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Evidence of red-cockaded woodpecker nestling displacement by southern flying squirrels.

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EVIDENCE OF RED-COCKADED WOODPECKER NESTLING DISPLACEMENT BY SOUTHERN FLYING SQUIRRELS

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ABSTRACT.—Red-cockaded Woodpeckers (*Picoides borealis*) are unique among woodpeckers in that they excavate their roost and nest cavities entirely within living pines (Ligon 1970). A number of secondary cavity nesters and other vertebrates are dependent on Red-cockaded Woodpeckers for the cavities they create (Rudolph et al. 1990, Loeb 1993, LaBranche and Walters 1994, Conner et al. 1997). Harlow and Lennartz (1983), Rudolph et al. (1990), Loeb (1993), and Conner et al. 1996, 1997) showed that southern flying squirrels (*Glaucomys volans*) in Texas and South Carolina were the most common occupants observed in the cavities other than Red-cockaded Woodpeckers and that these cavities were selected primarily on the basis of entrance size. While these studies showed that there is a propensity for squirrels to use unenlarged cavities, none have shown evidence of Red-cockaded Woodpeckers being killed by southern flying squirrels. Stabb et al. (1989) proposed that smaller birds may suffer mortality or disturbance from flying squirrels usurping the occupied cavities. Jackson (1978a), along with Hooper and Lennartz (1983), noted that southern flying squirrels have usurped Red-cockaded Woodpecker cavities without killing the birds. We report an instance of two 12- to 15-day-old nestlings found dead at the base of the nest tree and 3 flying squirrels inside the nest cavity.

While examining nest trees of resident groups of woodpeckers for presence of eggs and/or nestlings on the Angelina National Forest (62,423 ha; 31°15'N, 94°15'W) we inserted a small camera attached to a telescoping 15-m pole into each cavity chamber. On 26 May 1999 we observed two dead 12- to 15-day-old nestlings at the base of a nest tree. These nestlings were last observed alive in the cavity on 23 May 1999. Upon subsequent cavity inspection, we found the tree to be occupied by 3 southern flying squirrels. There was a well-developed, copious resin flow surrounding the cavity, but it did not deter the squirrels from entering the cavity, which is consistent with findings in other studies (Rudolph et al. 1990, Loeb 1993).

While it is conceivable that a predator such as a rat snake (*Elaphe obsoleta*) could have ejected the nestlings and the flying squirrels moved in after the cavity was unoccupied, certain evidence suggests that this was not the case. The resin barrier on this particular tree was well established with clear fresh resin 0.5 m above the cavity and 1.5 m below the cavity. Thus, it is unlikely that a snake or any other small terrestrial vertebrate could have gained access to the cavity contents. Dennis (1971) and Jackson (1978b) documented two instances of *E. obsoleta* gaining access

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to cavities occupied by flying squirrels or Red-cockaded Woodpecker nestlings, but the resin barriers on those cavities were compromised. Other study results (Jackson 1974, Rudolph et al. 1990) have supported the hypothesis that pine boles coated with fresh, sticky resin reduce the access that rat snakes have to cavities. Had a rat snake entered the cavity, it is almost certain that it would have eaten the nestlings. Given the fact that these birds were found 20 cm from the base of the nest tree, we suggest that the flying squirrels ejected the nestlings and usurped the cavity from the woodpeckers. Because there were no bite marks on either nestling and all adult woodpeckers were still present, we suggest that the cavity was usurped without attempting predation on the nestlings or adults.

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DISTRIBUTION OF THE SUBSPECIES OF GREAT HORNED OWLS IN TEXAS

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ABSTRACT.—The ranges of two subspecies of Great Horned Owls (*Bubo virginianus virginianus* and *B. v. pallescens*) in Texas were determined by comparison of 157 specimens from Texas and smaller series of each subspecies from east and west of Texas respectively, with the same three specimens (pale, medium and dark). Six color characters were used. The values of these were summed, and mapped. The range of nominate *virginianus* was found to be closely dependent on the distribution of hardwood, pine and oak dominated wooded areas in Texas.

The Great Horned Owl, *Bubo virginianus*, is an abundant, widespread, and successful avian predator in diverse habitats. Two distinctive subspecies occur in Texas. In the wooded areas of the east is the dark, heavily barred, richly ochaceous nominate subspecies, *B. v. virginianus*, while the paler, more xeric adapted subspecies, *B. v. pallescens*, (type locality: Watson Ranch, on the Medina River, 18 miles southwest of San

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