

OBSERVATIONS ON FEMALE PROMISCUITY IN THE RED-SHOULDERED HAWK

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During the spring of 1982, we observed a case of promiscuity in the Red-shouldered Hawk (*Buteo lineatus*), hitherto, an unreported reproductive behavior in this species. Observations were made on the Ronald E. Caspers Wilderness Park, Orange County, California of one female and two territorial male Red-shouldered Hawks. Each hawk was marked with a U.S. Fish and Wildlife Service (FWS) leg band. Additionally, the female and one of the two males were also marked with a colored and numbered plastic band readily visible up to 100 m. All observations were made with binoculars and spotting scopes.

During spring 1981, we trapped and color-banded a breeding pair of Red-shouldered Hawks (male 1, female 1) at their nest site. This pair fledged young that year. On 26 February 1982, while attempting to trap a Red-shouldered Hawk approximately 0.5 km north of what we considered to be the boundary of the color-banded pair's territory, we accidentally retrapped female 1. We were further surprised when, after release, this bird and the bird we had originally been trying to trap (an unpaired adult-plumaged male with only a FWS metal band, male 2) jointly pursued an immature Red-shouldered Hawk. After chasing the immature hawk into her 1981 territory, female 1 returned with male 2 to the area where we had retrapped her, at which time the two birds copulated. After losing sight of these birds, we drove southward to the color-banded pair's 1981 nest site where we found male 1 chasing an immature Red-shouldered Hawk. Shortly afterward, male 1 was joined by female 1 who flew in from the north; the two birds then copulated.

On 7 March 1982 we began watching these same three hawks more closely. At 09:00 we observed male 1 calling from the previous year's nest, while female 1 called from a nearby tree. After a few minutes, the male flew from the nest to the female and copulated with her. Shortly afterward, both birds flew to the south end of their territory where they called, while vigorously pursuing a Red-tailed Hawk (*Buteo jamaicensis*). This behavior is typical of territorial pairs during the breeding season (McCrary, M.Sc. thesis, California State Univ., Long Beach, 1981).

At 09:45 we relocated the female to the north of her 1981 territory near where we had retrapped her on 26 February. After she called periodically for approximately 10 min, male 2 flew in from the north and copulated with her. He then flew off to the north, calling, while the female continued to call from the same tree for another 5 min.

At 10:08 the female resumed calling and flew from her perch as another Red-shouldered Hawk (possibly male 2) was soaring overhead. Both birds soared together for sev-

eral minutes until the female drifted south toward her 1981 nest.

As we drove south, we observed another Red-shouldered Hawk, which we later identified as male 1, engaged in courtship flight (soaring and calling with legs extended) directed toward female 1. This activity continued for approximately 5 min, after which the female drifted back to the north.

At 10:55 we found male 1 near his 1981 nest and shortly thereafter, female 1, flying from the north, landed on the nest. She called several times before flying into a nearby tree where male 1 copulated with her. The pair then flew out of sight to the south of the nest pursuing a Red-tailed Hawk. At 11:20 we observed the female and male 2 engaged in courtship flight, and shortly afterward, we saw the two birds perched next to each other in the same tree where they had copulated earlier that morning. At 11:45 we saw the female back near her 1981 nest, where she once again copulated with male 1.

We again observed the promiscuous behavior of this female during brief observations on 13 March when she copulated with male 2 three times in 15 min.

The female re-used the 1981 nest in 1982, and she and male 1 were observed incubating. However, for unknown reasons they were unsuccessful in fledging young. Male 2 apparently remained unpaired in 1982, and the nest which he had constructed was not used. In 1983 male 1 and female 1 again mated and produced four young. The territory to the north was occupied by a banded (FWS only) adult-plumaged male, presumably still male 2, and an unbanded adult-plumaged female. We witnessed no promiscuous behavior by female 1 in observations of similar duration as 1982 during the 1983 nesting season.

To our knowledge, promiscuity in raptors has been documented only for the American Kestrel (*Falco sparverius*) (Fast and Barnes, *Wilson Bull.* 62:38, 1950; Cade, *Wilson Bull.* 67:5-17, 1955; Balgooyen, *Univ. Calif. Publ. Zool.* 103:1-83, 1976). Female kestrels are frequently promiscuous during early spring before pair formation, leading Balgooyen (1976) to suggest that this behavior stimulates pairing and female sexuality. Additional observations of individually marked raptors are needed to determine the actual frequency of this behavior. However, promiscuity in the Red-shouldered Hawk appears to be extremely rare; in over 1,000 h of observation of three adjacent pairs during three breeding seasons (McCrary 1981, and unpubl. data) no instance of promiscuity was observed. In the observations reported here it seems significant that this behavior was observed in 1982 when male 2 lacked a mate and not in 1983 when he was mated to another female.

We thank the management of Ronald E. Caspers Wilderness Park for kindly permitting us to use this area for research and C. T. Collins, C. H. Stinson, and J. W. Wiley for their constructive comments on the manuscript.

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