation (Rodewald et al. 2010, Schlossberg and King 2010), and local predator communities play an important role as well. In all cases, the effects of invasives on shrubland birds depend to a large extent on their relative abundance. If plant diversity is high, the negative effects are diluted and less likely to impact bird populations. However, if the habitat tends toward a monoculture, reduced insect supplies and/or higher predation may reduce reproductive success to the extent that the habitat becomes a sink.

Mortality from subsidized or introduced predators (Threat Rank: Medium)

Many predators (e.g., skunks, raccoons, feral cats) occur in relatively high densities in developed landscapes, often because of direct association with humans or food that is provided either intentionally or unintentionally. Most early successional birds nest on or near the ground, and as a result are more susceptible to nest predation. The problem is compounded because much early successional habitat is near human population centers.

Habitat degradation from aspects of right-of-way management (Threat Rank: Medium)

Rights-of-way need to be maintained as short vegetation so as to reduce risks associated with trees and powerlines. As a result these corridors are regularly treated by mechanical (rarely chemical) means to remove or cut back vegetation. In general, such practices create habitat suitable for shrubland birds, although in extreme cases a site may be rendered unsuitable for 1-2 years large areas of vegetation are completely removed. If management occurs during the breeding season, reproductive success will be reduced. See also shrubland habitat profile.

List of Lower Ranking Threats:

Habitat degradation from fire suppression and associated succession

Habitat degradation from sand and gravel pit reclamation practices that make habitat unsuitable

Actions to benefit this Species or Habitat in NH

Research on response to management

Primary Threat Addressed: Habitat degradation and conversion from natural succession or a lack of active management

Specific Threat (IUCN Threat Levels): Natural system modifications

Objective:
To best conserve this and other shrubland birds, there is a recognized need for information on how it responds to management implemented for other early successional species.

General Strategy:
Collect standardize data on occupancy and abundance of Blue-winged Warblers at sites managed for New England Cottontail, American Woodcock, Karner Blue Butterfly, and other species. Combine these data with data on habitat availability at the state and regional scale, to estimate actual or potential population size, which in turn could be compared to population objectives that also need to be developed.

Political Location:
Statewide

Watershed Location:
Statewide

References, Data Sources and Authors

Data Sources
Trend data from Breeding Bird Survey (Sauer et al. 2014, above). NH distribution data from NHBR/NH eBird

Data Quality
Because this species is easily detected and identifiable, data on distribution and habitat use are generally well known.

2015 Authors:
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2005 Authors:

Literature

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