Changes of Covey Affiliation by Bobwhite Quail in Tennessee

Noel S. Yoho

Ralph W. Dimmick

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Noel S. Yoho[1] and Ralph W. Dimmick, Department of Forestry, the University of Tennessee, Knoxville

Abstract:

This study was conducted on a 214-acre area of the Ames Plantation, Fayette County, Tennessee. Information on behavior of bobwhite quail (Colinus virginianus) during winter was obtained through flushing, trapping, color-marking, and telemetering quail during January-March, 1970. Interchange of quail between coveys was common; at least 20 incidences of change in covey affiliation were recorded. An average covey lost and gained a member every 3 days. Rapid replacement of birds lost from covey ranges was attributed to communication between coveys.

The degree to which bobwhite (Colinus virginianus) coveys retain the integrity of their membership has been discussed by several authors. Stoddard (6:169) noted changes in covey composition in southeastern United States, but believed that quail attempted to remain with a given covey. Harvey (3) concluded that exchange of individuals between coveys in Virginia may be common throughout winter. In a population of quail in Iowa with density sufficiently low that covey ranges did not overlap, individuals did not change coveys (1,2). The fact that covey ranges overlap, however, does not necessarily indicate that interchange will occur. Murphy and Baskett (4) investigated coveys in Missouri with overlapping ranges and concluded that individuals did not change their covey affiliation during the study period.

This paper estimates the extent of interchange of quail between coveys in a moderately high density population in southwestern Tennessee. A discussion of the biological significance of changes in covey affiliation by quail is offered.

The Study Area

The study area was located on the Ames Plantation, an 18,600-acre tract in Fayette and Hardeman counties, Tennessee. Quail behavior was studied on a 214-acre plot within a quail management unit. A census conducted immediately prior to this study (December, 1969) revealed a density of 1 quail per 2 acres on the study area. At the termination of the study the population had declined to 1 quail per 2.4 acres.

Methods and Materials

Quail were live-trapped on the study area, and marked with radios or colored back streamers, and released at the point of capture (7). Coveys containing a telemetered bird were located at 2-hour intervals

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[1] Present address: International Paper Company, Camden, Arkansas.

diurnally. The bird was approached to within 30 to 70 yards as indicated by signal intensity and then circled to discern its exact location. Each captured covey was assigned 1 of 6 easily discernible colors of back streamers. Systematic searches were conducted to flush coveys on the study area; data recorded at each flush included the number of birds seen, color of streamers seen, if any, and flush location and landing site of coveys.

Results and Discussion

Density of quail on the area was sufficiently high that several coveys often utilized a unit of habitat in a fashion resulting in great overlap of their ranges. Our efforts to define individual covey ranges and to evaluate preferences for specific cover types were repeatedly complicated by shifts of individuals from one covey to another. Observations of color-marked birds, data obtained from telemetered birds, and counts of covey size at time of flushing all supplied evidence of interchange of quail between coveys.

Despite the transitional quality of its membership, each covey unit displayed rigid fidelity to its home range. Only once did a covey wander across a range perimeter previously established by a week or more of telemetry data. Flushed birds were never observed to fly across established range boundaries. However, the number of birds counted at flush for each covey fluctuated irregularly as winter progressed (Fig. 1). Stoddard (6:170) and Rosene (5:96) noted similar changes in size of coveys.

Changes in Covey Affiliation by Banded, Color-marked Quail

In the southeast portion of the study area we banded and color-marked 16 quail in Covey 1, 15 quail in Covey 3, 8 quail in Covey 4, and 13 quail in Covey 5. Of the 52 birds banded in these 4 coveys, 24 were recaptured at least once. Ten of these were recaptured after changing covey affiliation; 1 quail was captured in 3 different coveys. Quail captured in 2 or more coveys included 3 adult males, 3 juvenile males, 1 adult female, and 3 juvenile females. These 10 quail were recaptured over an average span of 40 days. The 14 quail recaptured each time in their original covey were followed over an average of 25 days.

Observation of color-markers during covey flushes in the southeast portion of the study area provided additional information on interchange of quail between coveys. Covey 1 was flushed 11 times, Covey 2 11 times, Covey 3 17 times, Covey 4 8 times, Covey 5 6 times, and Covey 6 16 times.

In 5 instances the number of color-marked quail observed to have shifted covey affiliation was greater than the shift indicated by trapping records. Nine color-marked quail changed covey affiliation but were not recaptured during their association with the second covey. We recorded a total of 20 incidents of banded and color-marked quail changing affiliation (Fig. 2).

Changes in Covey Affiliation by Telemetered Quail

Four of 13 birds carrying functional transmitters changed coveys during the period of observation. Although it is possible that transmitters on quail affected their behavior, our data indicated that telemetered quail were not noticeably deviant in behavior after rejoining a covey. Telemetered birds were always with a covey after having rejoined one. Also, telemetered quail were not readily recognizable from other quail during any of 35 covey flushes involving a telemetered bird. Since behavioral patterns of harnessed quail did not seem to deviate greatly from the norm, a crude estimate of the rate of interchange of quail between coveys could be obtained. We derived this estimate by dividing the 148 days birds carried transmitters (13 birds-average 11 days/bird) by the 4 times that harnessed quail changed coveys. These quail then, changed coveys once every 37 days. By this estimate an average covey of 13 birds would lose and gain a bird roughly every 3 days.

Mechanism of Covey Interchange

Rapid replacement of missing birds on covey ranges was believed common. On several occasions coveys from which a number of birds were trapped and held captive were near original size the following day prior to the release of trapped members. A marked decrease in the number of color-marked quail often occurred from 1 day to the next without a corresponding drop in covey size. However, a corresponding increase in the number of these color-marked birds in other coveys was not observed. Quail probably did not often lose color-markers in such a short time, but the fate of these birds was not determined.

This consistent, rapid replacement of birds between covey ranges suggests that replacement may be facilitated through communication between quail. Often members of several coveys give covey calls simultaneously. Perhaps members of coveys which have been reduced in size issue characteristic calls which signify their desire to join or be joined by other individuals. Quail separated from coveys may be attracted to these coveys by recognizable characteristics of the covey call.

Conclusions

Fluidity in covey membership apparently occurs most in populations of quail that are dense enough to provide considerable overlap in covey ranges. The adaptive advantage of this fluidity may be important. The observed receptivity of coveys to "newcomers" serves to prevent excessive and uneconomical strife and aggression that might otherwise occur in dense populations. Efficient exploitation of food resources and spatially close units of favorable cover is thus enhanced. As winter progresses and covey sizes are reduced through mortality, this phenomenon of interchange may maintain adequate covey size in those coveys occupying superior habitat units within the range.

Because bobwhites do not normally move long distances in their daily or annual travels, adjustments in home range will likely be small and

internal to the population. Large scale emigrations or immigrations will not occur, though translocation of individuals or groups of quail across borders between good habitat and poor habitat may be significant.

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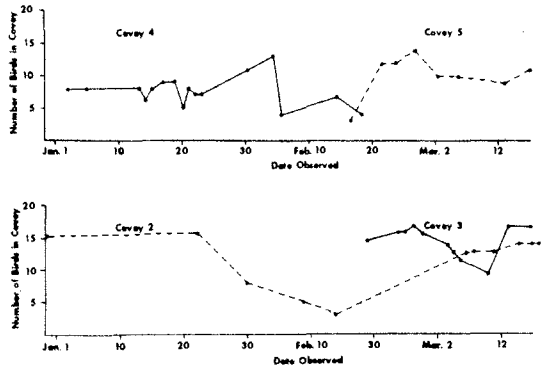

Fig. 1. Variation in size of four coveys observed during winter, 1970 on Ames Plantation.

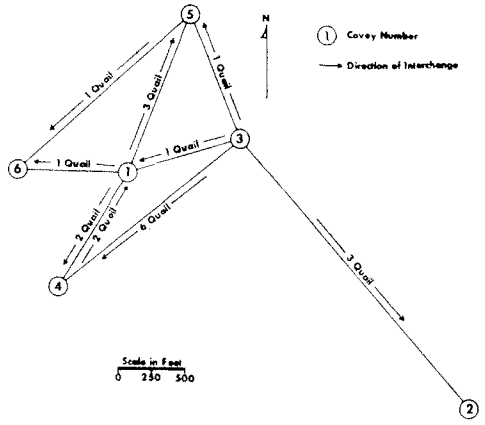

Fig. 2. Interchange of quail between coveys during winter, 1970 on Ames Plantation. Circled numbers represent activity centers for covey units.