Red-cockaded Woodpecker Banding at Bienville National Forest, Mississippi

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ABSTRACT

We examined differences in wing length, tail length, and body mass among male and female Red-cockaded Woodpeckers *(Picoides borealis).* Between 1997 and 1999 we banded 169 Red-cockaded Woodpeckers at Bienville National Forest, Mississippi. Males exhibited greater tail length and body mass than females, but no differences in wing length were detected. Our data provide additional support for Bergman's Rule in Red-cockaded Woodpeckers, but we did not observe the reversed sexual dimorphism in tail length reported in the literature.

INTRODUCTION

Red-cockaded Woodpeckers are a federally endangered species endemic to the pine forests of the southeastern United States (U.S. Fish and Wildlife Service 1970, Jackson 1994). Few data on Red-cockaded Woodpecker morphometrics from Mississippi exist in the literature (see Mengel and Jackson 1977). Between 1997 and 1999, we conducted a Red-cockaded Woodpecker foraging and reproductive ecology study at Bienville National Forest (BNF), located in central Mississippi. Although BNF has the largest subpopulation of Red-cockaded Woodpeckers in Mississippi (n = 104 groups; approximately 275-300 individuals), research on this species has been infrequent. Fewer than 35 were banded during the 10 years prior to 1997 at BNF (Stangel and Dixon 1995, Raulston et al. 1996). During our study, we captured, banded, and color-marked adult and nestling Red-cockaded Woodpeckers to identify individuals during subsequent observation periods (Wood 2001).

METHODS

We trapped adult Red-cockaded Woodpeckers during the non-breeding season (September - March) using a 15.24 m telescoping pole with mist-netting attached to an embroidery hoop to remove woodpeckers from their roost cavities at night (Jackson and Parris 1991). Birds were marked with a U.S. Fish and Wildlife Service band and a unique set of three color bands for individual identification. Red color bands were not used because they may reduce Red-cockaded Woodpecker fledgling success and affect social structure (Hagan and Reed 1988). Morphometric measurements were recorded including wing and tail length, body mass, age, sex, and body condition (Short 1970, Jackson 1971, Mengel and Jackson 1977, Jackson 1979). After processing, birds were placed on the bole of a nearby tree and released, after which they frequently hitched up the bole until they were above the first limbs and roosted in the crown or limbs.

We trapped nestlings from brood cavities during the breeding season (April - June). Once age and condition of nestlings were determined, we banded 7- to 10-day-old nestlings for identification during the post-fledging period. To extricate nestlings from the brood cavity, we used a noose technique developed by Jackson (1982). Nestlings were banded in the same manner as adults, except when an enlarged tarsus was encountered, then only one or two color bands were attached, depending on the size of the tarsus. They were then promptly returned to the cavity. No nestlings were injured during the course of this study. All research methods were approved by the Mississippi State University Animal Use and Care Committee under the approved Institutional Animal Care and Use Committee protocol number 97-005.

Paired t-tests were used to detect differences in wing length, tail length, and body mass of after-hatching-year (AHY) and hatching-year (HY) Red-cockaded Woodpeckers. We also pooled AHY and HY by sex to examine differences between sexes. We used SAS v. 7.0 for all statistical analyses ($\alpha = 0.05$).

RESULTS

We banded 169 Red-cockaded Woodpeckers of the following age and sex classes between February 1997 and March 1999: 34 AHY females, 31 AHY males, 13 HY females, 6 HY males, 31 HY of unknown sex, and 54 nestlings. Since nestlings were banded at different ages, we do not report morphometric analysis here. Although Red-cockaded Woodpeckers were banded from groups selected for a foraging ecology study, we attempted to band them throughout BNF when possible. Banding was discontinued in spring 1999 as the project neared completion.

Wing length - Wing length was not different among AHY males and females (t=1.06, 30 df, P= 0.299) or HY males and females (t= -0.77, 5 df, P= 0.074; Table 1). No differences were detected among combined age classes (AHY and HY) of males and females (t =0.36, 36 df, P=0.72; Table 1).

Tail length - Tail length was different among AHY males and females (t=2.56, 30 df, P=0.016). Male tail length was 1.5 mm longer than female tail length (Table 1). Tail length was not different among HY males and females (t =-0.88, 5 df, P= 0.421) and combined age classes of males and females (t=1.57, 36 df, P=0.125; Table 1).

Body mass - AHY males had greater body mass than AHY females (t =5.73, 30 df, P<0.0001); however, HY males were not heavier than HY females (t =0.59, 5 df, P=0.584; Table 1). Combined age class males were heavier than combined age class females (t =5.67,36 df, P< 0.0001; Table 1).

Table 1. Mean, standard deviation (SD), range, and sample size of wing length, tail length, and body mass of after-hatching-year (AHY) and hatching-year (HY) Red-cockaded Woodpeckers by sex at Bienville National Forest, Mississippi.

Metric	Age	Sex	Mean ± SD	Range	*n*
Wing length	AHY	Male	120.9 mm ± 2.6	115-125	31
	AHY	Female	120.2 mm ± 2.1	115-124	33
	HY	Male	118.7 mm ± 2.2	116-122	6
	HY	Female	118.6 mm ± 2.6	113-124	13
	Combined	Male	120.5 mm ± 2.7	115-125	37
	Combined	Female	119.8 mm ± 2.4	113-124	46
Tail length	AHY	Male	74.9 mm ± 2.3	70-79	31
	AHY	Female	73.4 mm ± 2.9	68-81	33
	HY	Male	73.8 mm ± 2.9	71-77	6
	HY	Female	73.5 mm ± 3.4	70-80	13
	Combined	Male	74.7 mm ± 2.4	70-79	37
	Combined	Female	73.5 mm ± 3.0	68-81	46
Body mass	AHY	Male	49.4 g ± 1.6	46-52	31
	AHY	Female	47.3 g ± 1.2	45-50	33
	HY	Male	48.7 g ± 1.6	47-51	6
	HY	Female	47.4 g ± 1.8	45-52	13
	Combined	Male	49.2 g ± 1.6	46-52	37
	Combined	Female	47.3 g ± 1.4	45-52	46

DISCUSSION

Red-cockaded Woodpecker wing lengths at BNF (Table 1) fall within the range of wing lengths reported by Pyle (1997): 111 - 123 mm for female and 110 - 124 mm for male. Tail lengths were similar to those reported by Pyle (1997) for female (69 - 81 mm) and male (65 - 81 mm). Mengel and Jackson (1977) reported 119.7 ± 0.57 mm for wing and 76.3 ± 0.12mm for tail lengths from Red-cockaded Woodpeckers measured near Picayune, Mississippi. However, they had a very small sample size (n = 7), even when they combined sexes.

Short (1970) suggested that many woodpecker species, including Red-cockaded, exhibited reversed sexual dimorphism, namely with regard to wing and tail length (i.e., females had longer wings and tails than males). He reported mean wing lengths (females =119.1 mm, males =118.4 mm) and tail lengths (females =77.4 mm, males =76.0 mm) from Red-cockaded Woodpeckers measured in Florida (females =32, males = 31). However, our data do not support the reversed sexual dimorphism hypothesis postulated by Short (1970). No difference in wing length was detected between males and females, and AHY males had significantly longer tails than AHY females (74.9 mm vs. 73.4 mm) at BNF.

Reversed sexual dimorphism with regard to wing and tail length may not be as extensive as Short (1970) suggested. He based his conclusions on measurements from Red-cockaded Woodpeckers in only one location, not throughout the species' range. Therefore, his conclusion may have been premature. Further, Red-cockaded Woodpeckers used in Short's analysis were from a longleaf pine *(Pinus palustris)* forest in northern Florida. However, Red-cockaded Woodpeckers at BNF use loblolly *(P. taeda)* and shortleaf *(P. echinata)* pines, which differ substantially from longleaf pines with regard to the texture and thickness of bark and limbs. These structural differences may partially explain differences in wing and tail length in different portions of the Red-cockaded Woodpeckers' range (Short 1970). Red-cockaded Woodpeckers also exhibit sexual segregation during foraging (Ligon 1970, Engstrom and Sanders 1997). Females forage primarily on the trunk below the crown, and males forage within the crown and on limbs. Richardson (1942) suggested that a shorter tail may be advantageous to a female foraging on the trunk, whereas a longer tail would provide balance for a male foraging on smaller branches (see also Jackson 1971).

Mengel and Jackson (1977) reported a mean body mass of 49.0 g for 14 male and female Red-cockaded Woodpeckers at the Noxubee National Wildlife Refuge. Male Red-cockaded Woodpeckers at BNF were slightly heavier (mean 49.2 g), whereas females were 1.7 g lighter than the mean body mass reported by Mengel and Jackson (1977). Since Mengel and Jackson combined sexes in their sample, direct comparisons of differences among sexes are not possible. However, Red-cockaded Woodpecker body masses at BNF fall within the range of mean body masses reported in Florida (43.7 g) and Kentucky (49.9 g) (Mengel 1965, Ligon 1968). Mengel and Jackson (1977) suggested that Bergman's rule may apply to Red-cockaded Woodpeckers. Bergman's rule suggests that a species will exhibit increased body size at higher latitudes than conspecifics at lower latitudes. In conjunction with other studies, our data provide support for Bergman's rule in Red-cockaded Woodpeckers (Table 2).

Table 2. Mean Red-cockaded Woodpecker body masses (g) from different latitudes within the species' geographic range showing increase in mean body mass from south to north.

Source	State	Body Mass (g)
Ligon (1968)	Florida	43.7
Wood (2001)	central Mississippi	48.3
Mengel and Jackson (1977)	northern Mississippi	49.0
Mengel (1965)	Kentucky	49.9

We concur with Mengel and Jackson (1977) that AHY male and female Red-cockaded Woodpeckers have similar wing lengths. Red-cockaded Woodpeckers at BNF exhibited sexual dimorphism, with AHY males having longer tail lengths and greater body mass than AHY females. Thus, our data do not support the reversed sexual dimorphism in tail length (i.e., females larger than males) reported by Short (1970).

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