NOTES

INCUBATION AND BROOD REARING BY A WILD MALE MOUNTAIN QUAIL

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The Mountain Quail (*Oreortyx pictus*) is among the most poorly known birds of the American west. No comprehensive study of the species' breeding biology exists (Gutiérrez 1975, 1980). This is unfortunate because Mountain Quail populations have declined significantly in Washington (Wash. Dept. Wildlife 1993), Oregon (K. Durbin, Ore. Dept. Fish and Wildlife, pers. comm.), Idaho (T. Hemker, Ida. Dept. Fish and Game, pers. comm.), and Nevada (S. Stiver, Nev. Div. Wildlife, pers. comm.). Information on Mountain Quail reproduction could benefit management efforts.

Primary accounts of the Mountain Quail provide little information on male and female roles in reproduction (i.e., Coues 1874, Grinnell et al. 1918, Grinnell and Storer 1924, Bent 1932, Linsdale 1936, Miller and Stebbins 1964, Gutiérrez 1975, 1980). Grinnell and Storer (1924:268) stated, "Females, so similar to the males in plumage as not to be distinguishable under normal circumstances, are not in much evidence after the nesting sites have been selected," suggesting an assumption that primarily females tend nests and eggs. Miller and Stebbins (1964:70) noted that many male Mountain Quail have incubation patches, and they collected one such male associated with a brood of one-third-grown young. Incubation by males has been documented for the California Quail (*Callipepla californica*), Scaled Quail (*C. squamata*) (Johnsgard 1988), and Northern Bobwhite (*Colinus virginianus*) (Clark 1903, Curtis et al. 1993). Males of these species also brood young, as do male Gambel's Quail (*Callipepla gambelii*) and Montezuma Quail (*Crytonyx montezumae*) (Johnsgard 1988). Neither incubation nor brooding by male Mountain Quail has been documented, although incubation patches on males imply this possibility (Johnsgard 1973). Here, I report a case of a wild first-year male Mountain Quail successfully incubating a clutch of 13 eggs and subsequently rearing the young unaided by a female.

On 2 June 1993, Dave Pratt located and reported to me a Mountain Quail nest containing 6 eggs in second-growth mixed pine forest in Nevada Co., California (39° 26′ 35″ N, 120° 16′ 04″ W). On 16 June, I trapped an adult Mountain Quail on the nest while it incubated. I did not count the number of eggs the day the adult was trapped, but I did notice that the nest contained more than 6 eggs. Two days after trapping, the nest contained 13 eggs, which proved to be the complete clutch. I placed a radio transmitter on the quail, took a blood sample for genetic identification of sex, and inspected its plumage. The quail had buffy-tipped greater primary coverts on the upper side of the wing. Also, primaries 9 and 10 were faded and worn relative to primaries 1-8, a pattern typical of first-year quail. Together, these features indicated the bird was a yearling (Johnsgard 1983). Subsequent genetic analysis, following the methods of Longmire et al. (1993) as adapted to Mountain Quail (unpubl. data), indicated that the quail was male.

I relocated the quail nine times each during incubation and brood-rearing. Relocation times varied from early morning to dusk, and monitoring periods ranged from

brief visits to the nest to as many as 10 hours of continuous monitoring. During incubation, I also photographed and observed the quail for extended periods from a blind 3 m from the nest.

Two days after capture, the male was off the nest for 10 hours before beginning incubation at dusk. Thereafter, during each relocation, I observed the male incubating or, in the early morning, foraging near the nest. Whenever the male was not incubating, I checked the nest for another adult incubating the eggs. I did not observe another quail on or near the nest.

The 13 eggs hatched on approximately 14 July, after which I regularly relocated the male with chicks. I ended each relocation by flushing the male away from the chicks and listening to the subsequent reassembly of the adult and brood. The male and chicks vocalized back and forth until they were reunited. In no case did an adult quail other than the radio-marked male vocalize to assemble the brood. Only once was another adult Mountain Quail observed near the brood. Twenty-six days after the eggs hatched, an adult Mountain Quail flushed with the radio-marked male approximately 10 m from the brood. The radio-marked male quickly returned to the area and, unlike the second adult, which was not seen or heard again, vocalized and assembled the brood. Twenty-nine days after hatching, I observed 12 or 13 chicks with the radio-marked male. My last observation was made 37 days after hatching, when approximately 12 strongly flying young Mountain Quail flushed with the radio-marked male.

Together, these observations imply that a single yearling male Mountain Quail successfully incubated and reared 13 young. Incubation and brood-rearing by males as a regular feature of Mountain Quail reproduction would have strong implications for our understanding of the reproductive and population dynamics of the species. For example, if female Mountain Quail are also able to incubate and rear young alone, which is likely, then "pairs" might be able to rear two broods during one breeding season by employing uniparental care for each brood. This could occur even where the breeding season is too short for two broods to be raised sequentially. Thus, the frequency of uniparental care by Mountain Quail merits further investigation.

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