

The Cackle Call of Female Blue Grouse: Does It Have a Mating or Aggressive Function?

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The "quaver cry" or "cackle" is a vocalization given by female Blue Grouse (*Dendragapus obscurus*) on their breeding range during spring and summer. This paper summarizes research designed to test three hypotheses of the function of the cackle.

- (1) The cackle indicates a readiness to mate in females.
- (2) The cackle synchronizes the breeding cycles of males and females.
- (3) The cackle is an aggressive call, related to spacing behavior in females.

Stirling and Bendell (1970) advanced the first two hypotheses to account for the temporal association of the call with copulation in Blue Grouse. The call was hypothesized to be aggressive in nature because captive hens cackled when they attacked their mirror images (Stirling 1968, Stirling and Bendell 1970).

The research reported here is part of a more comprehensive study investigating the reproductive biology, behavior, and movement patterns of female Blue Grouse and their relation to population regulation (Hannon 1978). The study was conducted on the east slope of Vancouver Island, 16 km west of Courtenay, British Columbia in the spring and summer of 1976 and 1977.

Experiments were of two types: a series of transects designed to assess the temporal and behavioral response of males and females to the call, and experiments with individual hens to determine whether or not they would respond aggressively to a calling hen placed nearby.

Four transects were established along abandoned logging roads to determine how males and females responded to the cackle. A 5-min tape of a series of cackles was played at each of 5 stations situated at 400-m intervals along the transect. A mounted female was placed at the edge of the road. For 1 min prior to playing the tape, the total number of hoots (the song of territorial males), whoots (a single syllable call given by a male during courtship of a hen), and cackles was noted. The cackle tape was played and all responses of females recorded. After completion of the tape, additional male and female vocalizations were tabulated for 1 more min. I initiated experiments 1 h before sunset, a period when grouse activity is high (Bendell 1955), and surveyed each transect once weekly from 6 April to 2 June.

Another 40 trials were conducted from 13 April to 4 June, with individual hens found by a trained pointing dog. A trial consisted of withdrawing approximately 20 m from the bird, setting up a mounted female in a conspicuous position, waiting 20 min in silence, playing the taped cackle, and noting the hen's response.

Is the cackle a mating call?—If the cackle indicates a readiness to mate, then females must be in breeding condition when they give the call. I captured eight hens that had responded by cackling to the taped call and removed a sample of blood from each. Reproductive status was determined by measuring total plasma calcium (Hannon 1979). Six were in the rapid phase of gonadal recrudescence (i.e. were within 10 days of ovulation and could be sexually receptive), one was in the slow phase (i.e. not sexually receptive), and one was incubating.

To compare incidence of all cackles heard to events in the breeding season for hens in the population, I calculated the ages of captured juveniles (Zwickel and Lance 1966, Redfield and Zwickel 1976). I then backdated to determine the date of laying of the first egg and time of copulation for their parents (Zwickel 1977). Cackles were heard from early April to late May, with a peak from 5 May to 11 May (Fig. 1). This peak corresponds to peak copulation and the beginning of egg laying. The first cackling, however, was heard at least a week prior to the beginning of copulation and 2 weeks prior to the laying of the first egg, and ceased before copulations were terminated. Thus many, but not all, hens could have been ready to mate when they gave the call.

If hens use this call to attract males, then males should respond with courtship behavior, and hens should be receptive to them. During cackle transects, frequency of hooting stayed the same, but frequency of whooting increased after the tape was played (Table 1). Sixty percent of increases occurred at stations where hens called back to the tape. Clearly, males increase their courtship activity in response to the cackle.

I observed 13 instances in which a male in courtship display approached a cackling hen or was heard whooting or hooting nearby. Four hens ignored the males and continued calling, one flew away, and one

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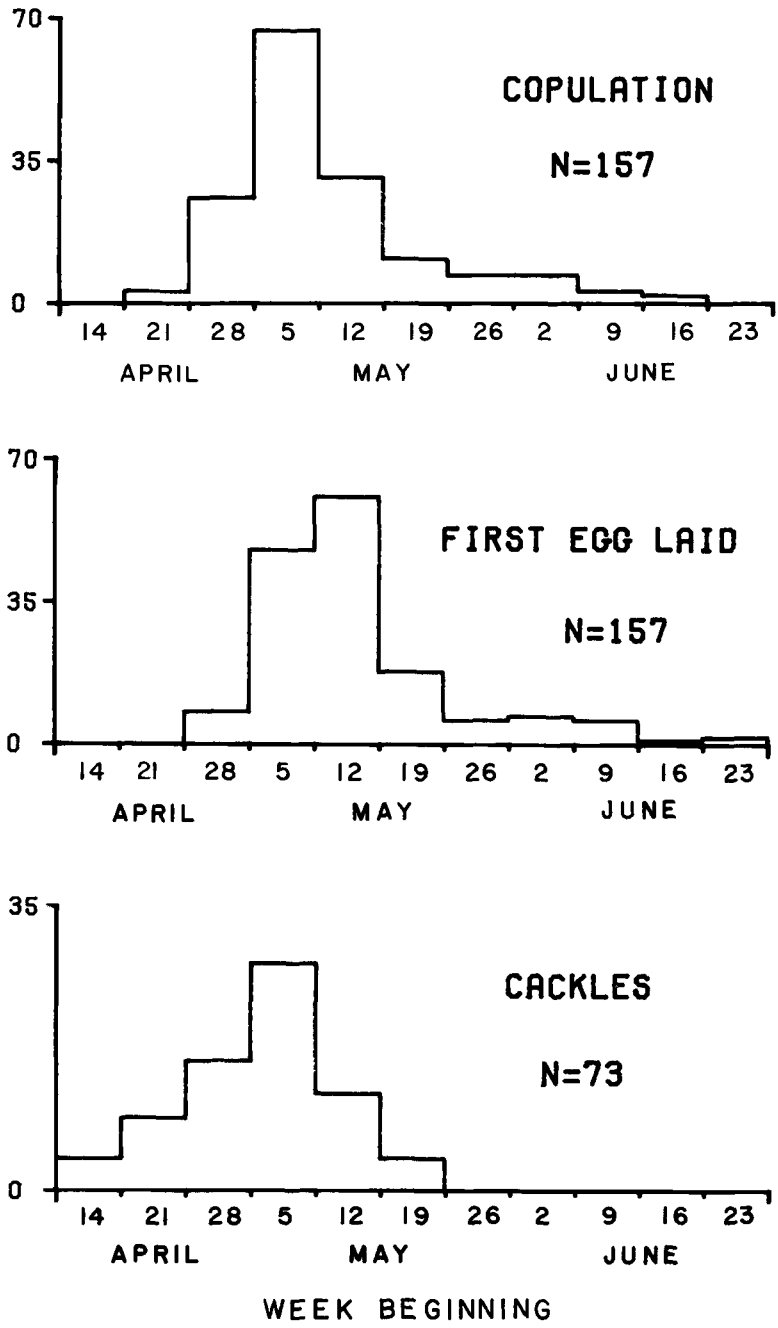


Fig. 1. Comparisons of the incidence of cackling to timing of copulations and dates when first eggs were laid; data from 1976 and 1977 combined.

ran away. Seven stopped cackling when a male began hooting nearby. From these observations, I conclude that, although males are attracted to females that cackle, these females are not necessarily receptive.

Does the cackle synchronize male and female breeding cycles?—If the cackle is a synchronizing call, then it should be heard before males reach breeding condition. Testes from adult males collected near

TABLE 1. Number of stations in which male vocalizations increased or decreased after a taped cackle was played.

	Increase	Decrease	P^a
Hoots	75	59	0.1591
Whoops	20	7	0.0091

^a Wilcoxin matched pairs signed ranks test.

Campbell River, B.C. were in breeding condition by the first week in April (Hannon et al. 1979). Adult males shot in the second week of April on my study area had testes in breeding condition (Lewis pers. comm.). The first cackles were heard during the third week of April and peak cackling occurred 2 weeks later (Fig. 1). Thus, it seems unlikely that the call synchronizes reproductive cycles.

Is the cackle an aggressive call?—Females do not appear to use the call to attract males. In fact, because hens readily answer the call and sing in duets in the wild, it seems to be directed toward other females. The cackle is given by many hens when they are close to ovulation. This period of rapid gonadal recrudescence coincides with the time when yearling hens restrict their movements around a potential nest site. Adult hens localize earlier than yearling hens, some as early as the third week in April (Hannon 1978). This period of localization overlaps that of cackling.

Female Spruce Grouse (*Canachites canadensis*) reply to an aggressive female call only when established on territories (Herzog and Boag 1977). Perhaps female Blue Grouse use the cackle to advertise occupancy of an area and to warn away other hens.

In the laboratory, female Blue Grouse have attacked their mirror images (Stirling 1968). In the 40 trials I conducted with individual hens, none attacked the female model. Thus, either hens are not overtly aggressive in the wild or my experiments were not natural enough. Perhaps birds attack only when threatened by the close proximity of another bird, such as in the laboratory experiments. A high frequency of overt aggression may not be necessary to cause spacing of birds. Calls may function as a warning, and females may space themselves by mutual avoidance.

An interesting feature of the call is that it is heard only in April and May. Hence, its function must be specific to events occurring during this time. Two major processes take place during spring: population regulation and copulation. These processes overlap in time. Thus, aggression or spacing behavior can occur when a bird is in breeding condition, and the hormones controlling these behaviors may be produced at the same time.

I have demonstrated that the cackle is unlikely to be a mating call. The hypothesis that the call has a warning function and serves to space hens, however, needs more rigorous testing. For example, the call could be played at various sites on one area. If the call should serve to warn away other females, then the density of hens on this area should be lower than on an area where the tape was not played. If the call were indeed aggressive, then its periodicity and frequency could be used to establish the timing of population regulation and the level of aggressiveness among females.

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First Records of the Spotted Rail (*Pardirallus maculatus*) on the Island of Hispaniola

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On 17 April 1978, a bird watcher from San Francisco de Macoris brought a live rail to me for identification. He had purchased the individual from some boys who had captured it in a patch of grass in the center of a freshly plowed field (never before cultivated) at Madre Vieja, near the town of Nagua, Province of Maria Trinidad Sanchez, in the Dominican Republic.

My identification of the bird as a Spotted Rail (*Pardirallus maculatus*) was later confirmed by George Reynard and John Clements, who both saw it alive. A second bird, a male with enlarged testes, was taken in the same area on 29 June 1978 and was made into a study skin. A second specimen, taken alive at the edge of a rice field in Pimentel on 3 January 1978, died in captivity on 15 March 1978 and was injected with formalin. The two specimens are in the collection of the Museo Nacional de Historia Natural in Santo Domingo (MNHN #936 and MNHN #966). Upon investigating the general area where the birds were found, I learned that the Spotted Rail is also known from Cotuí, Rincón, municipality of San Francisco de Macoris, and Limón, all in the Yuna River basin, one of the principal rivers of Hispaniola.

George E. Watson has examined the specimens and reports that they are identical in color with Cuban and South American specimens, not with the darker, browner Central American population (*P. m. insolitus*). Although Parkes et al. (1978, *Amer. Birds* 32: 295) found that Cuban birds tended to have longer bills than South American birds, the two Hispaniolan birds have short bills (45.5 mm, and broken). Because of the variation in color and pattern as well as in bill length in Greater Antillean birds, Watson (1962, *Wilson Bull.* 74: 349; pers. comm.) does not recognize *P. m. inoptatus*.

Recent new records of the wanderings of Spotted Rails in the United States, Chile, Bolivia, and western Mexico (Parkes et al. 1978, *Amer. Birds* 32: 295) might suggest that Hispaniolan birds were vagrants or newly arrived colonists from Cuba, but Storrs Olson (pers. comm.) has examined bones from old cave deposits in the Dominican Republic that he has tentatively identified as *Pardirallus*. Allen Keith (pers. comm.) also reported an unconfirmed sighting of a Spotted Rail along the Black River, about 7 km inland in Jamaica, a location at which the bird was thought to be extinct (Bond, 1956, *Check-list of birds of the West Indies*, Philadelphia, Acad. Nat. Sci.). Because this species is hard to see and even harder to collect, it is likely that it has been an overlooked, long-time resident on Hispaniola.

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A Nest of the White-plumed Antbird (*Pithys albifrons*) in Surinam

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The White-plumed Antbird (*Pithys albifrons*) is one of the birds that follows army ants in the undergrowth of northern South American forests. In Surinam, breeding records involve only collected speci-