

# Notes on vagrancy in Brown-headed Nuthatch, with attention to recent range expansion and long-term habitat changes

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## ABSTRACT

The Brown-headed Nuthatch (*Sitta p. pusilla*) is a permanent resident of the pinewoods of the southeastern United States from southern Delaware through eastern Texas (A. O. U. 1998), with a weakly differentiated subspecies, *caniceps*, that inhabits southern Florida (Pyle 1997) and an Endangered subspecies, *insularis*, on Grand Bahama Island (Smith and Smith 1994).

Current ornithological literature designates this species as sedentary, with no recognized dispersal or irruptive movements, although the A. O. U. *Check-list* (1998) indicates extralimital records from four states. In fact, records of the species outside of normal range were mentioned in multiple late-nineteenth-century sources, and these appearances appear to correspond to a period of extensive logging of the southern pinewoods. Most of these records, however, have more recently been assumed erroneous and thus omitted from the ornithological literature of the twentieth century. There were only two sightings of this species north of normal range during the first half of the twentieth century. A second cluster of sightings occurred between 1954 and 1977, during a period of renewed degradation and logging of the southern

pinewoods. After a period of gradual habitat recovery, coinciding with a well-documented expansion of the breeding range, a series of deleterious events has more recently afflicted portions of the southern pinewoods, including several years of intense drought, fires, and storm damage, which were followed by a severe outbreak of the Southern Pine [Bark] Beetle (*Dendroctonus frontalis*). Concomitant with this recent deterioration in the Brown-headed Nuthatch's habitat has been a recent series of vagrant records north of normal range, which have been verified by multiple observers and photographically documented. Both historically and in recent times, it would seem that extralimital wandering of this species could be triggered by episodes of severe habitat loss.

## INTRODUCTION

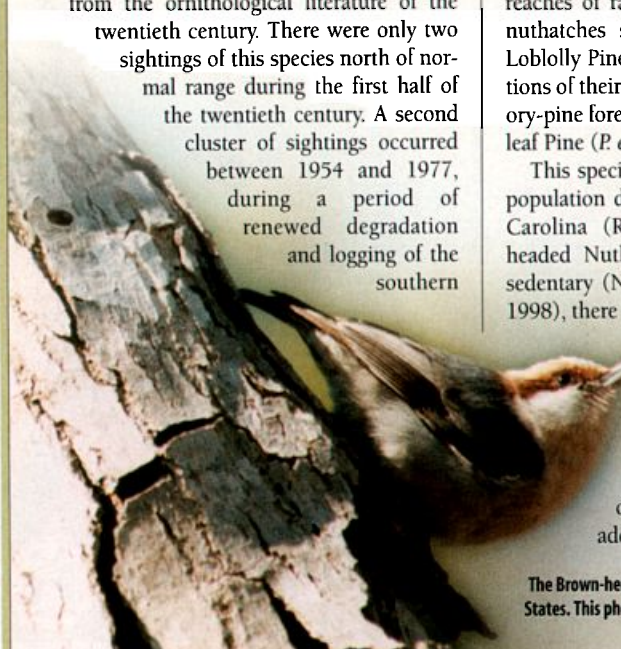
The Brown-headed Nuthatch (*Sitta pusilla*) is a year-round resident of the Piedmont and the southern Coastal Plain regions of the southeastern United States, with some secondary, disjunct populations in southern portions of the Cumberland Plateau and lower-elevation areas of the Appalachians (Harrap and Quinn 1995). In the southern Coastal Plain portions of its range, the species occupies Longleaf Pine (*Pinus palustris*) forest, once quite vast but now considerably diminished in extent and quality. In the Piedmont and northerly reaches of range in the Coastal Plain, these nuthatches show a decided preference for Loblolly Pine (*P. taeda*). In some upland portions of their range, they inhabit the oak-hickory-pine forest with a strong element of Shortleaf Pine (*P. echinata*).

This species apparently reaches its highest population densities in Louisiana and North Carolina (Root 1988). Although Brown-headed Nuthatch is generally described as sedentary (Norris 1958, Withgott and Smith 1998), there have been numerous instances of vagrancy recorded over the years. With respect to these reports of extralimital individuals, considerations such as changes in habitat, range expansion, and irruption or dispersal seem not to have been addressed in a thorough manner.

## THE CURRENT BREEDING RANGE OF BROWN-HEADED NUTHATCH IN HISTORICAL CONTEXT

The historical northern boundary of the breeding range of Brown-headed Nuthatch is described by Bent (1948) as extending from Arkansas, possibly southeastern Missouri, through northern Mississippi and northwestern South Carolina, into eastern Virginia and Maryland, and just into southern Delaware. In Tennessee and Missouri, its historical breeding status is uncertain. A record of a pair collected (AMNH 230089, 230090) on 19 March 1907 in Shannon County (Robbins and East-erla 1992) may pertain to an extirpated breeding population in the Shortleaf Pine area of southeastern Missouri. Woodruff (1908) described the female as flying to and from a dead pine in the middle of a cornfield, a situation indicative of possible nesting, as is the March date. Two unconfirmed Tennessee records also date from this period, one counted on a Christmas Bird Count (C.B.C.) near Knoxville in 1914, and another along the Ocoee River between Copperhill, Tennessee and Blue Ridge, Georgia in 1915 (Trabue 1965). These Tennessee records were both considered suspect by Haney (1981). Both however, occurred in or very near areas into which the species has expanded its range in recent times. There are also some indications that the Delaware population may have extended slightly farther north at one time. This species was mentioned in a list of the birds of Cape May County, New Jersey in 1857 and as a rare visitant in the southern counties of New Jersey or Pennsylvania in 1869 (Stone 1965).

Over the past 40 years, there has been a well-documented expansion of the breeding range of the Brown-headed Nuthatch into the state of Tennessee, coinciding with more modest expansions into western North Carolina, western Virginia, and very recently into northeastern Maryland. In 1968, two Brown-headed Nuthatches were found in Hamilton County, Tennessee, a first accepted state record (Basham 1969), with nesting confirmed in 1977 (Haney 1981). In recent years breeding Brown-headed Nuthatches have also been found in southwestern Tennessee at Pickwick Dam, Hardin County (Cardiff 1997



The Brown-headed Nuthatch (*Sitta pusilla*) is a permanent resident of the pinewoods of the southeastern United States. This photograph was taken in Okaloosa County, Florida on 2 February 2000. Photograph by Frank Renfrow.

Stedman 2000). In 1995, breeding was confirmed at the Kingston Steam Plant, 126 km to the north of Chattanooga, in Roane County (Nicholson 1997). Several more breeding records (Figure 1) were confirmed over the next several years (Hall 1998, Leberman 2000). Beginning in 1999, Brown-headed Nuthatches have also been found at Cookeville in Putnam County, 116 km west of Kingston, with breeding confirmed here in 2002 and 2003 (Stedman and Walden, in press). A first Knox County record in 2002 was indicative of continued northward expansion along the Tennessee River (Sloane and Palmer-Ball 2003).

A Brown-headed Nuthatch nest record at Cleburne County, Arkansas in 2002 was considered unusual for the area (Myers and Wallace 2002) and may indicate further range expansion in this state as well.

In western North Carolina, a similar advance of breeding populations has occurred from the Piedmont region up into higher elevations to the west. Pearson et al. (1942) listed this species as unrecorded west of Burke County. More recently, breeding populations have been confirmed in Buncombe (H. LeGrand, pers. comm.; Simpson 1992), Clay (Renfrow, unpubl.), and Polk Counties (W. Forsythe, pers. comm.).

A westward expansion into higher-elevation areas in Virginia has likewise been observed, with recent records from Botetourt, Montgomery, Augusta, Pulaski, and Roanoke Counties (E. Brinkley, pers. comm., J. Buckelew pers. comm.; Hall 1988). Project FeederWatch data also indicate some expansion into western Virginia and possibly West Virginia, although this has not yet been verified by experienced observers (W. Hochachka, pers. comm.). There are currently no accepted records of this species for West Virginia (W. Argabrite, pers. comm., J. Buckelew, pers. comm.).

Despite indications of a population decline in Maryland and eastern Virginia (Ilf 1997), an apparent increase in numbers in the winter of 1997 (Ilf 1998) was followed by increased north-of-range sightings in Queen Anne's County, Maryland, where Brown-headed Nuthatch had not been previously recorded (Ilf 1999, 2000).

#### RECORDS AND REPORTS OF BROWN-HEADED NUTHATCH AWAY FROM BREEDING RANGE

The unevenness in the documentation of

extralimital Brown-headed Nuthatches poses a particular problem for the determination of a given report's accuracy and therefore for a clear picture of vagrancy or dispersal. All 26 possible records of vagrants have been given a specific designation according to the degree of uncertainty surrounding each record (Tables 1–3). The records with the greatest amount of uncertainty are designated as "suspect," in accord with current assessment at the state



Figure 1. Brown-headed Nuthatch at an area of recent range expansion in Roane County, Tennessee on 11 May 2000. Photograph by Frank Renfrow.

Table 1. Vagrant Brown-headed Nuthatches in the Great Lakes Region of the United States.

LOCATION	DATE	DETAILS	SOURCE
<b>Illinois</b>			
Lake	11 Jul 2001–9 Feb 2002	m. ob./documented**	Semel 2002
<b>Indiana</b>			
Lake	5–6 Apr 1932	m. ob./documented*	Mumford and Keller 1984
<b>Michigan</b>			
Ingham	12 May 1877	specimen lost/credible details	Barrows 1912
<b>New York</b>			
Chemung	24 May 1888	specimen CUM 13512**	Levine 1999
<b>Ohio</b>			
Lake?	pre-1838	specimen lost/credible details	Kirtland 1838
Geauga	21 Nov–14 Jan 2002	m. ob./documented**	Gilbert 2002
<b>Wisconsin</b>			
Rock	1 May 1964	documented*	Maxson 1964
Dane	14 May 1970	documented*	Robbins 1991
Milwaukee	Oct 1971–Jan 1972	m. ob./documented**	Robbins 1991
Milwaukee	Nov 1977	credible details	Korducki, pers. comm.
Milwaukee	26 Feb 2000–19 Apr 2000	m. ob./documented**	Domagalski, pers. comm.

\* = accepted but with details insufficient to rule out *Sitta pygmaea* \*\* = accepted by state bird records committee  
italics indicate names of counties; "m. ob." indicates multiple observers

level. These flagged records are all included with accepted records in the Tables, as they are in keeping with a cyclical pattern of historical occurrence established by those records that have been accepted by states' records committees. The ratified records, as well as those with credible extant details, are detailed in the following. Because of the disparity between verifiable and unverifiable accounts, however, there has been no attempt

to map these uneven data or to manipulate them statistically.

Prior to 1850, there seems to be only one mention of a vagrant Brown-headed Nuthatch in the literature: an individual collected in northern Ohio sometime prior to 1838: the observer and collector of this specimen was none other than Jared Potter Kirtland (1793–1877), the noted nineteenth-century naturalist (Kirtland 1838). This specimen was apparently lost, and the record is omitted in the most recent ornithological history of Ohio (Whan 2001).

During the 27-year interval between 1876 and 1903, there were nine possible occurrences of vagrant Brown-headed Nuthatches (Tables 1–3). The first of these sightings was in New Jersey, where one was carefully studied at a Camden County suet feeder during the winter of 1876 (Bent 1948, Stone 1965). On 12 May 1877, Dr. H. A. Atkins collected a Brown-headed Nuthatch at Ingham County, Michigan. This specimen was subsequently lost, and the record had been called into question due to possible confusion with the Red-breasted Nuthatch (*Sitta canadensis*) (Barrows 1912). The next year, there was a slightly north-of-range record at St. Louis County, Missouri on 6 May 1878 (Robbins and East-erla 1992). A Brown-headed Nuthatch was

collected near Philadelphia—but not necessarily within Pennsylvania—in the autumn of about 1885 (McWilliams and Brauning 2000). In western New York, an adult male was collected (CUM 13512) at Chemung County on 24 May 1888 (Levine 1998). Finally, a Brown-headed Nuthatch specimen in the collection of the Reading Museum was collected at Berks County, Pennsylvania on 6 September 1894 (McWilliams and Brauning 2000; R. Leberman, pers. comm.).

During the 51-year interval between 1903 and 1954, there was, remarkably, only one possible sighting of a vagrant Brown-headed Nuthatch (Table 1). In 1932, two observers reported a sighting of the species in Indi-

ana (Mumford and Keller 1984). This record is currently accepted by the Indiana Bird Records Committee, but without determination that the details adequately rule out the similar Pygmy Nuthatch (*Sitta pygmaea*) as a possibility (Bruner 1996; D. Gorney, pers. comm.).

During the 23-year interval between 1954 and 1977, there were again nine reported sightings of vagrant Brown-headed

Nuthatches (Tables 1–2), possibly indicating another peak in extralimital appearances. Five of these are considered "suspect" records from the Northeast (Zeranski and Baptist 1990, Halliwell et al. 2000), and only one, the 1971 Milwaukee record, has been officially accepted as a Brown-headed Nuthatch. There was a Wisconsin sighting of a Brown-headed Nuthatch on 1 May 1964 in Rock County (Maxson 1964) and another in Dane County on 14 May 1970. These two sightings were accepted by Robbins (1991), but, as with the Indiana report, the details were considered insufficient to exclude Pygmy Nuthatch. A Brown-headed Nuthatch frequented a feeder at Milwaukee County, Wisconsin from October 1971 through January 1972 (Robbins 1991). There was also one other sight record at Milwaukee County in 1977. The observer viewed the bird at close range and noted the rich, chocolate brown coloration of the head (M. Korducki, pers. comm.).

There was one isolated, suspect sighting for New Jersey in 1989. This was the last of three "suspect" twentieth-century sightings for the state, with the two others being from the 1960s (Halliwell et al. 2000). Such occasional sightings might be expected, given the state's close proximity to the Delaware population, though the water barrier of the Delaware Bay would certainly pose an obstacle for at least some wanderers.

Between 1997 and 2001, there were five north-of-range records of Brown-headed Nuthatch (Tables 1–3). Each bird was documented and furnished a first or second state record. The first of these was at Johnson County, Kansas, where a Brown-headed Nuthatch frequented a feeder from 25 December 1997 through 25 January 1998 (Grzybowski 1998). A Brown-headed Nuthatch also frequented a feeder in Russell County, Kentucky from 26 September through 12 October 1999. This was only about 90 km north of the recently expanded Tennessee breeding range but nevertheless a first

**Table 2. Vagrant Brown-headed Nuthatches in the northeastern United States.**

Location	Date	Details	Source
<b>Connecticut</b>			
Hartford	19 Dec 1954	suspect details	Zeranski and Baptist 1990
Fairfield	2 May 1962	suspect details	Zeranski and Baptist 1990
Hartford	13 Feb 1966	suspect details	Zeranski and Baptist 1990
<b>New Jersey</b>			
Camden	Winter 1876	credible details	Stone 1965
Cape May	28 Apr 1962	suspect details	Halliwell et al. 2000
Middlesex	9 Dec 1989	suspect details	Halliwell et al. 2000
Sussex	Fall 1968	suspect details	Halliwell et al. 2000
<b>Pennsylvania</b>			
Philadelphia area	Fall 1885?	specimen lost/credible details	McWilliams and Brauning 2000
Berks	6 Sep 1894	specimen /Reading Museum**	McWilliams and Brauning 2000
Franklin	12 Aug 1903	suspect details	McWilliams and Brauning 2000

**Table 3. Vagrant Brown-headed Nuthatches in the central United States.**

Location	Date	Details	Source
<b>Iowa</b>			
Lee (also Hancock, IL)	9–13 May 1893	suspect details	DuMont 1935
<b>Kansas</b>			
Johnson	25 Dec 1997–24 Jan 1998	m. ob./documented**	Grzybowski 1998
<b>Kentucky</b>			
Russell	26 Sep 1999–12 Oct 1999	m. ob./documented**	Palmer-Ball 2003
<b>Missouri</b>			
St. Louis	6 May 1878	credible details	Robbins and Easterla 1992
<b>Nebraska</b>			
Sioux	26 Feb 1896	suspect details	Bruner 1896

\* = accepted but with details insufficient to rule out *Sitta pygmaea* \*\* = accepted by state bird records committee  
italics indicate names of counties; "m. ob." indicates multiple observers

state record (Palmer-Ball 2003).

At Milwaukee County, Wisconsin, a Brown-headed Nuthatch frequented a feeder from 26 February through 19 April 2000 (R. Domagalski, pers. comm.). A little over a year later, an individual was found at Lake County, Illinois, 72 km to the south of Milwaukee. Unlike most of the other sightings, this bird was not visiting a feeder but was found in a



**Figure 2. Observers gather to watch for the vagrant Brown-headed Nuthatch at Geauga County, Ohio on 9 December 2001. Photograph by Frank Renfrow.**

large area of Scots Pine (*P. sylvestris*) and Austrian Pine (*P. nigra*) that had been planted in the 1880s. This record is also unusual for being the only summer record noted in any northern state. This bird was first seen on 11 July 2001 and was last seen on 9 February 2002 (ph. in *North American Birds* 55: 505). In a remarkable example of precise habitat selection by vagrant birds, a Red-cockaded Woodpecker (*Picoides borealis*) had been found at this same location in 2000. The nuthatch was actually observed in the same pine tree in which the woodpecker had been seen to roost (Brock 2001; Semel 2002; B. Wengelewski, pers. comm.; ph. in *North American Birds* 55: 118).

In northeastern Ohio, the Brown-headed Nuthatch returned to the realm of Kirtland after a 163-year hiatus (Figure 2). This individual frequented a feeder and was photographed and documented by multiple observers from 21 November 2001 through 14 January 2002 (Gilbert 2001).

#### POTENTIAL INFLUENCES OF ANTHROPOGENIC AND NATURAL LANDSCAPE CHANGES ON BROWN-HEADED NUTHATCH DISTRIBUTION

The first recorded peak in extralimital Brown-headed Nuthatch records occurred during the period between 1877 and 1903 (Table 4). Extensive logging took place in the southeastern United States during this same period. Ashe (1894) calculated the decrease in the

area of Longleaf Pine forest between 1880 and 1894, concluding that the constantly accelerating rate of consumption would result in the complete elimination of North Carolina's Longleaf Pine forest in less than 20 years (Ashe 1894). His similar assessment of the state's Loblolly Pine forest predicted exhaustion of the supply within 15 years. Forest fires were also widespread in North Carolina during this period, with 221,000 ha burned in 1880 (Ashe 1895).

In turn-of-the-century

Mississippi, the development of a railroad system allowed for extensive logging activities. Wildfires were also widespread until conservation measures were enacted during the 1930s. Turcotte and Watts (1999) describe how the former pinewoods were reduced to blackened stump forests. Many of the fires in the South at this time were deliberately set in order to improve livestock forage. Nicholson (1997) considered a contemporary estimate of 400,000 ha of Tennessee forest burned in 1880 to be overly conservative. Robbins and Easterla (1992) recount how the Shortleaf Pine region of southeastern Missouri was devastated by the lumber industry between the 1880s and the early 1900s.

During 1931 and 1932, a period of severe droughts and forest fires occurred throughout much of the southeastern United States, with close to 800,000 ha burned in the Carolinas, Georgia, and Florida at that time (Holbrook 1943). This brief period of widespread habitat disruption—which was perhaps the worst in the past three centuries as far as drought is concerned (Cook et al. 1996)—coincided with the 1932 Brown-headed Nuthatch sighting in Indiana.

The subsequent peak in extralimital Brown-headed Nuthatch reports in the mid-twentieth century (Table 4) coincided with another period of intensified logging of the southern pinewoods. During the 1950s and 1960s, logging was increased in order to optimize lumber and pulp production during a period of marked economic growth in the United States. This increase was also a possible factor in the noticeable decline in Red-cockaded Woodpecker populations during this same period. Insect infestations were also a contributing factor in the loss of Loblolly Pine, with over 42,000 ha defoliated by the Loblolly Pine Sawfly (*Neodiprion taedae linearis*) in eastern Texas during the early 1950s (Walker 1998), for instance.

In Tennessee, despite an overall decrease in naturally-occurring Loblolly–Shortleaf Pine and oak-pine habitat, there had been a large increase in pine plantations over the past century, prior to the recent pine-beetle outbreaks. Over 200,000 ha of pine plantations existed by 1991, mostly of Loblolly Pine and mainly on the Cumberland Plateau (Nicholson 1997). Similarly, in North Carolina, Potter et al. (1980) describe

Table 4. Vagrant Brown-headed Nuthatch records by decade.

1830	GL				
1840					
1850					
1860					
1870	NE	GL	CN		
1880	GL	NE			
1890	NE	CN	CN		
1900	NE				
1910					
1920					
1930	GL				
1940					
1950	NE				
1960	GL	NE	NE	NE	NE
1970	GL	GL	GL		
1980	NE				
1990	CN	CN			
2000	GL	GL	GL		

suspect details  credible details   
 accepted as *S. pusilla* or *S. pygmaea*  accepted as *S. pusilla*   
 Central U.S.=CN Great Lakes U.S.=GL Northeast U.S.=NE

the planting of Loblolly Pine in abandoned farmland in areas of the state that had formerly been native deciduous forest.

The recent peak of vagrant Brown-headed Nuthatch records during the 1990s has continued into the present decade (Table 4). During this period, negative factors affecting the southern pinewoods have included increased logging, drought, fire, storm and hurricane damage, and an extensive outbreak of the Southern Pine Beetle. During the mid-1990s, the resurgence of logging in the South was staggering: the previous record production of southern pine lumber—4.95 billion board meters cut in 1902—was not approached again until 1996, when 4.64 billion board meters were harvested (Walker 1998).

Stedman (1996) describes how extensive clear-cutting of pine forests in northern Mississippi may have caused Brown-headed Nuthatches to move north into southwestern



Figure 3. A logging operation in an area infested by Southern Pine Beetle in Bledsoe State Forest, Tennessee, 25 September 2001. Note the brown-needled pine trees in the background. Photograph by Frank Renfrow.

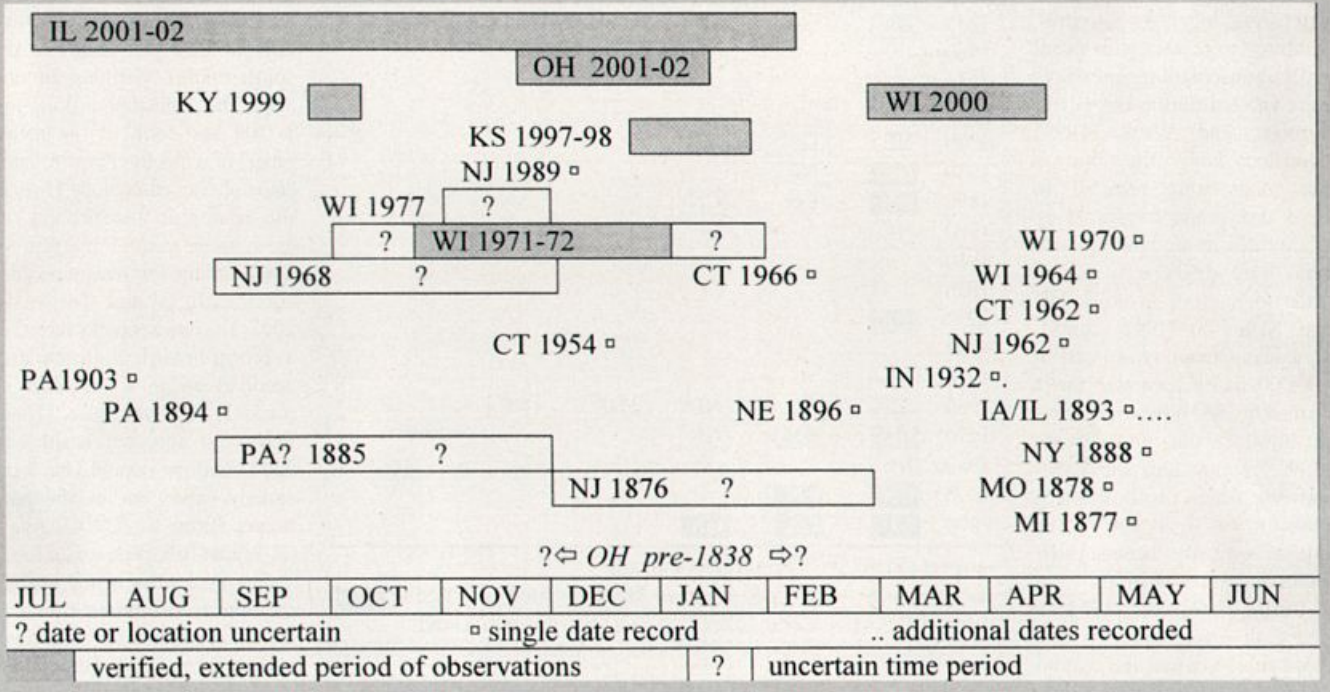
Tennessee. These southern Tennessee populations are all within the relatively small area of native Loblolly Pine that occurs in the southernmost portions of the state. The population at Kingston is 100 km north of the native range of Loblolly Pine. A large stand of planted Loblolly Pines at the steam plant entrance was cut as a beetle control measure in 2000, and the few remaining trees succumbed to pine beetles in 2001. The one Kentucky record of a Brown-headed Nuthatch also occurred within a large area of planted Loblolly Pines. These pines still appeared healthy in 2000 (Renfrow, unpubl.) but were entirely wiped out by the pine beetles during the following year (B. Palmer-Ball, pers. comm.).

The final years of the twentieth century also brought moderate to severe drought conditions to many parts of the southeastern

United States, which persisted in many areas well into the summer of 2002. A major snowstorm in February of 1998 followed by a severe windstorm on 16 April 1998 caused extensive damage to National Forest areas, particularly the pine trees, in eastern Kentucky and Tennessee. Walker (1998) cites frequent occurrence of tree-destroying storms and tropical cyclones along the Atlantic coast in the late 1980s and 1990s as adversely affecting Red-cockaded Woodpecker populations, and these factors clearly helped to precipitate the recent outbreak of the Southern Pine Beetle, which has affected the pinewoods in Alabama, eastern Kentucky, western North Carolina, and eastern Tennessee, as well as the fragile maritime pine forests of the barrier islands of North Carolina and to a lesser extent Virginia. This pine-beetle outbreak was particularly severe on the Cumberland Plateau, prompting the March 2001 removal from Kentucky of the state's last 17 Red-cockaded Woodpeckers by the U.S. Fish and Wildlife Service (Stedman and Stedman 2002, Palmer-Ball 2003). A massive amount of logging (Figure 3) has also been carried out, ostensibly for pine-beetle control measures, but this has also had a devastating effect on the actual and potential nesting habitat for Brown-headed Nuthatch (Leberman 2000, Renfrow unpubl.).

Loblolly Pine seems to have been particularly hard hit by pine beetles, whose invasions could themselves be cyclical in nature. There are historical accounts of unusual pine mortality in North Carolina in 1797, which

Table 5. Vagrant Brown-headed Nuthatch records by seasonal occurrence.



may have been due to a Southern Pine Beetle outbreak (Walker 1991). Nevertheless, Loblolly Pine may have become weakened by a more recent environmental threat. This species is similar to White Pine (*P. strobus*) in its sensitivity to increased levels of ultra-violet (UV-B) radiation. Particularly high levels of this radiation measured during the summer of 1993 may have been due to depleted ozone levels in the upper atmosphere (Little 1995). Climatic warming may also be a factor in the recent outbreaks of Southern Pine Beetle in several areas, as the beetle has a high brood mortality at temperatures below -9° C (Wahlenberg 1946).

It is not difficult to imagine the negative effects that the combined events of logging, fires, and other disruptions of habitat might have had on Brown-headed Nuthatch populations by the close of the nineteenth century. A half-century later, Burleigh (1958) witnessed how the species decreased from common and widespread to scarce and local after logging operations had decimated the pinewoods around Athens, Georgia. The Brown-headed Nuthatch had to adapt to a radically changed landscape after the clearing of the pine forests. Pough (1946) describes this species as being attracted to decaying snags in burns and clearings as well as to young seedling pines on abandoned farmland. This description of habitat preference differs from the mature pinewoods described as their primary habitat in both earlier and more recent times. These mid-century accounts perhaps support the inference that habitat degradation during the middle twentieth century can be linked to this period of renewed vagrant sightings.

Along with disturbance from logging and fires, cyclical failures of the cone crop may also account for some vagrant occurrences. The Longleaf Pine ecosystem is marked by heavy seed production, usually at intervals of five years, but intervals as infrequent as 10 years occasionally take place (Walker 1998). These prolonged periods of rest are followed by exceptionally prolific seed production. During the 1800s, heavy mast years were recorded in 1845, 1872, and 1892 (Schwarz 1907). Irruptive behavior during years of cone-crop failure might be a likely result, as is the case in Red-breasted Nuthatch. In addition to the data compiled above, unvetted Project FeederWatch reports indicate some slight north-of-range movement detected at feeders, venturing out of their usual haunts every five to seven years, or roughly when the pine-seed crop fails (Dunn and Tessaglia-Hymes 1999). Some vertical migration and irruptive behavior, possibly tied to cone crop abundance, has also been suspected in the Pygmy Nuthatch (Bent 1948, Matthysen 1998). This western counterpart to Brown-headed Nuthatch also shows a modest pattern of vagrancy east to Nebraska, Kansas, North Dakota, Minnesota, and Iowa that can be plausibly tied to episodes of intensive logging, extreme drought, and extensive forest fires (Renfrow, unpubl.).

In addition to fluctuations in natural food supply, Brown-headed Nuthatches are certainly subject to natural landscape degradation. Some pine species, for instance, are predisposed to a limited life cycle. Upon germi-

nation, the stem of the Shortleaf Pine develops a double crook just below the ground. Consequently, stands more than 100 years old begin to deteriorate rapidly. Loblolly Pine lacks a dominant taproot and is thus particularly susceptible to wind-throw as it ages (Walker 1998). Although fire is an essential ingredient in maintaining the health of the southern pinewoods, historical accounts describe periodic, uncontrolled wildfires devastating vast areas of mature pines (Ashe 1895, Walker 1991).

**OTHER FACTORS THAT MAY INFLUENCE DISTRIBUTION OF BROWN-HEADED NUTHATCH**

Another natural factor that possibly limits range expansion in Brown-headed Nuthatch is its primary preference for pine seed wings as nesting material (Norris 1958). This may explain why most populations are in areas with at least some component of Loblolly Pine, Longleaf Pine, or Slash Pine (*P. Elliottii*). These three species have seed wings roughly twice the size of Shortleaf Pine, Virginia Pine (*P. virginianus*), and Pitch Pine seed wings. The latter three species have ranges that extend well to the north of the range of the Brown-headed Nuthatch, while the former three do not.

Interspecific competition and hostility between the White-breasted Nuthatch (*Sitta carolinensis*) and the Brown-headed Nuthatch has been cited as a limiting factor in the ranges of both species (Root 1988, Harrap and Quinn 1995). However, the author has observed both species in mixed oak-pine forests feeding peacefully in close proximity,

each keeping to their preferred oaks or pines respectively, in locations as widely separated as western South Carolina and eastern Texas. In the Piedmont region of Georgia, where both species are common, they can occasionally be found foraging at different levels in the same tree with little or no animosity noted. Thus, it would appear that these species segregate by habitat and niche as well as divergent foraging strategies.

### TENTATIVE CONCLUSIONS: PATTERNS OF DISPERSAL AND VAGRANCY AND THEIR POSSIBLE CAUSES

Despite assertions to the contrary (Norris 1958, Withgott and Smith 1998), there is evidence that some dispersal of Brown-headed Nuthatch occurs on an irregular basis. An analysis (Table 5) of vagrant Brown-headed Nuthatch records indicates high seasonal variability. Ten records cluster in the spring, from April and May, whereas one is from March, and there are none from June. Six recent records are of extended duration, one in the early spring and five from the fall and winter, one of these beginning in July; the remaining nine extralimital records are also from the fall and winter. Whereas natural and anthropogenic alterations of habitat appear to correspond crudely to large-scale temporal patterns of extralimital records, seasonal patterns are much more difficult matters for speculation. The spring records may pertain to unmated birds in search of new territory, possibly due to habitat shortages in their natal areas, while the fall and winter records may pertain to individuals fleeing habitat disruption or cone crop failures. These latter may also involve juvenile dispersal, as is the case with fall and winter vagrant occurrences in many other avian species (Berthold 2001).

Due to their proximity to the northern boundary of the breeding range, the Kentucky, Missouri, New Jersey, and Pennsylvania records and reports might be better categorized as pertaining to limited short-range dispersal rather than "vagrant" occurrence, though the distinction between designations of "dispersive" versus "vagrant" is often only a semantic one. Nevertheless, similarities in periods of occurrence do seem to link 23 of the 26 possible records, and it is curious that records or reports of the species in areas between the near and far extremes of extralimital occurrence are lacking. There are no credible records from Illinois, Indiana, or Ohio away from the Great Lakes, which may have as much to do with the patterns of human settlement along the lakes, which clearly concentrates observers of birds, and likewise with the concentrating effect of the lakes' coastlines on vagrant passerines. The comparatively large number of occurrences in the Great Lakes region, and more specifically in the Milwaukee area in particular, is noteworthy: out of a total of 26 possible records,

11 were within 120 km of one of the Great Lakes. Of these, three were at Milwaukee and four others were not more than 160 km distant. This clustering of records may reflect the general lack of significant areas of coniferous habitat between the Great Lakes region and the southern pinewoods, as well as the physical barrier to further movement posed by the lakes themselves. A clear reluctance to cross the Great Lakes has been noted even in long-distance migrant passerines. Dunn and Nol (1980) found that migrating warblers, the juveniles in particular, would sometimes return to land after starting to cross Lake Erie. (The absence of historical or modern Canadian reports of Brown-headed Nuthatch [Godfrey 1979; K. Roy, pers. comm.] is therefore unsurprising.) Withgott and Smith (1998) describe the flight of the Brown-headed Nuthatch as fairly weak, slow, and short-distanced. In Bent (1948), flight is described as gently undulating but with strong and rapid wing-beats. The latter description is much more in agreement with the author's observations of the species, which occasionally executes swift, direct flights across expanses of open water one km or more (pers. obs.). Tail length in this species is relatively shorter than in Red-breasted Nuthatch, but relative wing length is about the same, which may indicate that Brown-headed Nuthatch might well be capable of such extended flights.

Analysis of extralimital records by region yields different results for each period of wandering. Vagrant Brown-headed Nuthatch records from the 1800s are almost equally divided between the Northeast, the Central, and the Great Lakes regions (Table 4), possibly indicative of the widespread habitat degradation that took place throughout the Southeast during this period. There are no records from the Central region during the mid-1900s and only one suspect record from the Northeast during the most recent period. These more regionally specific distinctions may indicate nuthatches' responses to differing habitat changes in areas roughly south of the vagrant sightings.

The planting of Loblolly Pine in areas where it is not native has most likely played a significant role in expansion of the breeding range, and the sudden loss of these planted pines due to the recent pine-beetle outbreak may be a factor in the recent increase in vagrant occurrences.

In sum, Brown-headed Nuthatches occasionally wander considerable distances, and this limited dispersive (or irruptive) behavior appears to be a response to severe habitat loss and degradation, with which all peaks in reports of extralimital nuthatches show correlation. Forest fires, droughts, and shortages of breeding places are some of the primary reasons for so-called "escape movements" in birds (Berthold 2001). Such movements would

appear to be the best explanatory model for these vagrant occurrences, which probably follow cycles of natural as well as anthropogenic degradation of the southern pinewoods.

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