

TERRITORIAL STABILITY IN SHARP-TAILED GROUSE

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RETURN of individual males to the same small "sexual territories" (Nice, 1941) within a lek on successive days of a breeding season has been documented for the Sharp-tailed Grouse (*Pedioecetes phasianellus*) (Grange, 1948) and other closely related lek species (reviewed in Lumsden, 1965). There are fewer reports of individual males utilizing the same territories within a given lek for more than one season. Such a return to the same particular display area implies a high degree of behavioral stability, a condition which, when present, is of relevance to recent suggestions (Wynne-Edwards, 1962; Lumsden, 1965) concerning the possible importance of social organization in the regulation of population density of these species.

In the Lesser Prairie Chicken (*Tympanuchus pallidicinctus*), Copelin (1963) has reported that 15 out of 17 males studied used the same display territories on two successive years, and that some birds also used these same territories during the brief fall display period.

METHODS

Male Sharp-tailed Grouse were trapped on a lek located on untilled pasture land 20 miles southeast of Provost, Alberta, by flushing them into two 3.94 inch mist nets placed along two edges of the area. A numbered aluminum leg band, and a colored neck band made of vinyl plastic and measuring $0.062 \times 0.5 \times 9$ inches, were placed on each trapped male. By fusing one of six different colors of plastic to one end of each neck band, it was possible to provide each male with a different color combination. When in place, the visible ends of the neck bands were approximately one inch long. Ten males, from a total of 20 on the lek, were color marked in the spring of 1959.

Small wooden pegs, placed on the lek in the form of a grid at intervals of 14.3 feet, were used as guides to determine the locations of displaying males. Movements of individual color-marked males were recorded on maps. Points along territory boundaries were determined by the positions taken up by two males when they exhibited threat behavior directed at each other from essentially stationary positions (see Hinde, 1961). A line constituting the outermost margin of all such points for a given male was used to delineate the territory boundary.

Observations were made from a blind set up at the periphery throughout the early morning display periods for a total of 18 days in the spring and fall of 1959 and spring of 1960. The number of points used to plot the spring territories ranged from 51 to 130 in 1959 and 37 to 57 in 1960.

Twenty-six colored boards, measuring 1 inch \times 4 inches \times 3 feet were distributed over the lek in the spring of 1959. In late May of 1960, these boards, which could have served as territory markers, were displaced laterally, and the subsequent locations of the territories were determined.

RESULTS

Of the 10 males that were color marked in the spring of 1959, five returned to the same lek in the spring of 1960. The other five males were not

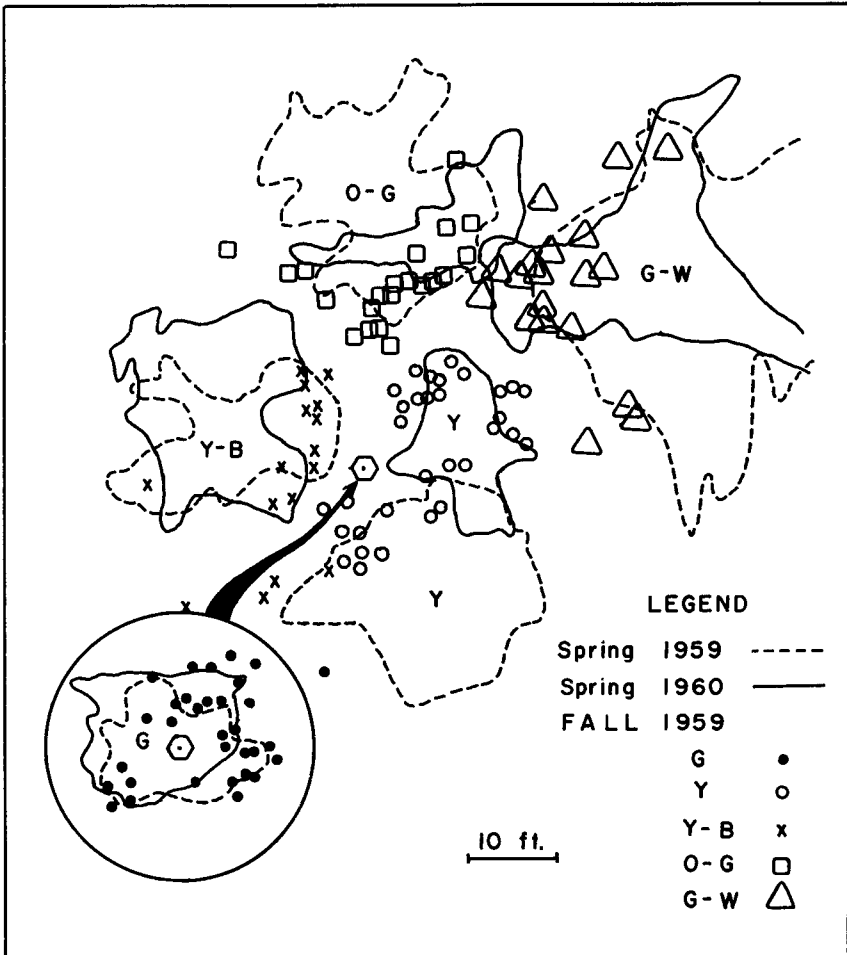


FIG. 1. Territories occupied by five color-marked Sharp-tailed Grouse males on the same lek over two successive years. All territories drawn to the same scale. The arrow indicates the true position of the center of the territory of Male G. Territories were contiguous, each of the five territories shown being surrounded by those of other males (not shown) with the exception of the peripheral portions of the territory of G-W.

seen on any nearby leks in 1960 and so may have suffered over-winter mortality. The territories occupied by the five color-marked males present in the springs of 1959 and 1960 are illustrated by the broken and solid outlines shown in Figure 1. It is evident from Figure 1 that minor variations in the locations of boundaries occurred between years for all males. However, with the exception of Male Y, whose territory shifted approximately 25

feet towards the center of the lek, the positions of the territories, relative to the lek as a whole, were similar in the two years.

The locations of points representing the positions of territorial boundaries in the fall of 1959 are indicated for each of the five males by the various symbols plotted in Figure 1. Although the number of these points was necessarily small relative to the sample sizes obtained in the spring, it is apparent that the males occupied portions of essentially the same territories in both the spring and fall. The data for Male Y indicate that the shift in the territory of this male occurred in part during the fall period.

Displacement of the colored boards was done in late May of 1960, after the above observations were completed. There was no indication that the territories of any color-marked males were altered as a result of this manipulation, which suggests that the colored boards did not constitute the necessary landmarks used by the males in maintaining their territory boundaries.

DISCUSSION

Stability of territories indicates the existence of suitable landmarks that can be used over successive seasons. The lek observed in the present study was located in untilled pasture land which is covered with short tufts of sage interspersed with shallow, narrow depressions apparently denuded by the repeated action of the displaying grouse. Since the displacement of the boards which could have served as artificial landmarks had no effect on the positions of the territories, it is probable that the birds were orienting primarily to the many cues provided by the natural habitat.

It should be emphasized that the stability and permanence of territories described above does not necessarily imply a similar degree of stability on leks of different sizes, or for those located in different types of habitat. For example, Hamerstrom and Hamerstrom (1955) have described an apparent lessening of stable social organization on large leks of the Greater Prairie Chicken (*Tympanuchus cupido*) (see also Grange, 1948; Lumsden, 1965). The territorial permanence observed in the present study cannot therefore be considered typical of all leks. The present results do, however, indicate that a high degree of stability can arise under appropriate conditions of lek size and natural landmarks, and as such provide a basis for comparison with other populations exposed to different conditions of habitat and density.

The lek observed in the present study is apparently an example of what Lumsden (1965) has called the "classical" lek situation, in which the display ground is characterized by a high degree of territorial stability. This author (loc. cit.) has pointed out that the restriction of mating to a limited number of males on such leks tends to decrease the variability of the offspring. In addition, the quality, and hence survival of offspring may possibly be in-

fluenced "through selection of certain cocks for mating. . ." (Lumsden, 1965:65). The long-term maintenance of territorial tenure observed in the present study indicates that the territorial stability characteristic of the "classical" lek situation may in some instances extend beyond a single season. Such an extension of territorial stability introduces a strong conservative influence in the social behavior of this species that presumably would act to further reduce the variability of offspring between successive years. Similarly, it would tend to enhance any effects on survival that the highly selective mating system of the "classical" lek might entail.

SUMMARY

The territories of color-marked male Sharp-tailed Grouse were determined by mapping the locations of threats directed across territory boundaries. Of 10 males banded in the spring of 1959, five returned to the same lek the following fall and spring. The positions of territories of these males were essentially the same in both the spring and fall of 1959 and, with one exception, again in the spring of 1960. This stability, which apparently depended on the year to year use of natural landmarks, indicates a conservative tendency in the social behavior of this species that may influence genetic variability and survival.

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