

## Notes on Breeding Sharp-shinned Hawks and Cooper's Hawks in Barnwell County, South Carolina

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**Abstract** - Breeding records of *Accipiter striatus* (Sharp-shinned Hawks) in the southeastern US are scattered and isolated. We documented a Sharp-shinned Hawk and *Accipiter cooperii* (Cooper's Hawk) nest while conducting a telemetry study on *Melanerpes erythrocephalus* (Red-headed Woodpeckers) in Barnwell County, SC in 2006 and 2007. We report the first known nest of a Sharp-shinned Hawk in Barnwell County, SC and the first report of Sharp-shinned Hawks preying upon Red-headed Woodpeckers. Thirteen of 93 (13.9 %) woodpeckers were killed by accipiters in the summers of 2006 and 2007. Large, contiguous forests managed for *Picoides borealis* (Red-cockaded Woodpeckers) may be used by breeding Sharp-shinned Hawks. The bright plumage, loud calls, and behavior of Red-headed Woodpeckers, particularly during the nestling stage, may make them conspicuous prey for accipiters.

### Introduction

*Accipiter striatus* Vieillot (Sharp-shinned Hawk) and *Accipiter cooperii* (Bonaparte) (Cooper's Hawk) are year-round residents of the southeastern US that typically prey upon small to medium-sized birds and mammals. In North America, the core breeding range of Sharp-shinned Hawks includes the contiguous boreal and mixed forests of Canada, the Appalachian mountains, the northern Midwest, and the western and northern US (Bildstein and Meyer 2000). Sharp-shinned Hawks regularly nest as far south as the mountainous regions of the Carolinas and Georgia, but there are few modern records of nests from the Piedmont and only one from the Coastal Plain (Cely 2003, Davis 1998, Gobris 1994). Sharp-shinned Hawks, however, are known to breed as far south as Central and South America (Bildstein and Meyer 2000). Although Sharp-shinned Hawks are easily observed and counted at migration sites in North America, they are among the most difficult raptors to detect during the breeding season because of their frequent use of unbroken forest canopies (Reynolds and Wight 1978, Reynolds et al. 1982) and concealment of nests in upper tree canopies (Wiggers and Kritz 1991). Therefore, little is known about nesting activity at the perimeters of their known breeding range where territories are scattered and isolated. Cooper's Hawks are more common than Sharp-shinned Hawks in the South Atlantic Coastal Plain and Piedmont.

We documented several predation events on *Melanerpes erythrocephalus* (L.) (Red-headed Woodpeckers) by Sharp-shinned and Cooper's Hawks while conducting research in South Carolina in 2006 and 2007. Radio

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transmitters on the woodpeckers led us to the nests of the hawks, and locations of the woodpecker territories allowed inference about home ranges of these hawks. Here we present: 1) evidence of a breeding record for Sharp-shinned Hawk in South Carolina, 2) a brief summary of modern records for Sharp-shinned Hawks for the southeastern US, and 3) the first report of Sharp-shinned Hawks preying upon Red-headed Woodpeckers.

### Methods

We studied Red-headed Woodpeckers from May to August 2006–2007 on the US Department of Energy's Savannah River Site (SRS), an 80,000-ha National Environmental Research Park in Aiken and Barnwell counties, SC. The SRS is in the Upper Coastal Plain and Sandhills physiographic provinces. Our woodpecker study sites included 50–60-yr old *Pinus taeda* L. (Loblolly Pine) forests with scattered *Quercus* spp. (oaks) and *Carya* spp. (hickories). The area surrounding these sites was similar but also contained some younger pine plantations and old-growth bottomland hardwood forest in riparian zones.

We captured Red-headed Woodpeckers at ground and sub-canopy levels using mist nets, and at cavities using a telescoping pole with a net attached. We attached a 1.9-g transmitter (Holohil Systems, Ltd.) on the backs of woodpeckers using the harness design of Nesbitt et al. (1982), but modified to exclude the breast band. To ensure stability and limit movement of the transmitter, we used crimping beads at each tube opening of the transmitter. We used a standard size for all harnesses. The transmitter harness package weighed 2.1 g (2.6–3.6% of body mass), and the battery life of transmitters was 16 weeks. The behavior of Red-headed Woodpeckers was not affected by the harness (M. Vukovich and J.C. Kilgo unpubl. data). We used receivers with an H-antenna or 3-element Yagi antenna (Telonics, Inc.; Advanced Telemetry Systems, Inc.) to relocate woodpeckers by homing 4 to 5 times per week. We marked woodpecker locations with a handheld GPS unit. When a radio signal was not detected from a bird's known territory, we searched surrounding areas in expanding concentric circles until contact was made.

### Results

We tracked 93 Red-headed Woodpeckers ( $n = 46$  in 2006,  $n = 47$  in 2007), of which 13 were killed by accipiters ( $n = 7$  in 2006,  $n = 6$  in 2007). Most predation events occurred in July (77%). In 2006, an average of 15 days was needed to relocate missing birds. In 2007, an average of 1 day was needed to relocate birds. The following are descriptions of significant depredation events.

#### Sharp-shinned Hawk depredations

On July 17, 2006, 3 days after the last contact with Red-headed Woodpecker no. 77, we discovered its radio signal 2.3 km north of its last known location. On approaching the signal, we heard an alarm call of a Sharp-shinned Hawk and briefly observed it flying around us. We found

the transmitter and remains of 77 on the ground. We observed old prey remains and feathers of other small passerines in the immediate area while we searched briefly but unsuccessfully for a nest.

On July 3, 2007, we located the signal of bird 101 in a *Pinus palustris* Miller (Longleaf Pine) 2.1 km north of 101's last known location, and about 2.8 km east of the recovery of bird 77 in 2006. Upon approach, we heard an alarm call of an adult Sharp-shinned Hawk. An adult female hawk approached within 5 to 10 m of us while circling, diving, and continuing to give alarm calls. Although we heard begging calls of Sharp-shinned Hawk fledglings on at least 2 occasions and we observed several old nests consistent with the size of small accipiters, we did not find a definitive Sharp-shinned Hawk nest. Observations of fledglings were only fleeting glimpses. Two additional woodpecker depredations in 2007 (birds 107 and 116) led us to the same area, with 1 transmitter located in a Longleaf Pine and the other on the ground. The transmitters of bird 107 and 116 were approximately 3.0 and 1.8 km from their last known locations.

On July 9, 2007, we discovered a nest when we observed an adult female Sharp-shinned Hawk carrying unknown prey land in the top of a Longleaf Pine. She then quickly left with the prey and flew to fledglings begging nearby. The nest was concealed near the top of the Longleaf Pine (23.5 m) in which she had first landed. The tree's height was approximately 24.4 m and diameter at breast height (dbh) was 40.6 cm. The nest tree was approximately 42 m from the tree that contained the transmitter of bird 101. Whitewash and small passerine remains were scattered about the base of the nest tree. No nestlings were seen or heard in the nest. The surrounding habitat was dominated by 50- to 60-year-old Longleaf Pines that were moderately thinned. The area had been burned (prescribed fire) the preceding winter and there was little to no midstory or understory.

On July 13, 2007, we located the signal of the transmitter for bird 103 in a tree 0.9 km from its last known location and approximately 1.4 km southeast of the Sharp-shinned Hawk's nest. A hatch-year Sharp-shinned Hawk circled and called in alarm. We found no remains of 103 at the time, but on 26 July, we found the transmitter and Red-headed Woodpecker feathers on the ground under the tree.

### **Cooper's Hawk depredations**

On July 25, 2006, we flushed a hatch-year Cooper's Hawk on the ground 20 m from the remains of bird 52 in a riparian zone about 0.6 km west of its territory. The location was under the same large *Liriodendron tulipifera* L. (Tulip Poplar) where the remains of birds 46, 53, 59, 73, and 81 had been found. Average distances of these 4 birds from their last locations were 1.6 km (range = 1.1–2.1 km). Other prey remains present included feathers of *Cyanocitta cristata* (L.) (Blue Jay) and *Colaptes auratus* (L.) (Northern Flicker). We found no nest in subsequent searches, but observed 2 old, medium-sized stick nests in the area. We concluded that all nestlings fledged and that the Tulip Poplar was used as a perch for plucking prey by adult and hatch-year Cooper's Hawks.

On June 18, 2007, we located the signal for bird 108 in the same riparian zone, 101 m from the Tulip Poplar perch used for plucking in 2006. The transmitter and some remains of bird 108 were approximately 1.8 km from its last known location. We heard an alarm call of an adult Cooper's Hawk upon approach and then observed a nest with 2 large nestlings (18–30 days) 23.5 m high in a *Liquidambar styraciflua* L. (Sweet Gum). The tree's height was approximately 35 m and dbh was 38.9 cm. An examination of the area directly under the nest revealed whitewash, Blue Jay feathers, and small-mammal remains. The tree was within 20 m of a small creek and surrounded by mixed pines and hardwoods. The area had mixed ages of trees (10–90 years old) with a dense midstory and moderate understory. On July 3, 2007, we located the remains of bird 110 on the ground 10 m from the nest tree and approximately 0.9 km from its last known location.

### Discussion

We confirmed nesting by Sharp-shinned Hawks in 2007, but the species was present in the area in 2006 and may have been nesting then. Despite extensive long-term ornithological fieldwork at SRS, Sharp-shinned Hawks have never been documented as a breeding species (Kilgo and Bryan 2005). Possible nests of Sharp-shinned Hawks have been reported within 50 km of our study site by the South Carolina Breeding Bird Atlas (Fig. 1; Cely 2003). Only 10 Sharp-shinned Hawk nests have been reported from South Carolina

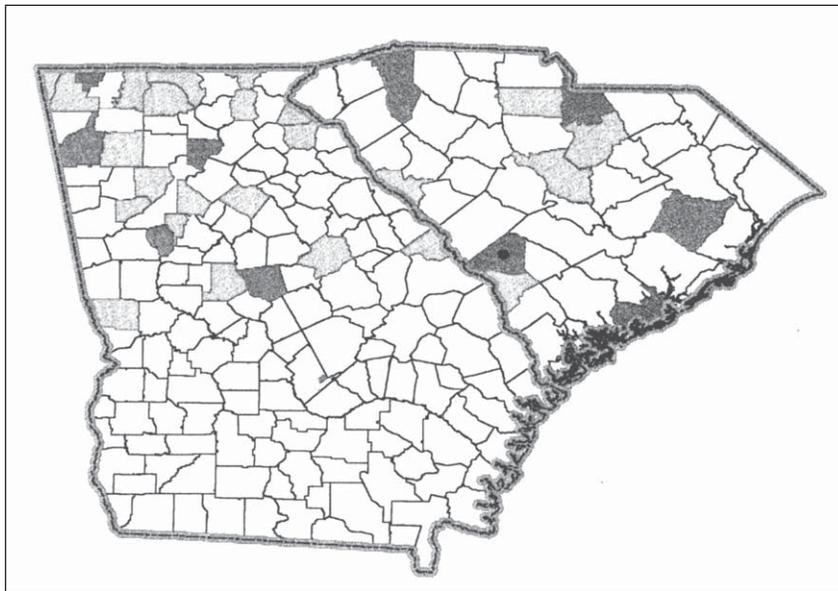


Figure 1. Counties in South Carolina and Georgia with confirmed (dark gray), and possible/probable (light gray) breeding Sharp-shinned Hawks since 1988 (taken from South Carolina and Georgia Breeding Bird Atlases). Barnwell County, SC, is indicated with a black dot.

and Georgia since 1988 (Fig. 1; Cely 2003; Gobris 1994; Georgia Breeding Bird Atlas, Forsyth, GA, unpubl. data). Given the difficulty of detecting and accurately identifying Sharp-shinned Hawks, combined with the species' widely scattered distribution in the area, we suspect that nesting pairs may have gone undetected. The existence of another pair of Sharp-shinned Hawks near our study site remains uncertain but possible based on the extent of suitable habitat and current management practices of the area. Large, contiguous pine forests, particularly *Picooides borealis* (Vieillot) (Red-cockaded Woodpecker) management areas, in the southern US may be used by breeding Sharp-shinned Hawks.

The distance between the Sharp-shinned Hawk and the Cooper's Hawk nests was 3.9 km. Researchers have reported two Sharp-shinned Hawk nests and a Cooper's Hawk nest 300 m apart in Oregon (Reynolds and Wight 1978). They concluded that overlapping home ranges probably occurred between the species. Based on the locations of territories of Red-headed Woodpeckers depredated by accipiters, no overlap of accipiter home ranges occurred in 2006, but some minimal overlap may have occurred in 2007.

Although Cooper's Hawks have been known to prey on Red-headed Woodpeckers (Errington 1933), this is the first report of Sharp-shinned Hawks preying upon Red-headed Woodpeckers. The mean mass ( $\pm$ SE) of woodpeckers depredated by accipiters in our study was  $67.9 \pm 1.4$  g. *Turdus migratorius* L. (American Robin), a frequent prey species of Sharp-shinned Hawks (Storer 1986), is larger than a Red-headed Woodpecker, but both species approach the upper limit of prey sizes for Sharp-shinned Hawks (Bildstein and Meyer 2000). Overlap of prey niches for Cooper's Hawks and Sharp-shinned Hawks have been reported (Reynolds and Meslow 1984). The female Sharp-shinned Hawk may have hunted more often in the latter stages of nesting and specialized on woodpeckers (female accipiters are larger than males). However, because we did not get good views of hunting accipiters and because Cooper's Hawks were present, we were not able to positively identify hunting accipiters to sex.

Although the total number of woodpeckers killed was similar between years, there were differences in the number taken by accipiters. During 2006, Cooper's Hawks preyed on more radio-instrumented woodpeckers ( $n = 6$ ) than Sharp-shinned Hawks ( $n = 1$ ), but the opposite was so during 2007, when 4 woodpeckers were taken by Sharp-shinned Hawks and 2 by Cooper's Hawks. We suspect that both accipiters shifted their territories and hunting areas between years, perhaps caused by fluctuations in numbers of prey or by their annual differences in clutch sizes and survival of nestlings or fledglings.

Most predation events of Red-headed Woodpeckers by accipiters occurred in July. July is typically when there are large numbers of nestlings or fledglings of Red-headed Woodpeckers at SRS (M. Vukovich, pers. observ.) and it is also the late-nestling to fledgling period of accipiters in the Carolinas (Bildstein and Meyer 2000, Rosenfield and Bielefeldt 2006). The bright

plumage, loud calls, and behavior of Red-headed Woodpeckers, particularly during the nestling stage, may make them a conspicuous prey species for both accipiters. In addition, Red-headed Woodpeckers are the most abundant breeding woodpecker on our study site (Lohr et al. 2002). This potential prey base combined with the presence of extensive, contiguous mixed forest may have been among the factors that made SRS attractive to accipiters.

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