

NESTING PHENOLOGY AND COOPERATIVE BREEDING OF THE BROWN-HEADED NUTHATCH IN NORTH FLORIDA PINELANDS

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Abstract.—We monitored 15 nests of the Brown-headed Nuthatch (*Sitta pusilla*) in pine flatwoods at Camp Blanding Training Site, Florida, during 1995-1998. Dates of clutch initiation ranged from 27 February to 11 April and peaked during late March. Nuthatches initiated nesting earliest in 1997, a year marked by an exceptionally mild winter. We observed two cases of probable re-nesting after initial nest failure but no evidence of double-broodedness. Eleven of 15 (73%) nests were successful. Cooperative breeding was documented for 3 of 15 (20%) nests, or 3 of 13 (23%) nuthatch groups, which is similar to the results of Norris (1958) in the coastal plain of Georgia but much less frequent than that documented by Slater (1997) in the Big Cypress region of southern Florida. Cooperative breeding and other nesting behaviors in the Brown-headed Nuthatch warrant further investigation, particularly in light of the species' population declines and the fragmented nature of remaining tracts of extensive, mature pinelands.

The Brown-headed Nuthatch (*Sitta pusilla*) is a cavity-nesting bird species inhabiting open pine forests of the southeastern United States (Withgott and Smith 1998). Breeding Bird Survey data indicate that Brown-headed Nuthatch populations are declining (Peterjohn et al. 1996), particularly in Florida (Cox 1987). Although once described as "abundant" in northwest Florida and "moderately common" in central and south Florida (Howell 1932), the Brown-headed Nuthatch today is only "fairly common" in north Florida and "uncommon" or "rare" through the central and southern portions of the state (Stevenson and Anderson 1994). Populations may have declined because of extensive logging of mature pinelands, fragmentation of habitat, and forest management practices that limit the availability of dead trees suitable for cavity excavation (Cox 1987, Jackson 1988, Withgott and Smith 1998).

Nesting ecology and breeding behavior of the Brown-headed Nuthatch have been little studied (Withgott and Smith 1998). Norris (1958) found that Brown-headed Nuthatches in Georgia occasionally bred in social groups that included a breeding pair and a helper, but cooperative breeding behaviors remain poorly studied in this species. Recently, Slater (1997) reported a high frequency of cooperative breeding

for Brown-headed Nuthatches in a slash pine (*Pinus elliottii*) and cypress (*Taxodium distichum*) mosaic in the Big Cypress region of southern Florida.

We located and monitored Brown-headed Nuthatch nests during 1995-1998 as part of a larger study of nest-site selection and nesting success of cavity-nesting birds in north Florida pinelands. Our objectives in this paper are to document aspects of nesting phenology and cooperative breeding of the species in north Florida.

STUDY AREA AND METHODS

Our study area was located at Camp Blanding Training Site, a Florida Army National Guard facility encompassing approximately 30,000 ha in Clay County, Florida. We searched for nests of cavity-nesting birds in slash pine plantations (even-aged, 30-35 years old) and in adjacent longleaf pine (*Pinus palustris*) stands (uneven-aged, with a significant component of >60 year-old trees and scattered ≥ 100 year-old relict trees). Most nest searching was done in the plantations, which were mesic flatwood sites characterized by moist, poorly-drained soils (Abrahamson and Hartnett 1990) and a shrub layer dominated by gallberry (*Ilex glabra*), saw palmetto (*Serenoa repens*), and various ericaceous shrubs. Plantation study plots were 10 ha in size and had an average canopy height of ≥ 20 m and canopy closure of >70%. During 1995-1996, we located nuthatch nests opportunistically in the course of other research activities. During 1997-1998, we conducted nest search efforts specifically for nuthatches beginning in mid-March and continuing until nesting activity abated. We surveyed study plots once per week by walking slowly through the habitat for ≥ 1 hour; if nuthatches were not detected, tape-recorded nuthatch calls were played to elicit vocalizations. Once territories were identified, we located nests by following individual birds. We monitored nests regularly at 3-4 day intervals to assess nesting status (Martin and Geupel 1993, Ralph et al. 1993). Nests located <4m above ground were reached with a stepladder and the contents checked with a light and dental mirror to determine clutch size and nest status. Nests located >4m above ground or those in unsteady, well-decayed trees were monitored from the ground through observation of adult behaviors (Martin and Geupel 1993, Ralph et al. 1993). Nest phenology was monitored using 14 days for incubation period and 18-19 days for nestling period, as reported in Norris (1958) and McNair (1984). We determined group size during each monitoring visit by counting the number of adult nuthatches engaged in any of three breeding activities: incubating eggs, brooding young, or bringing food to the nest. If ≥ 3 individuals were observed simultaneously participating in breeding activities at a nest, we categorized the nest as belonging to a cooperative family group. We made repeat visits to nuthatch territories throughout the summer to look for evidence of re-nesting.

RESULTS

We located 15 Brown-headed Nuthatch nests, 4 opportunistically during 1995-1996 and 11 during nest searches in 1997-1998. All nests were located in dead, well-decayed slash pine ($n = 9$) or longleaf pine ($n = 6$) trees. Dates of clutch initiation ranged from 27 February to 11 April (Table 1). Although spread over a 6-week period, nest initiation peaked in late March, when eight of 15 (53%) nuthatch pairs initiated clutches (Fig. 1). Most nests fledged young during the last week of April, but young from three February nests fledged on 4 April.

Table 1. Reproductive data from 15 Brown-headed Nuthatch nests monitored at Camp Blanding Training Site, Clay County, Florida, 1995-1998.

Nest No.	Group size	Clutch initiation ^a	No. of eggs	No. of fledglings
1	3	23 Mar	4	4
2	2	11-20 Mar	U ^b	0
3	2	24 Mar	U	2
4	3	24-25 Mar	U	1+ ^c
5	2	27 Feb	U	4
6	2	28 Feb	4	4
7	3	24 Mar	U	5
8	2	8-10 Apr	U	0
9	2	27-28 Feb	U	4
10	2	11 Apr	4	3
11	2	30 Mar	U	0
12	2	25 Mar	5	4
13	2	27 Mar	5	5
14	2	20-27 Mar	U	0
15	2	7-8 Apr	4	3
All nests ^d	2.2 (0.4)		4.3 (0.5)	2.7 (1.9)
Successful nests	2.3 (0.5)		4.3 (0.5)	3.8 (0.9)

^aRange of possible dates given.

^bUnknown.

^cNest successful, but exact number of fledglings unknown.

^dMean (SD).

We observed two probable instances of re-nesting after an initial nest failure. In both cases (nests #3, #15), presumed second nests were located in the same territory, within 100 m of the first nests (nests #2, #14). Although nuthatches were not color-banded for positive identification, the proximity in space and time to the first nest and low nuthatch densities (typically <1 pair or group per 10-ha study plot) strongly suggested that these second nests were by the same nesting pair or group. We found no evidence of double-broodedness; occasionally we saw nuthatches engaged in cavity excavation after early April, but we did not observe any subsequent evidence of nesting.

Four nests that were monitored throughout the entire nesting cycle enabled confirmation of 14 days and 18-19 days as the length of incubation and nestling periods, respectively, although one nest had a nestling period of 19-20 days. Clutch size averaged 4.3 ($n = 6$; Table 1). Eleven of 15 nests (73%) were successful, and the number of fledglings produced by successful nests ranged from 2 to 5 (Table 1). We documented cooperative breeding for 3 of 15 (20%) nests, or 3 of 13 (23%) groups (because two nests were believed to be re-nests). All three nest attempts by cooperatively-breeding groups were successful, whereas only 8 of 12 (67%) nest attempts by breeding pairs were successful. Mean size of nuthatch groups was 2.2.

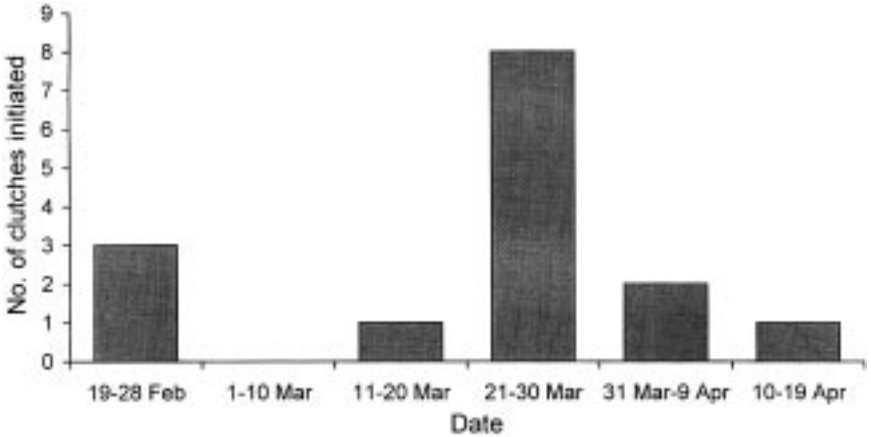


Figure 1. Phenology of clutch initiation for 15 Brown-headed Nuthatch nests, Camp Blanding Training Site, Clay County, Florida, 1995-1998.

DISCUSSION

Nuthatches probably breed earlier in years with exceptionally mild weather. All three February nests were from 1997, a year marked by a very mild winter with only a few hours of freezing temperatures in northcentral Florida. The three early nests we found are among the earliest dates reported for the species in Florida (McNair 1984, Stevenson and Anderson 1994). McNair (1984; pers. comm.) reported a few early nest records in Florida, including egg sets collected 2 March 1960 in Walton County and 4 March 1893 in Putnam County and a nest record of 5 eggs "heavily incubated" on 7 March 1962 in Leon County. Similarly, Worthington and Todd (1926) described a nest with five nuthatch eggs in northwest Florida on 2 March. Howell's (1932) account of eggs in a nest on 18 February 1908, the earliest date reported for Florida, appears to be an outlier and warrants further confirmation.

Our results reinforce previous studies (McNair 1984, Slater 1997, Withgott and Smith 1998) that indicate that the Brown-headed Nuthatch is typically single-brooded in Florida. As in this study, Slater (1997) found few Brown-headed Nuthatches in south Florida attempted to re-nest after nest failure. The long dependency period of fledglings (>40 days; Norris 1958) may be a constraint on re-nesting and double broodedness in Brown-headed Nuthatches (Slater 1997).

This study is one of only a few records of cooperative breeding in Brown-headed Nuthatches. Frequency of cooperative breeding in

Brown-headed Nuthatches in north Florida (3 of 13 groups, 23%; this study) was similar to that in Georgia (3 of 17 groups, 18%; Norris 1958). The ecologically similar Pygmy Nuthatch (*Sitta pygmaea*) of western North America is a cooperative breeder at about 30% of its nests (Sydeman 1988). In contrast, Slater (1997) documented a high frequency (35 of 58 groups, 61%) of cooperative breeding for Brown-headed Nuthatches in extreme southern Florida, where mean group size ranged from 2.6 to 2.7 individuals.

In our study area, cooperatively-breeding nuthatches had greater nest success than did pairs of nuthatches. Similarly, Slater (1997) found that breeding groups with ≥ 3 individuals were significantly more successful at fledging young than were pairs in south Florida.

Local variation in the expression of cooperative breeding in Brown-headed Nuthatch populations may be considerable. We were unable to examine how cooperative breeding might correlate with environmental factors in our study because of small samples. Evidence suggests that habitat saturation (e.g., Brown 1987, Komdeur 1992) as well as variation in the quality of territories (e.g., Stacey and Ligon 1987, 1991) could be factors that facilitate delayed dispersal and the development of cooperative breeding in birds. Cooperative breeding behaviors in the Brown-headed Nuthatch warrant further investigation particularly in light of the species' population declines and the fragmented nature of remaining tracts of mature pineland habitat.

ACKNOWLEDGMENTS

G. L. Slater contributed advice about field techniques, and S. A. Johnson assisted with data collection. D. B. McNair and E. Walters provided helpful comments that improved the manuscript. We thank McNair for sharing with us some records of early nesting. Funding for study of cavity-nesting birds was provided to KEM by the Nongame Wildlife Program of the Florida Game and Fresh Water Fish Commission, the Florida Department of Military Affairs Army National Guard, and the University of Florida's Department of Wildlife Ecology and Conservation. This paper is Journal Series #R-06825 of the Florida Agricultural Experiment Station.

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