

SHORT COMMUNICATIONS

Nesting of Golden Eagles in the central and southern Appalachians.—Many sources have asserted that Golden Eagles (*Aquila chrysaetos canadensis*) bred in the Appalachians as far south as North Carolina and Tennessee. There is little evidence to support these claims. Maine, New Hampshire, and New York are the only eastern states with confirmed Golden Eagle nesting records (Spofford 1971), and there is a mid-1800 record from Pennsylvania (see below). The species now breeds only in Maine, where nests have been reported as recently as 1986 (Andrle and Carroll 1988). In this note we review the published reports of Golden Eagles nesting in the central and southern Appalachians, and find no evidence of nesting in the area.

The notion that Golden Eagles nested in the southern Appalachians grew out of circumstantial associations. First, southeastern records indicated Golden Eagles have been sighted throughout the year. Secondly, adult and immature birds occasionally were seen together. Finally, Golden Eagles were seen at nest sites. Although fledglings were never sighted, and eggs never reported, the cumulative circumstantial evidence persuaded some authors to build a case for the nesting of Golden Eagles in the Southeast (e.g., Mengel 1965). Authors of non-regional publications independently drew from the regional sources of information to sketch the total nesting distribution of the Golden Eagle in North America and included the southern Appalachians in its range (e.g., Bent 1937; A.O.U. 1957, 1983; Palmer 1988). South of the Adirondacks, "evidence" of nesting is available only from one site in Pennsylvania and from one site in the Cumberland Plateau. All other accounts are from second-hand sources or are circumstantial (see below), and, except for one 1902 record, the five reports with specified dates are from between 1934 and the early 1940s. The lack of verifiable evidence does not eliminate the possibility of individual pairs of Golden Eagles nesting sporadically throughout the central and southern Appalachians; however, it certainly makes all records suspect.

Below we have summarized the literature concerning the nesting status of Golden Eagles in the southeast. One remarkable feature of the summary is that since the first mention of "Golden Eagles" possibly nesting in the southeast by Audubon in 1831 (in Kentucky at the mouth of the Green River), no ornithologist has personally reported seeing nesting Golden Eagles. The lack of first hand accounts, especially considering the extent of coverage of the southern Appalachians by pioneer bird students (Brewster 1886, Cairns 1889, Burleigh 1941, and many others) and the high profile and nest-site loyalty of Golden Eagles, weaken the idea that Golden Eagles nested in southeastern United States. Furthermore, despite the large number of naturalists and commercial collectors who collected bird eggs from mid-1800s to the 1940s and the relatively large assemblage of egg sets from this period that made their way into museum collections, there is not a single set of Golden Eagle eggs from south of the Adirondacks. Surely, if nesting sites were known, Golden Eagle eggs would have been collected. For example, the historic distribution of Peregrine Falcons (*Falco peregrinus*) in the same area can be partly reconstructed from data associated with the collection of egg sets (e.g., McNair 1988).

Many statements concerning the nesting of Golden Eagles in the southern Appalachians are based on the local presence of birds "throughout the year" or during the nesting season. Because these eagles take four years or more to reach maturity, the presence of birds during any season does not constitute nesting. Furthermore, adults from elsewhere in North America, whose nesting attempts have failed, are likely to wander, and there is some evidence that they appear at certain sites during spring lambing season (see below). Also, birds regarded

as adults may be subadult individuals because of the similarities in plumage. Field guides and similar aids showing plumage progression were not available during the period when most of the presumed nesting activity was taking place. Bird students in the southern Appalachians would have had little experience with either of the North American eagles, and some reports probably refer to immature Bald Eagles (*Haliaeetus leucocephalus*). (Note, for example, Audubon's 1831 report for Kentucky.)

Other statements concern eagles associated with cliff nests. There are no specific references to birds sitting on nests, feeding young in nests, or carrying nesting material. Almost no nest-associated records are from the known nesting season (April through July to mid-August for Maine, Spofford pers. obs.). In fact, there are no descriptions of any nest, so the nests involved could have been those of Bald Eagles, Peregrine Falcons, Red-tailed Hawks (*Buteo jamaicensis*), Common Ravens (*Corvus corax*), or perhaps other, cliff-nesting species.

The only "evidence" for nesting in the southern Appalachians is the mention of "four young birds" captured and "two birds" collected from a nest (Brooks 1944, Bent 1937, see below). The capture of four young Golden Eagles in West Virginia would be an incredible number of young from a single nest, and the capture of four young from different nests in the same county in the same year is equally unlikely. Bent's (1937) record of two birds collected from a nest is doubtful. Data with the specimens does not clearly match Bent's (1937) statements (see below). Nevertheless, these reports represent the only rationale for a 800 mile (1290 km) southern extension to breeding distribution of Golden Eagles in the eastern United States.

Another problem with the possibility of Golden Eagles nesting in the southeast is that for the most part, natural foraging habitat for these eagles is absent from the southeastern United States in general and from the central and southern Appalachians in particular. Stupka (pers. comm. to George Hall) doubted the existence of breeding Golden Eagles in the Great Smoky Mountains because of the unavailability of open habitats. The clearing of land for agriculture could have allowed Golden Eagles to expand briefly their nesting range. They may have nested in the Southeast in isolated sites that offered protected nesting ledges and artificially maintained foraging habitat. Open, wind-swept mountain balds of the southern Appalachians do attract Golden Eagles, apparently because they offer open areas in which to hunt. With few exceptions, however, these areas are small, widely scattered, limited in number, and not successional stable, and it is unlikely that they could sustain nesting pairs and their growing young.

The following is a state-by-state summary of the literature concerning the presumed breeding of Golden Eagles in the central and southern Appalachians.

Pennsylvania.—There are no nesting records cited by recent authorities. Van Fleet (1884) stated that the Golden Eagle "quite certainly breeds in Clearfield County." Beck (1924) reported on a nest of Golden Eagles along the Susquehanna River prior to the 1850s in "A Chapter on the Ornithology of Lancaster County, Pennsylvania." The eyrie was on a cliffside opposite the mouth of the Pequea River and thus appears to have been in York County. The observation was reported by Dr. M. W. Raub, a known ornithologist of the period. Beck regarded the species as a "former rare resident." The Susquehanna River eyrie has apparently been overlooked by recent authors.

West Virginia.—Hall (1983) states "There is no definite evidence that the species ever nested in the state, but four young birds were captured by a hunter near Dunmore, Pocohontas County, in 1934 (Brooks 1944), and there are many summer reports. . . . It seems likely that even now, in the 1980s, this species does on occasion nest on some remote mountain cliff."

Maryland.—No nesting records are available. Stewart and Robbins (1958) consider the species a transient.

Kentucky.—Mengel (1965) considered Golden Eagles to have probably nested in Kentucky in early times, but he had no evidence for the state. He cited an account by Audubon (1831) under Bald Eagle. Audubon (1831) described a pair of "Birds of Washington" on a cliff near the mouth of the Green River and concluded that they were not young "White-headed Eagles" because of the cliff site (Bald Eagles are now known to occupy such sites). As noted by Mengel, Audubon's description of the birds catching and eating fish rules out the possibility that they were Golden Eagles.

Virginia.—Murray (1952) states "The author has good reason to think that a pair nested about 1935 at the Devil's Backbone, near Crabbottom, Highlands County. [C.O.] Handley, Jr. was told by local people that until the early 1940's a pair had nested on the western face of Massanutten Mountain in Shenandoah County." In 1975 it was reported that Golden Eagles had "no firm breeding records but possibly has nested in Giles, Highlands, Shenandoah, and Washington cos." (Larner 1975). Palmer (1988) states that "most recent active nest in SE U.S. presumably in Giles Co., Va in 1952." This record was from Spofford's files but was misinterpreted and is not valid. Despite much talk of a supposed nesting on Little Stony Creek in Giles Co., there is no substance to the reports and the supposed observer later confirmed to Spofford that no nest was found.

North Carolina.—There is no nesting evidence, although the birds are believed to have nested in the state. Pearson et al. (1959) noted "There have long been rumors that these eagles breed in our higher mountains, but we know of no eggs or eaglets having been recorded." Powell (1968) listed about a dozen places named after eagles (not including several referring to family names of early settlers). Most are in the mountains in the western portion of the state along major water courses. Eagle Creek (Swain County) was named "from the fact that a nest of eagles was found near its head" (near Fontana Lake). Several other sites are named Eaglenest (Eaglenest Branch, Eaglenest Creek, Eaglenest Mountain, and Eaglenest Ridge [the latter three sites are associated with, and named after, each other]). Thus, while there is no doubt that eagles formerly nested in the southern Appalachians, the proximity to major water courses suggests that all may refer to Bald Eagle nest sites.

Tennessee.—There are no conclusive records of nesting and there are only a few records for the state. Dubke (1964) noted that individuals appeared on Roan Mountain around lambing time and stayed for about a month. The birds appeared again in the fall. Alsop (1972) regarded Golden Eagles as "presumed breeders" but had no evidence of nesting. Ganier (1973) reported that Golden Eagles visited Tennessee during the winter and that a few bred in the escarpments of the Cumberland Plateau and on cliffs in the high mountains along Tennessee's eastern border. He stated that he had been unable to find any occupied nests in either of these areas in the last 50 years "but found several old nests." There is a single unsexed Ganier specimen from Moore County, near Lynchburg (LSU 75702) collected on 12 April 1935, and the label reads "one of a pair." Bent (1937) noted "I have two birds in my collection that were taken from a nest on Walden's Ridge, in the Cumberland Mountains, Tenn., in 1902. . . ." However, Raymond Paynter informs us that the two specimens from Bent's collection (MCZ 252,795; 252,796) were collected in July and thus would represent very late breeding season specimens. Since young Golden Eagles may not leave nest sites until they are 10 weeks old, July does not rule out nesting, but if this species nested this far south, it seems reasonable that the nesting phenology should be in advance of birds in Maine, which leave nest in July. The Bent specimens were said to have been "raised in captivity for over a year," indicating they were young birds, but according to Paynter both are adults. The year of collection suggested by Bent (1937) is 1902, and the date on the tags is also 1902, so there was likely some confusion as to at least the date of capture.

After his account of Golden Eagle records in the Great Smoky Mountains, Stupka (1963) concluded "Normally, neither the Golden nor the Bald Eagle breeds in the type of envi-

ronment which prevails in the park, even though some of the early writers published comments to the contrary. The guide who directed Charles Lanman [1849] to Alum Cave Bluff in 1848 stated that the first time he came to this place he decided to climb a steep face at the north end of the formation, 'opposite to an eagle(s) nest, where the creatures were screaming at a fearful rate.' In spite of the considerable difference between the size of an eagle and of a Peregrine Falcon, the writer is of the opinion that the latter, and not the former, bird was encountered there. Lemoyne (1886) purloined the journal of a friend in which there is an account of the killing of a pair of Golden Eagles at their eyrie in Blount County and the collecting of two eggs. This report is referred to by Rhoads (1895) and Ganier (1926), but the latter, in his correspondence with me (1973), had serious doubts regarding Lemoyne's narrative. Cairns (1902) and Brimley (1940) state that these birds breed on the cliffs of the higher mountains in western North Carolina, but they give no particulars and it is assumed that the information is second-hand." Additionally, regarding the Alum Cave Bluff record, we would like to note that unlike Peregrine Falcons, Golden Eagles do not "scream" at intruders. They glide silently away to a remote perch.

South Carolina.—No nesting records are available, although Wayne (1910) and Sprunt and Chamberland (1949) both suggested that Golden Eagles may nest in the mountains of northwestern South Carolina. They knew of no authentic nesting record for the state.

Georgia.—No nesting records. Burleigh (1958) noted, "I was told of a nest found on the slopes of Brasstown Bald some years ago that was said to have been an eagle nest, but, unfortunately, there was no possibility of verifying that statement."

Alabama.—No nesting records (Imhof 1976).

Although it is not possible to disprove the occasional past nesting of Golden Eagles in the southeast, it is also apparent that the bird's breeding has not been documented and that the information that is available is unconvincing. On the other hand, the current literature has not addressed the unsubstantiated nature of the records, so it is possible that persons with photographs of active nests or other irrefutable information are simply unaware of its importance and, therefore, have not shared it with the ornithological community.

Furthermore, we would like to point out that even in the northeastern United States, the historic nesting of Golden Eagles was never adequately documented nor completely understood. For example in Eaton's (1911–1914) "Birds of New York State" there is a comment that Dr. William Ralph is the authority for the statement that the eggs have been taken in New York. However, there is no record of this, and such a rare and spectacular find would have been widely known. While Ralph's statement is apparently true, even in heavily worked New York state, the only published record, until 1957, was Audubon's 1833 account of a site in the Hudson River highlands of a pair that bred for nine successive years in the same crevice of rocks. Yet between 1955 and 1960 field investigations turned up five or six active nest sites in the Adirondacks. In the long overlooked pre-1850 nest record from the Susquehanna (Beck 1924), Witmer Stone, who proofread the manuscript, commented that this was probably the last stand of the Golden Eagle in eastern North America. Stone was apparently unaware of a nest with two young found in 1876 on White Horse Ledge at Conway, New Hampshire (Allen 1903). Thus, even in areas where Golden Eagles are now known to have nested, the confirmation of historic information was slow in coming, and at least several unquestionable published reports had been overlooked.

Unless more evidence becomes available, we suggest that authors use discretion in discussing the nesting status of Golden Eagles in the east south of New York. Because current authors are still suggesting that Golden Eagles nested in the southern Appalachians, well-intentioned persons have been trying to "reintroduce" the species into the southeast and to manage open habitats for their foraging. Hopefully, the information provided here will foster reconsideration the "re"-establishment efforts made on behalf of the Golden Eagle in the southeast.

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LITERATURE CITED

- ALLEN, G. M. 1903. A list of the birds of New Hampshire. *Proceedings of the Manchester Inst. Arts and Science* 4:21–222.
- ALSOP, F. J. 1972. A preliminary list of Tennessee birds. *Migrant* 43(3):57–64.
- AMERICAN ORNITHOLOGISTS' UNION. 1957. Checklist of North American birds. 5th ed. A.O.U., Baltimore, Maryland.
- . 1983. Check-list of North American birds. 6th ed. A.O.U., Washington, D.C.
- ANDRLE, R. F. AND J. R. CARROLL. 1988. Atlas of breeding birds in New York State. Cornell Univ. Press, Ithaca, New York.
- AUDUBON, J. J. 1831. Ornithological biography. Vol. 1. Adam and Charles Black, Edinburgh, Scotland.
- BECK, H. H. 1924. A chapter on the ornithology of Lancaster County, Pennsylvania. (Reprinted from Lancaster County, Pennsylvania—a history.)
- BENT, A. C. 1937. Life histories of North American birds of prey. Part I. U.S. Nat. Mus. Bull. 167.
- BREWSTER, W. 1886. An ornithological reconnaissance in western North Carolina. *Auk* 3: 94–112, 173–179.
- BRIMLEY, C. S. 1940. The birds of Buncome County. *Chat* 4:21–36.
- BROOKS, M. 1944. A check-list of West Virginia birds. *W. Va. Agri. Exp. Stat. Bull.* 316.
- BURLEIGH, T. D. 1941. Bird life on Mt. Mitchell. *Auk* 58:334–345.
- . 1958. Georgia birds. Univ. of Oklahoma Press, Norman, Oklahoma.
- CAIRNS, J. S. 1889. The summer birds of Buncombe County, North Carolina. *Orn. Ool.* 12:3–6.
- . 1902. List of the birds of Buncombe County, North Carolina. *Orn. Ool.* 14: 17–23.
- DUBKE, K. H. 1964. Golden Eagle on Roan Mountain. *Migrant* 35(3):58–59.
- EATON, E. H. 1910–1914. Birds of New York. Parts one and two. Univ. State of New York, Albany, New York.
- GANIER, A. F. 1926. Summer birds of the Great Smoky Mountains. *J. Tenn. Acad. Sci.* 1:31–40.
- . 1973. The wildlife met by Tennessee's first settler. *Migrant* 44(1):58–74.
- HALL, G. A. 1983. West Virginia birds. Carnegie Museum of Natural History. Special Publication No. 7, Pittsburgh, Pennsylvania.
- IMHOF, T. A. 1976. Alabama birds. 2nd ed. Univ. of Alabama Press, Birmingham, Alabama.
- LANMAN, C. 1849. Letters from the Alleghany Mountains. Geo. P. Putman, New York, New York.
- LARNER, Y. R. (ED.). 1975. Virginia's birdlife: an annotated check-list. *Virginia Avifauna* 2:1–117.
- LEMOYNE, A. 1886. Notes on some birds of the Great Smoky Mountains. *Orn. Ool.* 9: 8–12.
- McNAIR, D. B. 1988. Historic nest record of the Peregrine Falcon in Pickens County, S.C. *Chat* 52(3):57–58.
- MENGEL, R. 1965. Birds of Kentucky. *Ornithol. Monogr.* No. 3.
- MURRAY, J. J. 1952. A check-list of the birds of Virginia. *Virginia Society of Ornithology.*

- PALMER, R. 1988. Handbook of North American birds. Vol. 5. Yale Univ. Press, New Haven, Connecticut.
- PEARSON, T. G., C. S. BRIMLEY, AND H. H. BRIMLEY. 1959. (revised D. Wray). Birds of North Carolina. N.C. State Museum, Raleigh, North Carolina.
- POWELL, W. S. 1968. The North Carolina gazetteer. Univ. of N.C. Press, Chapel Hill, North Carolina.
- RHOADS, S. N. 1895. Contributions to the zoology of Tennessee. No. 2. Birds. Proc. Acad. Natural Sci. of Philadelphia, Philadelphia, Pennsylvania.
- SPOFFORD, W. R. 1971. The breeding status of the Golden Eagle in the Appalachians. *Am. Birds* 25(1):3-7.
- SPRUNT, A., JR. AND E. B. CHAMBERLAND. 1949. South Carolina bird life. Cont. Char. Mus. XI. Univ. of South Carolina Press, Columbia, South Carolina.
- STEWART, R. E. AND C. S. ROBBINS. 1958. Birds of Maryland and the District of Columbia. *North American Fauna* 62:1-401.
- STUPKA, A. 1963. Notes on the birds of Great Smoky Mountains National Park. The Univ. of Tenn. Press, Knoxville, Tennessee.
- VAN FLEET, W. 1884. Notes from DuBois, Pa. *Orn. Ool.* 9:108.
- WAYNE, A. T. 1910. Birds of South Carolina. Contr. Char. Mus. I. Daquet Printing Co., Charleston, South Carolina.

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Notes on Gray Jay demographics in Colorado.—The social organization and population dynamics of the Gray Jay (*Perisoreus canadensis*) are not well known. Most literature on the Gray Jay is anecdotal, consisting primarily of casual field observations or more detailed observations of one or very few individuals over a period of days or weeks (e.g., Warren 1899; Skinner 1921; Lawrence 1947, 1968; Rutter 1969; Burnell and Tomback 1985). To describe accurately the social and population structure, more long-term studies are required. The value of long-term studies of larger populations of jays has been clearly demonstrated by Woolfenden (1975), Woolfenden and Fitzpatrick (1984) and Brown (1963a, b, 1987). The objective of this paper is to provide an initial report of an ongoing demographic and behavioral study of Gray Jays in the northern Colorado Rocky Mountains. We provide information on survivorship based on mark-resight data, movements, and group size and composition. This report is based on field data obtained over eleven years of sporadic data collection; however, it provides the best information presently available on long-term patterns of Gray Jay social organization.

Materials and methods.—This study was conducted in the Colorado State Forest (CSF), which is 152 km west of Fort Collins on the west slope of the Medicine Bow Mountains, at an altitude of 2500-3800 m. The habitat is open pine forest on west and south-facing dry slopes below 2900 m and closed pine-spruce-fir forest interspersed with grass meadows on north slopes and above 2900 m. Three primary banding sites were established, approximately 3.2 km apart, within a 23-km² study area. Site #1 was located at North Michigan Reservoir; Sites #2 and #3 were north and east of the reservoir. Sites #1 and #2, located at