

she foraged briefly before the male again displaced her. The male returned to the cleared area for several minutes before both Hairies left the tree.

The female Hairy returned at 14:58 to forage at the cleared area for about a minute before being displaced once more by the male. For about 6 min the male Hairy and the Pileated foraged together, at times no more than 30 cm apart, with no notable interactions. The Pileated left after 10 min and the male Hairy continued to forage until 15:18 before leaving the tree. He was foraging at the cleared area again at 16:19.

The following day we observed a female Hairy foraging at the cleared area as well as at the debris pile below. A second male Hairy (judging from a lesser amount of red on the head) also foraged there.

Thus, a minimum of 3 Hairy Woodpeckers were attracted to the Pileated Woodpecker's foraging site. The Hairies did not attempt to pry off pieces of the tough bark, which in many places exceeded 3 cm in thickness, but rather gleaned the cleared surface and edges. We pried off a piece of bark (8 × 12 cm) from the edge of the cleared area and found 6 larvae ranging in size from 4–22 mm. If similar concentrations of larvae were present on other parts of the tree, this represented a potentially rich food resource, but one that may have been energetically unprofitable for the Hairies to exploit on their own.

Whether these observations represent a commensal pattern or isolated instances of opportunism requires further study. Reports by others, however, suggest that this may be a widespread pattern. Lawrence (Ornithol. Monogr. 5:150, 1967) noted that Hairy Woodpeckers were attracted to excavations made by Pileated Woodpeckers, and Kilham (Wilson Bull. 77:134–145, 1965) stated that Hairy Woodpeckers sometimes used Pileated Woodpecker excavations to forage more deeply within trees than they could by their own efforts. Bent (U.S. Natl. Mus. Bull. 174:185, 1939) remarked that it was common to find Hairy and Downy woodpeckers (*Picoides pubescens*) associated with Pileateds when feeding, and felt that this may represent a commensal association.

Pileated and Hairy woodpeckers are sympatric over a wide area. Since Pileated Woodpeckers are often visually and acoustically conspicuous while foraging, any Hairy Woodpeckers in the vicinity would likely be aware of a Pileated's activities. Both of these factors could facilitate formation of a commensal relationship.—STEPHEN J. MAXSON AND GEORGE-ANN D. MAXSON, *Field Biology Program, Bell Museum, University of Minnesota, Minneapolis, MN 55455*. Received 1 Aug. 1980; accepted 10 Nov. 1980.

**Gray Partridge Trapping Techniques.**—Several researchers reported difficulty live-trapping Gray Partridge (*Perdix perdix*; Dziedzic in Wilbur 1967:25, McCrow 1977, Schulz 1978). Partridge are most easily captured in winter in grain-baited, walk-in traps. However, winter trapping success is related to snow depth, and little snow cover results in low trapping success (Dziedzic op. cit., McCrow 1977). Furthermore, winter-trapped Gray Partridge may not survive to spring and summer months—a period of intensive field research and interest to many biologists studying this species (Trego 1973, Schulz 1974, 1978, Hupp et al. 1980). To monitor seasonal habitat use by Gray Partridge in eastern South Dakota, it was necessary to develop techniques that could be used to trap partridge in all seasons.

We experimented with 5 trapping techniques—winter bait-trapping, decoy-trapping, nest-trapping, brood-trapping, and a net-firing gun. Decoy-trapping, brood-trapping, and use of a net-firing gun have not previously been described as trapping techniques for Gray Partridge. We earlier described a technique using hoop nets to successfully nest-trap 7 incubating Gray Partridge hens without causing abandonment (Smith et al. 1980). Although we did not experiment with night-lighting, Harris (in Wilbur 1967:26) reported some success with this technique. All techniques were tested on a 62-km<sup>2</sup> study area approximately 10 km northeast of Brookings, South Dakota. All birds were aged, sexed, banded, and released at the trap sites. No trap mortality was noted.

*Winter bait-trapping.*—We used modified "lily-pad" traps to bait-trap partridge in winter (Gullion 1965). Traps were constructed of 3 × 5 cm welded wire and were covered with cotton netting to prevent captured birds from scalping themselves. Potential trap sites were prebaited with cracked corn. A 2-m diameter "lily-pad" trap was placed over bait sites used by partridge. We made 47 captures and 7 recaptures in 35 trap-days in

January and February 1979 when snow depths were up to 56 cm. (One trap-day constituted one trap set for any portion of one day.) Only one bird was captured during 175 trap-days between January and March 1980 when snow depths were only 4 cm. Our findings support McCrow (1977) and Dziedzic (op. cit.) that winter bait-trapping success increases with increased snow depths.

*Decoy-trapping.*—We used a modified “cock and hen” trap (Reeves 1952) to decoy-trap partridge in late winter and spring. Decoy-trapping was used in March and April 1980; partridge were most easily trapped in mid-March. This method was used after covey break-up to lure unpaired birds and territorial pairs. Live partridge were maintained in  $1.1 \times 2.2 \times 1.0$  m chicken-wire holding pens on the study area where we had observed several groups of partridge. Double entrance Havahart traps (Havahart Trap Co., Box 551, Ossining, NY 10562) ( $18 \times 18$  cm) and funnel entrance traps ( $0.5 \times 0.5$  m) were placed against the outside walls of the holding pens. Wild partridge attracted to the decoy bird would circle the holding pen and enter a trap on the side of the pen. A live female partridge was placed in a pen to lure males and a live male partridge was used to lure females. Six captures and 7 recaptures were made in 44 trap-days using a female decoy. One capture and 2 recaptures were made in 35 trap-days using a male decoy. Although we were only able to trap male birds with this technique, male partridge accompany females throughout the breeding cycle and therefore provide valuable pair habitat use and movement information.

*Brood-trapping.*—We used Ruffed Grouse (*Bonasa umbellus*) brood traps (Liscinsky and Bailey 1955) to trap partridge in July and August 1979. One “lily-pad” trap was placed at each end of a  $17 \times 0.5$  m chicken wire lead. Partridge that encountered the lead moved along its length entering one of the end traps. Traps were placed along field borders that were used as dusting areas by partridge. Fourteen captures were made in 47 trap-days using this technique: 2 adults, 3 juveniles, and 9 newly hatched chicks.

*Net-firing gun.*—We made several capture attempts in each season using a net-firing capture gun (Mechlin and Schaiffer 1979). Attempts were made on foot and from a vehicle. The gun fires a triangular entanglement net and is effective up to 40 m. Capture attempts with the net-firing gun were unsuccessful because of misfires and misjudging partridge flight pattern. We do feel, however, that this technique has potential if the gun is refined and we become more familiar with its use.

Using winter bait-trapping, decoy-trapping, nest-trapping, and brood-trapping techniques we were able to trap 69 Gray Partridge. We feel that researchers using a combination of these trapping techniques should be able to trap Gray Partridge in all seasons.

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**Sex-ratio Adjustment in Malnourished Red-winged Blackbird Broods.**—Howe (1977) recently reported that differential mortality among nestling Common Grackles (*Quiscalus quiscula*) resulted in more females than males surviving to leave the nest. Because female grackles are smaller and, therefore, presumably require less parental expenditure than males, Howe's observation is consistent with the prediction that at the end of parental care the less expensive sex should be the more numerous (Fisher 1958, Leigh 1970, Trivers 1972). In this note we report another example of apparent differential mortality among nestlings which favors females, in this case in the sexually size-dimorphic Red-winged Blackbird (*Agelaius phoeniceus*).

*Study area and methods.*—We added two nestlings at hatching to nests assigned by a random process to 1 of 3 categories: (1) experimental nests in which brood size was increased from 3 or 4 to 5 or 6, respectively; (2) control nests in which nestlings were exchanged, but in which brood size remained the same; and (3) natural nests in which brood size was not increased and nestlings were not exchanged. All nestlings added or exchanged were the same age (within 1 day) as their new nest mates, and we assumed that they were an unbiased sample of the population's sex ratio. By 9 days of age, nestlings in all 3 treatments fell into 2 distinct size classes based on length of bill, body, 8th primary, tarsus, and wing (Cronmiller 1978). We classified the larger group as males and the smaller females, using the criteria of Holcomb and Twiest (1971). Both of these size/sex categories were homogeneous with respect to treatment for all measures of size except weight (Cronmiller and Thompson 1980). The fate of individual nestlings was followed to determine whether or not there were differences among nests in the numbers of young lost to predators or abandonment (whole-brood loss) and starvation (partial-brood loss). In the absence of direct evidence of the fate of missing young, we assumed that predators were responsible when all young disappeared from the nest before the 8th day of the nestling period (see Thompson and Nolan 1973:160–161, Nolan 1978:411) and that abandonment had occurred when nestlings that seemed to be healthy and vigorous the day before all died in the nest. Nestlings that disappeared were assumed to have died of starvation if earlier they had been less vigorous, smaller, and lighter than their nest-mates. The experiment was performed during the summer of 1977 in wet meadow and marsh of the Conesus Inlet Wildlife Management Area, Livingston County, New York (see Cronmiller and Thompson 1980).

*Results and discussion.*—Of 88 nestlings in experimental nests, 18 (20.5%) died of apparent starvation, in contrast to less than 1% of the nestlings in control and natural nests. Although females increased their feeding trips to experimental nests, they were unable to compensate proportionately for the increased brood size; as a result, their nestlings suffered greater mortality and weighed less at nest-leaving than did nestlings in natural and control nests (Cronmiller and Thompson 1980). Under conditions of resource limitation, fewer males than females should be produced, and, as expected, the sex ratio of nestlings at nest-leaving in experimental nests strongly favored females, although not