

SPECIES PROFILE

Bicknell's Thrush

Catharus bicknelli

Federal listing: Not listed

State listing: Not listed

Global rank: Not ranked

State rank: Not ranked

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ELEMENT 1: DISTRIBUTION AND HABITAT

1.1 Habitat Description

Bicknell's thrush occupies balsam fir-dominated forests on high elevation mountain slopes of the northeastern United States and lower elevation forests further north in the Canadian Maritime Provinces. Dense fir thickets typical of breeding habitat have 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, as well as chronically disturbed high elevation and coastal forests. At high elevations, such areas are most common along exposed ridgelines. This species has also been found in habitats disturbed by humans, such as regenerating timber harvest sites, roads, and ski trails (Rimmer et al. 2001). Occupied habitats are characterized by high numbers of standing dead conifers with a dense understory of balsam fir. In the White Mountains of New Hampshire, occupied sites were dominated by conifers (75% foliage volume) and had a mean canopy height of 4.8 m (15.7 ft) (Sabo 1980 *in* Rimmer et al. 2001). Bicknell's thrushes also prefer a high density of trees, dead fallen trees, snags and stumps, and moss ground cover (Connolly 2000).

In the Catskills, which lie at the southern end of the range, breeding habitat is found above 1,100 m

(3,600 ft). In Maine, territories occur as low as 750 m (2,460 ft), and in southern Quebec and New Brunswick, where Bicknell's thrush reaches the northern edge of its breeding range, territories occur in coastal spruce-fir habitat, as well as in regenerating stands of mixed forests above 450 m (1,476 ft) (Rimmer et al. 2001). In New Hampshire, the Bicknell's thrush is found primarily in the White Mountains, between 1,070 and 1,370 m (3,500 to 4,500 ft) in elevation (Richards 1994).

1.2 Justification

Bicknell's thrush breeding habitat is relatively limited, consisting of a series of "islands" throughout the range. High elevation forests are especially vulnerable to degradation from global climate change, atmospheric pollution, and human disturbance caused by construction and maintenance of ski areas, cell towers, wind farms, and roads, as well as hikers, mountain bikers and other recreational users.

On its wintering grounds, this species occupies moist, primarily broadleaf forests, which have been severely reduced (Rimmer et al. 2001). The Dominican Republic has lost about 90% of its forest habitat, Jamaica has lost 75%, Cuba has lost 80-85%, and Haiti's forests are all but gone, with less than 1.5% remaining (Stattersfield et al. 1998). Bicknell's thrush was found at 7 of 11 surveyed historic sites (14 sites known) in 1995-97, and several sites had been degraded to the point of being unsuitable for this species (Rimmer et al. 2001).

Atlas projects in northern New England and New York indicate that Bicknell's thrush still occupies most of its historic breeding range. In New York, atlas maps of Bicknell's reports were very similar to locations reported by Bull in 1974, and no changes in distribution or abundance have been documented over the past century (Peterson 1988). In Vermont, this

species has probably never been widely distributed, being limited to the small number of peaks above 914 m (3,000 ft) along the spine of the Green Mountains (Kibbe 1985). Bicknell's thrush was known to occur historically on Mt. Greylock (Massachusetts) as early as 1888, but the small breeding population (6-11 pairs from 1934-60) began to decline in 1960, and the species was considered extirpated from the state by 1973 (Veit and Petersen 1993).

In Maine, Bicknell's were documented on several peaks in western Maine, and on Mt. Katahdin in central Maine (Adamus 1983). However, there are about 150 peaks rising above 750 m (2,460 ft) in western and central Maine, and it is likely that many of these support Bicknell's thrush. Most of these peaks are remote and lack access via trails or roads, making surveys extremely difficult (Maine Office of GIS).

1.3 Protection and Regulatory Status

The Bicknell's thrush is protected in the United States under the Migratory Bird Treaty Act of 1918.

1.4 Population and Habitat Distribution

In New Hampshire, Bicknell's thrush breeding habitat is centered in the White Mountains, where this species was first recorded during the breeding season in 1882 (Richards 1994). During the early 1950s, they were reported in Dixville Notch, the Third Connecticut Lake (Pittsburg), Mt. Sunapee (Newbury), and Mt. Monadnock (Jaffrey), and Mt. Kearsarge (Warner/Wilmot). A nest with eggs was found on Mt. Kearsarge in 1957, and the species was present on this site from 1950 through 1970 (Richards 1994). In 1970, Bicknell's thrushes were also documented on Mt. Cardigan, in Orange and Alexandria. Over the past few decades, breeding populations on Kearsarge, Monadnock, Sunapee, and Dixville Notch have disappeared, and today, the Bicknell's thrush is almost entirely restricted to the White Mountains, with possible occurrences on Mt. Cardigan and in the North Country (Richards 1994).

The transient and patchy nature of Bicknell's thrush breeding habitat results in erratic distribution of occupied breeding territories. They also exhibit a unique breeding strategy, termed "female-defense polygyny" (Briskie 1993 in Rimmer et al. 2001), where both males and females pair with more than

one partner. In Vermont, more than 75% of broods had multiple paternity, some males had offspring in two nests simultaneously, and 75% of nests had 2-4 males feeding the nestlings (Rimmer et al. 2001). The inaccessible nature of their breeding habitat combined with a rather complex mating system make this species especially difficult to study.

1.5 Town Distribution Map

Not completed for this species.

1.6 Habitat Map

The Bicknell's thrush habitat map was based on model developed by New Hampshire Fish and Game (NHFG) that integrates three data sets to capture potential breeding habitat. The first, a habitat model developed by the Vermont Institute of Natural Science (VINS), sets an elevation "mask" that drops 81.63 m for every 1 degree increase in latitude to reflect climatic effects on forest composition and structure (Lambert et al. 2004). This ratio is based on the lowest altitudes documented for Bicknell's in the southernmost sites (the Catskills), and the northernmost sites (southern Quebec), and is nearly identical to the ratio for tree line, which drops approximately 83-m/1 degree in elevation (Cogbill and White 1991). Above this mask, VINS used the 1992 National Land Cover Dataset (NLCD) to map softwood cover as potential Bicknell's thrush breeding habitat.

A second model designed to predict Bicknell's thrush distribution and abundance in the White Mountains used satellite imagery of land cover, digital elevation model, and point count data (Hale in press). This model was accurate in predicting Bicknell's distribution within a decile range of 0.10-0.60, but overestimated the number of birds above 0.60 deciles, which tended to occur at pixels in krummholz and in the alpine zone. This model also included lower elevation forests with high hardwood component, which support much lower densities of Bicknell's (Rimmer et al. 2001). However, because the area of this lower elevation habitat is so extensive, it has the potential to support a greater number of birds than the smaller area of higher elevation habitat.

In addition to these two models, NHFG also used NHNH data on four high elevation communities to ensure that as much high elevation softwood habitat as possible would be included as potential habitat.

1.7 Sources of Information

Information on historic and recent Bicknell's thrush distribution and habitat was found in breeding bird atlases from New York, Vermont, and New Hampshire, and from the Bicknell's thrush account of the Birds of North America series. Habitat models developed by VINS and S. Hale were combined with NHNH data in the mapping effort by NHFG. Data on Bicknell's thrush occurrences were derived from monitoring data gathered by Mountain Bird Watch (VINS) and the WMNF monitoring program from 1992 to 2000.

1.8 Extent and Quality of Data

Despite the quantity of data generated by the above-mentioned monitoring programs, a substantial portion of the Bicknell's range is inadequately surveyed, and there is incomplete information on their distribution, relative abundance, breeding success, and other population parameters. Due to the remoteness and inaccessibility of their breeding habitat and unique breeding strategy, Bicknell's thrushes are difficult to survey. Breeding Bird Survey (BBS) routes do not typically represent high elevation spruce fir habitat, and not surprisingly, Bicknell's are rarely reported on BBS routes (Sauer et al. 2003). The data gathered so far are not enough to determine significant trends in populations over recent years.

1.9 Distribution Research

The Mountain Birdwatch Program instituted by VINS in 2000 is the most comprehensive approach to determining the distribution of Bicknell's thrush throughout its range in the Northeast. In 2003, this program covered 117 routes throughout New York, Vermont, New Hampshire, and Maine, yet many potential breeding areas are too remote and inaccessible to be surveyed, particularly in northern New Hampshire and west-central Maine. Based on elevation data from the Maine Office of GIS, there are approximately 150 peaks above 750 m (2,460 ft) in Maine, all of which could provide suitable habitat for Bicknell's thrush. These inaccessible mountains would need to be surveyed in order to fully determine the actual extent of the breeding range.

ELEMENT 2: SPECIES CONDITION

2.1 Scale

Based on habitat mapping of high elevation spruce fir habitat conducted by NHFG, 24 units were identified as potential or known habitat. The largest area (approximately 39,000 ha) is on the WMNF, and includes 10 of the units. Another 11 units are located north of the White Mountains, two of which (Nash Stream and Bunnell Preserve) are listed separately because they are conservation lands. The units are grouped according to similarities in their ownership and/or conservation status:

- **North Country:** NHFG WMA North; Lyme Timber; NHFG Natural Area; Magalloway Mt.-Stubb Hill; Crystal Mt.-Blue Ridge; Mt. Dustan; Sanguinary-Rice Mts.; Dixville Peak-Mt. Kelsey; Cambridge
- **North Country west:** Nash Stream; Bunnell Preserve
- **Success:** Mahoosuc Range
- **WMNF:** Pilot-Kilkenny-Pliny Range; Wildcat Mt.; Mt. Washington; Pemi Wilderness; Franconia Ridge-Twin Mt.; Kinsman Ridge; Osceola-Kancamagus; Sawyer Pond-Bear-Moat Mts.; Moosilauke; Cushman-Carr Mts.
- **West Central:** Smarts Mt.; Mt. Cardigan

2.2 RELATIVE HEALTH OF POPULATIONS

There is no information on the relative health of Bicknell's populations in New Hampshire. Bicknell's thrushes are known to breed throughout most of their historic range in the state, with the exception of the most southern locations, although most of the potential habitat north of the White Mountains is inadequately covered.

Relative abundance of Bicknell's thrush appears to be unchanged from 2000 to 2003, based on Mountain Birdwatch data (Lambert 2003). However, surveys from 1992 to 2000 by VINS and WMNF showed that this species may possibly have increased slightly in Vermont and declined somewhat in New Hampshire (Rimmer et al. 2001). In general, the amount of data collected cover too brief a time to allow detection of significant population changes.

2.3 Population Management Status

Bicknell's thrush populations are not currently managed in New Hampshire.

2.4 Relative Quality of Habitat Patches

Nearly all of the peaks above a threshold elevation of 915 m (3,000 ft) in New Hampshire (Hale 2001) have habitat suitable for Bicknell's thrush, all of which are threatened by atmospheric deposition of acidic compounds, heavy metals, and other pollutants. Peaks in the White Mountains have several ski areas, and thousands of miles of trails that attract millions of visitors each year, making them vulnerable to recreation impacts. An assessment of habitat quality for different patches should include size of habitat block, forest stand characteristics, natural and human disturbance factors, 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 mortality rates, blood mercury content, etc.

2.5 Habitat Patch Protection Status

Bicknell's thrush habitat in the northeastern United States is mostly protected by national and state forests. Of the 111,346 ha of potential Bicknell's thrush breeding habitat identified by the VINS GIS model, 90,190 ha 81% is on conservation lands (Lambert 2003). New Hampshire and New York contain the majority of potential Bicknell's thrush habitat (45% and 24%, respectively), and have the highest percentages on protected lands (94% and 93%, respectively). Vermont, which has 8% of the breeding habitat, has 83% on conservation lands, and Maine, with 23% of the habitat, has just 41% on conservation lands (Lambert 2003).

In New Hampshire, approximately 83% of Bicknell's thrush habitat is on the WMNF, about 5% is on state forestlands, and the remainder (about 12%) is protected by private conservation lands, forest preserves, town forests, and timberland easements (Lambert 2003).

2.6 Habitat Management Status

See section 2.5. Habitat is not managed specifically for Bicknell's thrushes in New Hampshire, but populations may indirectly benefit from other management activity on state and federal conservation land.

2.7 Sources of Information

Most information on Bicknell's thrush breeding range, habitat, and conservation status, as well as extent and conservation status of potential breeding habitat was derived from documents and reports produced by VINS. Supplemental information was gathered from breeding bird atlases for the region. Population data were generated by the WMNF high elevation bird surveys and VINS Mountain Birdwatch surveys. Habitat models were developed by VINS and by Dr. Stephen Hale of the University of New Hampshire.

2.8 Extent and Quality of Data

Data on presence and relative abundance of Bicknell's thrush have been gathered by VINS and WMNF for several years, but not long enough to determine statistically significant population trends. The core breeding range continues to be monitored by the Mountain Birdwatch Program (VINS), but many more remote peaks are still not monitored at all. There is very little information on the effects pollution and other impacts on the breeding habitat.

2.9 Condition Ranking

2.10 Condition Assessment Research

The greatest threats to Bicknell's thrush are climate change, atmospheric deposition pollution (e.g., acidic compounds and mercury), and destruction of wintering habitats. To address issues threatening Bicknell's on their breeding grounds, research efforts should focus on determining the effects of pollutants and climate change on Bicknell's thrush as a component of the overall high elevation ecosystem.

ELEMENT 3: SPECIES AND HABITAT THREAT ASSESSMENT

3.1 Threats

See Form 1: Threat Identification, Form 2: Threat Ranking, and Form 3: Local Threat Weighting (attached). Form 4 (Feasibility Ranking) for Bicknell's thrush will be inextricably linked to the Feasibility Ranking for high elevation spruce-fir and for non-breeding birds. All threats to Bicknell's in New Hampshire are related to either habitat degradation or broader threats such as climate change and acid deposition.

Considerable evidence suggests that habitat loss on the Caribbean winter grounds may be the most critical threat facing Bicknell's thrush. New Hampshire should thus work cooperatively with other northeastern States and Provinces in developing a feasible and effective habitat conservation program in the Dominican Republic (where the majority of the population is believed to winter). Although few Bicknell's have been recorded in Haiti, Jamaica, Puerto Rico, and Cuba, this may be partly because these countries have so little of their original forested habitat remaining. International initiatives should consider these countries potential partners in any activities related to Bicknell's thrush conservation.

3.1.1 Acid Deposition

High elevation spruce fir forests throughout the Northeast have been affected by acid deposition. Acidification has resulted in extensive die-offs of red-spruce, which is not the dominant species in Bicknell's thrush breeding habitat, but makes up a large component of forest composition. Acidification also leaches calcium from the soil, causing declines in tree health, invertebrate prey quality, and ultimately reducing fitness in Bicknell's and other insectivorous vertebrates.

3.1.2 Mercury

Atmospheric deposition of pollutants such as mercury and lead may affect high elevation forests and wildlife. Methylmercury can accumulate in the food chain and pose a risk to insectivorous species such as Bicknell's thrush.

3.1.3 Climate Change

High elevation spruce fir forests and associated wildlife will likely decline as the climate changes and temperatures become too warm for the species to survive or compete with other warm-adapted species. One estimate indicates that a 3° rise in the mean July temperature could result in an 88% to 98% loss of the United States breeding habitat of Bicknell's, including extirpation from the Catskills, southern Adirondacks, Green Mountains, western Maine, and possibly up to 144 mountains in New Hampshire (Lambert and McFarland 2004).

3.2 Sources of Information

Threats information for Bicknell's thrush was derived from the literature and discussions with experts and colleagues during threat identification and ranking meetings. For Bicknell's thrush, the threats forms for high elevation spruce-fir habitat were used and modified as appropriate to address threats to this particular species.

3.3 Extent and Quality of Data

There is substantial information on the effects of forest practices and other habitat conversion (ski area expansion, roads, etc) on forest birds such as Bicknell's thrush. A great deal of research on the effects of acid rain on spruce-fir forests has also been done, although the direct impacts on Bicknell's and other species are not well documented. Less is known about other impacts, including pollutants, wind and cell towers, and recreation impacts.

3.4 Threat Assessment Research

There is little or no data on the effects of pollutants on Bicknell's thrush, but atmospheric deposition of mercury is likely to be a major threat to this species. Also, there is very little known about the effects of recreation along hiking trails and ski trails, nor the impact of developments at high elevation.

ELEMENT 4: CONSERVATION ACTIONS

See *Element 4 for High elevation spruce-fir and Non-breeding birds.*

ELEMENT 5: REFERENCES**5.1 Literature**

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5.2 Data Sources

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- Mountain Birdwatch Program. Vermont Institute of Natural Science (VINS), Woodstock, VT.
- White Mountain National Forest Breeding Birds Surveys. White Mountain National Forest (WMNF), Laconia, NH.

ELEMENT 6: LIST OF FIGURES:

- Figure 1. Historic (up to mid-1950's) and present distribution of Bicknell's thrush during the breeding season. Towns are coded as known (dark gray) or possible (light gray) sites for Bicknell's thrush.

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