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David Urban
Southern Illinois University

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ASPECTS OF BOBWHITE QUAIL MOBILITY DURING SPRING THROUGH FALL MONTHS

David Urban, Research Assistant, Cooperative Wildlife Research Laboratory, Southern Illinois University, Carbondale

Abstract:

The mobility of bobwhite quail was studied on an 1160-acre nonhunted area in southern Illinois during March through November. Seventy-eight quail (39 adult males, 29 adult females and 9 young of the year) were radio instrumented. Radio locations totaled 2,302 during 1,726 days in which quail were radio marked. Increase in average monthly range from March to April was attributed to change in habitat preference. Considerable variation in monthly ranges during the period of June through August were noted and attributed to variations in breeding status of individual birds. An increase in monthly ranges during October was associated with covey formation.

Past research on mobility of bobwhite quail has produced conflicting data. Although some studies have shown bobwhite to be quite sedentary (4,10), others have shown them to be capable of moving considerable distances (2,3,5,7,11).

In an attempt to clarify mobility during the spring-through-fall months, several authors have tried to relate movements to a particular time of the year. Loveless (7) concluded that there was no special increase in movement during the spring, but that bobwhite were highly mobile during the summer months. In contrast, Lewis (6) and Murphy and Baskett (8) in Missouri found movement in the spring to exceed that of summer. Movements in the fall are also exemplified by conflicting data. Agee (1) found that coveys often established their winter ranges within 100 yards of their hatching point. Duck (3), Lehman (5), and Loveless (7) on the other hand showed a definite shift from fall to

winter ranges. Duck (3) attributed this shift from summer to winter ranges to differences in habitat preference. Lehman (5) and Loveless (7) found no such correlation.

This study was initiated to clarify some of the aspects of bobwhite mobility during the spring-through-fall months and to indicate some of the reasons for increased mobility.

Study Area

A single 1,160-acre tract of Southern Illinois University farmland, which was not subjected to hunting and was not managed for quail, located in Jackson County, Illinois, served as the study area.

Twenty-seven % of the study area consisted of idle land (12% woods, 11% brushy areas and 4% weedy areas). Corn was grown on 45% of the area. Virtually all corn was mowed or plowed in the fall.

Populations of quail on the area were extremely low during the study. Spring populations varied from 65 to 99 birds, and fall populations from 96 to 274 birds.

The author acknowledges W. D. Klimstra and J. L. Roseberry for their supervision and encouragement during the course of the study. This publication is a contribution of Project No. 1: Cooperative Wildlife Research Laboratory and the Illinois Natural History Survey, cooperating; included are certain data being gathered for a doctoral dissertation, Department of Zoology, Southern Illinois University.

Methods and Materials

Quail were captured in wire traps (10, p. 447) baited with cracked corn in the fall and spring and with decoy hens during the summer. To determine movements, 78 quail (39 adult males, 29 adult females and 9 young-of-the-year) were equipped with radio transmitters. Radio locations totaled 2,302 during 1,726 days that quail were radio marked.

Locations of instrumented quail were determined by triangulation with the aid of a Model LA-11 AVM receiver and a Model 28 Hi-gain antenna. Locations were usually taken once daily at random periods, except during the period of 28 July to 30 September 1969, at which time radio locations were recorded at hourly intervals over a 4-hr period each day.

To determine monthly ranges, radio locations of each marked quail were plotted according to month. The area encompassed by a line connecting the least number of outermost fixes, but which still included all the other fixes of an animal, was defined as that animal's monthly range. Only those quail which were radio-tracked for 7 or more days were included. Radio locations were grouped according to the type of habitat in which the birds were found for an index of habitat usage.

Breeding status was determined by observing each marked quail at least twice weekly. Thus quail were categorized as to being in a covey,

mated, or unmated; mated quail were further categorized as to nesting or with a brood.

To determine significant differences between means, we employed the t test for independent sample means.

Results and Discussion

Early Spring Period

The ranges in March ($\bar{X} = 14.3$ acres) were significantly smaller ($P < .05$) than ranges in April ($\bar{X} = 32.6$ acres). The increase in mean size of range from March to April was not attributed to covey breakup but to a shifting or expanding of March covey ranges during April. This in turn was related to a change in habitat utilization. There was a noticeable decrease in use of wood and brush cover and a corresponding increase in use of weed cover from March to April (Table 1). Coveys whose March ranges consisted only of fencerows or wood and brush areas shifted ranges completely in April. Coveys that had sizeable weed areas in their March ranges simply used the weed area within their range and did not shift.

It must be emphasized that a sizeable weed area was necessary to prevent shifting of ranges. Although data were too few to determine actual size of weed areas needed, it was noted that weed fencerows bordered on both sides by cropland, power line right of ways, and isolated patches of weed areas in brush cover were not adequate to prevent shifting, while weed areas of approximately 5 acres or more did. This is in accord with Roseberry's study (unpubl. manuscript) of the habitat surrounding nest sites. He found isolated weed areas were seldom used for nesting.

The fact that mobility of the bobwhite during the spring was closely related to habitat quality may in part explain previous conflicting data in regard to spring movement. Loveless (1958) noted little mobility on an area managed specifically for quail, while Murphy and Baskett (1952) reported a great deal of mobility on an area that was not the best quail range.

Late Spring and Summer Period

Considerable variation in monthly ranges occurred during May through August and was attributed to breeding status of individual birds (Table 2). The average monthly range of mated cocks (22.9 acres) was significantly less ($P < .05$) than that of unmated cocks (41.0 acres). These differences were also reflected in hourly movements as mated cocks moved significantly less ($P < .01$) per hr (178 ft/hr) than unmated cocks (320 ft/hr). It must be emphasized, however, that high mobility was not limited to unmated males. On 3 occasions mated males were known to move more than 0.5 mile from their center of activity. Two of these movements were to decoy hens in cock-and-hen traps. In all instances, the male's mate was believed to be incubating.

Slight differences in monthly ranges were noted between females, but data were too few to provide definite conclusions (Table 2). During the nesting period, monthly ranges of females averaged 16.0 acres. Distribution of their radio locations did not occur randomly throughout their range. In each case at least 50% of the radio locations could be included within a 3-acre area.

Two hens moved considerably after their nests were terminated prematurely. One moved more than 1.25 miles from her nest site and encompassed 115 acres during the 30 days after her nest was destroyed. The other hen shifted her range slightly after abandoning what was believed to be her second nest attempt.

Fall Period

Sixteen quail in 10 coveys were radio tracked from August through November. Data did not indicate a major dispersal. Only 2 of 8 coveys showed a complete shift in ranges from 1 month to the next although the maximum distance between any 2 radio locations for a covey averaged over 0.5 mile during this period. The other coveys only expanded their ranges; this expansion came during October in virtually every case, followed by a contraction in November (Table 3). The reason for the increase in October did not appear to be related to change in habitat utilization or to crop harvest. This expansion seemed to be a behavioral mechanism with which coveys expanded their ranges to associate with neighboring coveys. Only 1 of 8 coveys radio tracked during October failed to exhibit this type of behavior; this was a brood that did not hatch until late September.

Conclusions

There were a number of variables that contributed to increased movement of bobwhite during the spring-through-fall months. Coveys that had interspersed heavy and open cover within their range utilized significantly smaller ranges in the spring than did other coveys.

Mated cocks had significantly smaller ranges than unmated cocks. Nesting females showed smaller ranges than those females whose nests were terminated prematurely.

The increase in area utilized during fall was possibly related to low population levels. If coveys expand their ranges during the fall simply to meet other coveys, this increase might be less pronounced in areas of high population density.

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Table 1. Habitat types utilized by bobwhite quail during March and April, Southern Illinois University Farm.

	Percent utilization					
	Wooded areas	Brush	Weed areas	Pasture	Grass fencerows	Wooded fencerows
March	17	21	19	13	14	15
April	12	8	52	14	10	4

Table 2. Mean size of bobwhite quail monthly ranges in relation to breeding status, May through September, Southern Illinois University Farm.

	$\bar{X}$ Acres	N	SD
Mated males	18.7	11	12.5
Unmated males	41.2	9	23.5
Nesting females	15.8	5	9.5
Post nesting females	38.5	4	22.6

Table 3. Mean size of bobwhite quail monthly covey ranges, August through November, Southern Illinois University Farm.

	August	September	October	November
	Acres			
$\bar{X}$	21.1	22.9	41.0	22.6
N	4	7	11	7
SD	14.9	16.9	17.6	4.2

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A STUDY OF BOBWHITE QUAIL NEST INITIATION DATES, CLUTCH SIZES, AND HATCH SIZES IN SOUTHWEST GEORGIA

Ronald C. Simpson, Georgia Game and Fish Commission, Albany, Georgia

Abstract:

Nest initiation dates, size of clutches, and proportion of eggs hatching are presented for a high-density bobwhite quail (Colinus virginianus) population studied from 1967 through 1971 in southwest Georgia. Initiation dates were known for 680 nests that were active when found; of these, 379 nests (56%) were initiated before 16 June. Nesting success (percentage of all nests producing chicks) was low for these nests. Of 171 successful active nests with known initiation dates, only 38 (22%) were initiated before 16 June.

Mean monthly clutch size decreased from March (25.0) to August (9.4). The mean clutch size for all nests was 12.0. The number of eggs hatching per nest also decreased from March (20.0) to August (8.4) with a mean of 9.9 eggs hatching for all nests.
