

havior he observed was a response to severe disturbance. Cunningham (op. cit.) reported watching a hen Wood Duck fly from a nest with either a whole or the greater portion of an egg in her bill. This same hen subsequently brought off a brood of 9, although 6 eggs had disappeared.

The role of egg-carrying behavior by ducks is yet unclear. However, our observations and the existing literature suggest that egg-carrying behavior is an adaptation that may increase the probability of the successful incubation of undamaged eggs in partially-destroyed clutches.—ROBERT W. STRADER, RICHARD DI GIULIO, AND ROBERT B. HAMILTON. *School of Forestry and Wildlife Management, Louisiana State Univ., Baton Rouge 70803. Accepted 9 Dec. 1976.*

Evidence of brood adoption by Ruffed Grouse.—Evidence that Ruffed Grouse (*Bonasa umbellus*) hens sometimes adopt chicks from other broods is scanty. Bump et al. (The Ruffed Grouse, Life History, Propagation, Management, N.Y. State Cons. Dept., Albany, 1947:293) reported a hen which had lost its clutch just before hatching that was later seen with 4 chicks. Apparent instances of 2 broods traveling together have been reported several times. Hungerford (Murrelet 34:35-40, 1953) noted a "brood" of 2 hens and 15 young. Chambers and Sharp (J. Wildl. Manage. 22:231-239, 1958) simultaneously captured 2 hens and 5 chicks of 2 age groups. On several other occasions they reported flushing groups of grouse containing young of noticeable age differences. Bump et al. (op. cit.: 293) reported occasional encounters of double broods with both hens normally present but felt that these often represented simply chance meetings of broods. They also believed that older broods may merge permanently at times, particularly if 1 hen is killed.

These reports consist primarily of chance sightings of unmarked individuals. The histories of the individuals sighted and the number of true adoptions of chicks were largely unknown. Here I present evidence that 2 radio-marked Ruffed Grouse hens adopted extra chicks in 1972 at the Cedar Creek Natural History Area 48 km north of Minneapolis, Minnesota. Brood hens were flushed at weekly intervals through early July and at irregular intervals thereafter. Chicks were counted at these times. Typically, the number of chicks seen gradually decreased as the season progressed. There were 2 exceptions. Yearling hen 2239, which hatched 9 eggs, was seen with 9 chicks 20 days after hatch and with 13 young 27 days after hatch. Three days later this hen was killed by a predator precluding additional data on her brood. Adult (22 months or older) hen 2235's brood of 10 chicks was reduced to 4 by 30 days after hatch. However, on 4 occasions between 57 and 70 days after hatch this hen flushed with 10-15 chicks. Since home ranges of the 2 hens were adjacent, Hen 2239's chicks conceivably could have joined hen 2235's brood. At no time was a second adult seen with these broods.

My observations of both captive and wild Ruffed Grouse chicks indicate that by 28-35 days of age they are well-feathered, strong fliers, forage for themselves, are very adept at spotting aerial predators, and possibly could survive on their own. However, broods normally remain together about 75-85 days (Godfrey and Marshall, J. Wildl. Manage. 33: 609-620, 1969). For this behavior to be maintained by natural selection there must be a survival advantage afforded to chicks that remain with the hen for this length of time. If this is the case, orphaned or lost chicks would benefit by joining another brood.

It is more difficult to explain what evolutionary advantage a hen obtains in accepting

another hen's chicks. Kin selection has been used to explain seemingly altruistic behavior in several species (Brown, *The Evolution of Behavior*, W. W. Norton and Co., Inc., New York, 1975:203). This concept seems unlikely to apply in the present circumstance since the fall dispersal pattern of Ruffed Grouse (Godfrey and Marshall, *op. cit.*, 1969) reduces the likelihood that adopted chicks would be closely related to the hen.

Clearly, there are situations (e.g., where food is limiting) when the presence of extra chicks would be detrimental to a hen's own young. Under these conditions a hen which adopted chicks would be selected against. Whether Ruffed Grouse hens can recognize their own chicks is not known. If brood adoption is disadvantageous, one would expect selection pressures for hens to recognize their own chicks and exclude others.

Since extra chicks apparently are tolerated, the possibility remains that hens actually benefit by accepting other chicks. After chicks are 2-5 weeks old, Ruffed Grouse eat a wide variety of plant foods (Bump et al., *op. cit.*: 850). Potential grouse food appeared to be abundant at Cedar Creek during this time and likely minimized the disadvantages of extra chicks in terms of competition for food. Where food is not limiting and where the effects of extra chicks in terms of predator attraction are offset by the increased probability of predator detection, a hen which adopts chicks or travels with another brood may increase her relative fitness because any chick captured by a predator would be less likely to be one of her own.

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Marsh Hawks follow hunting red fox.—At 11:00 on 11 January 1973, we observed a red fox (*Vulpes fulva*) hunting among scattered clumps of dead herbaceous vegetation in an otherwise heavily grazed pasture in northern Delaware County, Ohio. Snow cover was not present. Although the fox had a severe case of mange, the animal's behavior appeared normal. Its hunting behavior consisted of the typical canine search, pause, and pounce sequence. Two Marsh Hawks (*Circus cyaneus*) were near; 1 hawk circled at a low level over the hunting fox while the second bird perched on the ground at approximately 9 m to one side of the fox. As the fox completed its hunting activities in one clump of vegetation and moved to the next clump, 1 Marsh Hawk again perched on the ground near the fox while the other bird circled overhead. When the fox had exhausted the remaining huntable clumps in the general area and had proceeded off across the pasture, the hawks again followed. The trio was then lost from view as the fox entered an area of scattered woods at the end of the pasture. During the entire observation period of approximately 15 min, prey was not taken by either predator.

Two hypotheses may be advanced to account for the behavior of the Marsh Hawks: (1) the 2 hawks and the fox were involved in some form of cooperative feeding interaction, and (2) the movement of a small- to medium-sized mammalian predator may naturally elicit a following response among Marsh Hawks.