

# DISTRIBUTION OF BREEDING MALE SAGE GROUSE IN NORTHEASTERN UTAH

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Leks are of central importance to the life cycle of the Sage Grouse (*Centrocercus urophasianus*). When a lek or its surrounding habitat is altered or destroyed, Sage Grouse breeding often is reduced or ceases altogether, leading to poor recruitment and population decline (Patterson 1952, Rogers 1964, Peterson 1970, Wallestad 1975, Tate et al. 1979). To identify areas in the vicinity of a lek used by females for nesting and brooding and by males for feeding and loafing (day use), many studies have investigated the movements and distribution of breeding Sage Grouse (Klebenow 1969, Wallestad and Pyrah 1974, Wallestad and Schladweiler 1974, Rothenmaier 1979, Emmons 1980, Schoenberg 1982). With the exception of a brief treatment by Schoenberg (1982), no attempt has been made to determine if these areas change or remain the same from year to year. Information of this nature must be known if wise decisions are to be made concerning Sage Grouse habitat alteration or destruction.

We undertook this study of breeding male Sage Grouse (1) to determine if birds show an affinity for the same day-use areas from year to year, and (2) to compare the distribution and movement patterns of Utah birds to those of other states.

## STUDY AREA AND METHODS

The lek under study is 8 km north of Duchesne, Duchesne County, northeastern Utah, at an elevation of 1547.7 m (see Ellis 1984 for map). The vegetation of the nearly flat area is dominated by Big Sagebrush (*Artemisia tridentata*) and cactus (*Opuntia*) interspersed with open areas of mustard (*Brassica*). Mean annual rainfall is 223.8 mm; mean annual temperature, 6.8° C. The average annual frost-free period is 113 days. The area was severely overgrazed in the past, resulting in an almost total lack of native grasses and forbs. Crude oil production and localized winter sheep grazing are the major economic activities in the area.

We used radio telemetry to determine the spatial and temporal distribution of male Sage Grouse. Between 19 March and 16 May 1983 and 21 and 24 March 1984, we trapped male grouse, using a spotlight and long-handled net (Giesen et al. 1982), as they roosted on the lek. Captured grouse were fitted with radio transmitters attached to either poncho collars (Amstrup 1980) or to "necklaces" (Biotrack, Sawtrey, United Kingdom). Radio-tagged grouse were located 1 to 3 times per day (2 to 4 days per week) between 2

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April and 25 May 1983 and 2 April and 17 May 1984. Because of mortality and transmitter failure during the study, we did not find all birds each day monitoring was done. We began locating the grouse by triangulation typically 1/2 to 1 hour after they left the lek and terminated no later than 2 hours prior to sunset. To receive the signals we used either a dual 4-element Yagi null-peak antenna or a single 4-element Yagi. Both antenna systems were attached to a Telonics TR-2 receiver. All angles were adjusted for previously determined bias (Springer 1979) and plotted on a 7.5-minute series U.S. Geological Survey map. Each 2.56 km<sup>2</sup> of the map was divided into 36 equal cells and each radio location was classified into the cell that encompassed the majority of the error polygon. At the end of each monitoring day, we calculated grouse use for each cell by the following formula:

$$\text{Amount grouse } x \text{ used cell } y = \frac{\text{number of times grouse } x \text{ is in cell } y}{\text{total number of locations for grouse } x}$$

At the end of each field season these data were summed for all birds, across all cells. These data were then transformed to obtain percentage of grouse usage per cell by means of the following formula:

$$\frac{\text{number of grouse use days per cell}}{\text{total number of grouse use days}} \times 100$$

Grouse were periodically flushed to determine if radio-tagged grouse were associating with other male grouse from the lek.

## RESULTS AND DISCUSSION

In 1983, 8 males (7 adults, 1 juvenile) were monitored on 27 days, resulting in 78 grouse use days. In 1984, 10 males (adults) were monitored on 18 days, resulting in 130 grouse use days. Primary day-use areas during both years were north of the lek. Although the same area was used during both years, core areas (> 5% use) during 1984 shifted (by 0.4 to 0.5 km) to the west of those used during 1983 (Figure 1).

In both years, lengths of dispersal flights were typically 0.5 to 0.8 km. The longest flights recorded in 1983 and 1984 were 2.1 and 1.9 km, respectively. These data are comparable to those of other investigators. Carr (1967) reported that males had a maximum cruising radius of 1.4 to 1.8 km from the lek at his study area. Wallestad and Schladweiler (1974) reported that movements of males of up to 1.3 km from a lek were common and that 82% of all movements were greater than 0.3 km. Rothenmaier (1979) found that 64% and 86% of the radio locations of males using the "section 17 strutting ground" were within a 1.0- and 1.2-km radius, respectively. Emmons (1980) stated that dispersal distances to day-use areas of 0.2 km were common and that 67% of all day-use areas were over 0.5 km from the lek. Schoenberg (1982) found that daily movements of males to day-use areas averaged 0.9 km (range 0.03 to 2.4 km).

After arriving at feeding and loafing sites, birds remained fairly sedentary. Observations coupled with radio locations revealed that, if not disturbed,

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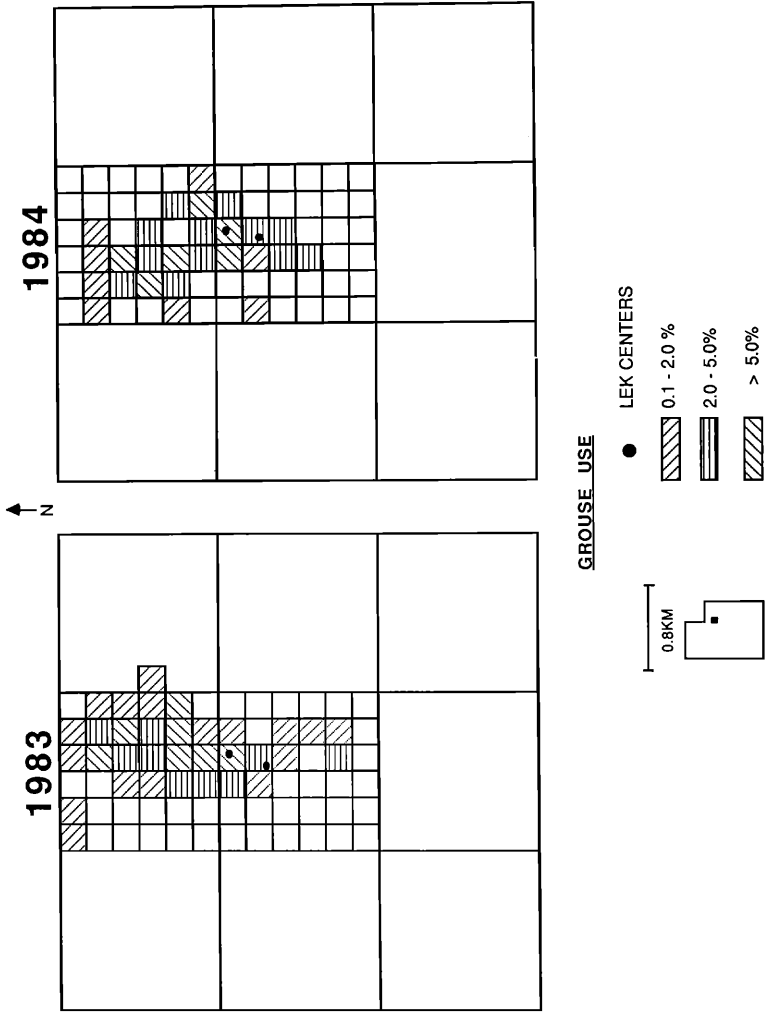


Figure 1. Distribution of radio-tagged Sage Grouse near Duchesne, Utah, in 1983 and 1984.

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birds seldom moved more than 0.2 km between 0900 and 1500. Birds often moved back toward the lek 2 hours before sunset. If disturbed while in day-use areas birds would flush and commonly fly beyond 0.8 km. Similar behavior was reported by Emmons (1980). Radio-tagged grouse were commonly with 15 to 30 other grouse when flushed.

The nonrandom dispersal patterns of breeding male Sage Grouse to day-use areas reported here are similar to those found by Rothenmaier (1979) in Wyoming, and by Emmons (1980) and Schoenberg (1982) in Colorado. These patterns are most likely the result of habitat selection for certain sagebrush characteristics (Schoenberg 1982, Ellis et al. unpubl.). None of these studies, however, intensively monitored the same lek from year to year to see if similar patterns persisted.

On the basis of similar dispersal distances and distribution patterns, we believe that breeding male Sage Grouse in other areas most likely continue to select the same day-use areas year after year. Such areas, once identified, should be protected to the greatest extent possible. Alteration of these areas may cause abandonment of a lek.

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### LITERATURE CITED

- Amstrup, S.D. 1980. A radio collar for game birds. *J. Wildlife Mgt.* 44:214-217.
- Carr, H.D. 1967. Effects of sagebrush control on abundance, distribution, and movements of Sage Grouse. Colorado Game, Fish, Parks Dept. Job Compl. Rep. W-37-R-20, Job 8a.
- Ellis, K.L. 1984. Behavior of lekking Sage Grouse in response to a perched Golden Eagle. *W. Birds* 15:37-38.
- Emmons, S.R. 1980. Lek attendance of male Sage Grouse in North Park. Colorado. M.S. thesis, Colorado State Univ., Fort Collins.
- Giesen, K.M., Schoenberg, T.J., and Braun, C.E. 1982. Methods for trapping Sage Grouse in Colorado. *Wildlife Soc. Bull.* 10:224-231.
- Klenbenow, D.A. 1969. Sage Grouse nesting and brood habitat in Idaho. *J. Range Mgt.* 33:649-662.
- Patterson, R.L. 1952. *The Sage Grouse in Wyoming.* Sage Books, Denver.
- Peterson, J.G. 1970. Gone with the sage. *Montana-Outdoors* 5:1-3.
- Rogers, G.E. 1964. Sage Grouse investigations in Colorado. Colorado Game, Fish & Parks Dept. Tech. Rep. 16.
- Rothenmaier, D. 1979. Sage Grouse reproductive ecology: breeding season movements, strutting ground attendance and nesting. M.S. thesis, Univ. Wyoming, Laramie.

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- Schoenberg, T.J. 1982. Sage Grouse movements and habitat selection in North Park, Colorado. M.S. thesis, Colorado State Univ., Fort Collins.
- Springer, J.T. 1979. Some sources of bias and sampling error in radio triangulation. *J. Wildlife Mgt.* 43:926-935.
- Tate, J., Jr., Boyce, M.S. and Smith, T.R. 1979. Responses of Sage Grouse to artificially created display ground. *Proc. Mitigation Symp., Colo. State Univ., Fort Collins*, pp. 459-463.
- Wallestad, R.O. 1975. Male Sage Grouse responses to sagebrush treatment. *J. Wildlife Mgt.* 39:482-484.
- Wallestad, R.O., and Pyrah, D. 1974. Movement and nesting of Sage Grouse hens in central Montana. *J. Wildlife Mgt.* 38:630-633.
- Wallestad, R.O., and Schladweiler, P. 1974. Breeding season movements and habitat selection of male Sage Grouse. *J. Wildlife Mgt.* 38:634-637.

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*Photo courtesy of California Department of Fish and Game*

*Sage Grouse*