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COMPARISON OF SAGE AND SHARP-TAILED GROUSE LEKS IN SOUTH CENTRAL WYOMING

James H. Klott¹ and Frederick G. Lindzey²

ABSTRACT.—Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*) and Sage Grouse (*Centrocercus urophasianus*) leks were compared in an area of sympatry in south central Wyoming. Sharp-tailed Grouse leks had more ($P < .05$) shrub cover, taller shrubs, more forb, grass, and shrub species, and less visibility than did Sage Grouse leks. Reduction in shrub cover or the diversity of herbaceous species could potentially have greater influence on the use of lek sites by Columbian Sharp-tailed Grouse than by Sage Grouse in areas of sympatry in Wyoming.

Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*) and Sage Grouse (*Centrocercus urophasianus*) occurred sympatrically over much of their historic ranges (Aldrich 1963). Viable populations of the two species now coexist only in portions of Utah, Idaho, Colorado, and Wyoming (Hart et al. 1950, Rogers 1969, Ward 1984, Oedekoven 1985). Because leks are traditional breeding areas and are the hub around which nesting occurs (Autenrieth 1986), they are important to both grouse species. Lek characteristics have been described for Sharp-tailed Grouse (Ward 1984) and Sage Grouse (Dalke et al. 1963, Rothenmaier 1979, Emmons 1980, Johnsgard 1983: 115). Characteristics of Sage Grouse and Sharp-tailed Grouse leks have not been described or compared in areas where the two species occur sympatrically. Objectives of the study were to determine whether leks of the two species differed in the following characteristics: visibility, vegetal composition, vegetal structure, ecotone location, and topography.

STUDY AREA

The study area is 97 km southwest of Rawlins, Wyoming, at an elevation of 1,980–2,500 m. Soils in the area are primarily sandy loams in the Paetic Agriboroll and Haploboroll soil groups. Topography is generally flat uplands and foothills dissected by river systems. Vegetation at lower elevations is dominated by sagebrush (*Artemisia* spp.)-grass communities. Mountain shrub communities of sage-

brush, mountain snowberry (*Symphoricarpos oreophileus*), and Utah serviceberry (*Amenlanchier utahensis*), as well as quaking aspen (*Populus tremuloides*) stands, occur at higher elevations or at sites where snow accumulates.

METHODS

Thirteen openings each of Sharp-tailed Grouse leks and Sage Grouse leks were randomly selected for characterization. Five 20-m-long transects were positioned to radiate from the center (dominant male territory) of each lek. The direction for each transect was selected from a random numbers table. Shrub cover was measured using the line-point intercept method (Heady et al. 1959), recording shrubs hit at 0.5-m intervals. Shrub height was measured in the center of each shrub contacted. We recorded the number of shrub, grass, and forb species present at each site within a 30-m radius that encompassed the lek. A cover board was placed at the center of the lek and 10 m from the center along each transect. We counted the number of squares visible within each at a distance of 9 m and a height of 15 cm (Jones 1968) and then averaged them for statistical comparisons. Percent slope was measured with a clinometer, and elevation was taken from topographic maps. The position of the lek was classified as edge or center in the opening in which it occurred.

Shrub communities in the area were classified as sagebrush-grass, sagebrush-bitterbrush, sagebrush-snowberry, and mountain

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TABLE 1. Characteristics of random openings, Columbian Sharp-tailed and Sage Grouse leks. Means with the same letter are not different ($P < .05$).

Characteristics	P value	Sharp-tailed		Sage		Random	
		\bar{x}	SD	\bar{x}	SD	\bar{x}	SD
Number		13		13		13	
Edge occurrence (%)	.233	46.15 ^a	0.52	23.98 ^a	0.44		
Elevation (m)	.643	2,183.77 ^a	78.90	2,160.85 ^a	131.75	2,167.49 ^a	40.09
Slope (%)	.046	4.15 ^{a,b}	3.41	2.77 ^a	1.48	6.07 ^b	3.69
Shrub cover (%)	.000	11.08 ^b	7.44	2.61 ^b	4.09	2.00 ^b	2.88
N shrub species	.000	2.54 ^a	1.05	0.85 ^b	0.69	0.79	0.98
Shrub height (cm)	.010	39.77 ^a	15.21	22.03 ^b	19.17	17.57 ^b	21.05
Number of forb species	.000	14.77 ^a	4.71	7.08 ^b	4.21	11.00 ^c	3.68
Number of grass species	.024	6.77 ^a	3.63	3.24 ^b	1.00	4.43 ^{a,b}	2.10
Visibility (%)	.000	65.23 ^a	20.69	80.24 ^b	7.54	31.69 ^c	15.53

shrub. We characterized vegetation at randomly located points within each habitat with the same methods used to measure variables at leks, except that we used four transects instead of five to reduce sampling effort. Points were selected using a random numbers table to determine bearing, starting location (1/4 of 1/4 section), and habitat. The bearing was followed until the habitat was encountered; the plot center was then placed a minimum of 25 m from the ecotone. Vegetation sampling was conducted between mid-April and early June 1986 to minimize the influence of seasonal shifts in plant species composition.

T-tests (Ott 1984, Wilkinson 1986) were used to determine edge occurrence, while analysis of variance (Ott 1984, Wilkinson 1986) was used to examine other characteristics. Statistical comparisons with differences of $P < .05$ were considered significant. Newman-Kuels post hoc tests were used to determine differences between groups when analyses of variance results were significant (Wilkinson 1986).

RESULTS

Columbian Sharp-tailed Grouse leks had greater shrub cover, taller shrubs, and greater numbers of shrub, forb, and grass species ($P < .05$) than did Sage Grouse leks (Table 1). Sharp-tailed Grouse leks were typically on steeper slopes, at higher elevations, and at the edge of openings more often than were Sage Grouse leks ($P < .05$). Visibility was greatest on Sage Grouse leks and least in random openings. Sixty randomly located shrub plots within 3 km of leks averaged 42.1% shrub cover, 71.8 cm shrub height, 11.8 forb spe-

cies, 6.6 grass species, and 4% visibility. Shrub cover and shrub height were greater, while visibility was less ($P < .05$), at shrub plots compared to leks.

DISCUSSION

Visibility on leks is important for ritualized displays of male grouse (Wiley 1978) and for attracting female grouse to the lek (Rothenmaier 1979, Ward 1984). Leks of Sage and Sharp-tailed Grouse in Wyoming had greater visibility than did random openings. Our data indicated that the visibility on the Sage Grouse leks was near the optimum (70–80%) reported by Ward (1984), while visibility on Sharp-tailed Grouse leks was slightly above optimum for that species. Kobriger (1965) noted that Prairie Grouse can considerably reduce herbaceous vegetation on a lek by trampling. We noted a similar effect on forbs and grasses at the leks we observed, suggesting that the primary difference between Sage and Sharp-tailed Grouse leks was in the amount of shrub cover present.

Cover is important in predator detection and avoidance. Ward (1984) found that Columbian Sharp-tailed Grouse used the more open areas of their territories on the lek when females were present, but stayed in areas with more cover when females were absent. Jones (1968) reported that Sharp-tailed Grouse moved behind cover when they detected predators. Marks and Marks (1987a) believed that Sharp-tailed Grouse were vulnerable to avian predation while attending leks, and Hartzler (1974) reported that predation influenced the time of activity of Sage Grouse on leks. Dead Sharp-tailed Grouse found by

Ward (1984) were all in areas of the lek with 70–80% visibility. We found remains of five Sage and eight Sharp-tailed Grouse on leks. Four of the Sage Grouse and all of the Sharp-tailed Grouse carcasses were found in open areas within the lek.

The amount of cover (herbaceous and shrubby) on a lek appears to represent a trade-off between high visibility desirable for breeding and displaying and lower visibility that enhances security. We frequently observed male Sharp-tailed Grouse at six leks cooing and gobbling while perched on shrubs. They used these shrubby sites even though open areas were available within 200 m of each lek. Rothenmaier (1979) found that Sage Grouse leks on large playas in eastern Wyoming were located near the sagebrush edge rather than the center openings. Ward (1984) similarly found that Sharp-tailed Grouse avoided open areas on leks, reporting that areas with 95–100% visibility were used significantly less than areas with lower visibility. Shrub cover values at randomly located plots within 3 km of the leks we observed were similar to those found by other researchers (Wallestad and Schladweiler 1974, Rothenmaier 1979, Oedekoven 1985).

Shrubs may contribute to grouse security also by providing vantage points at leks. Moyles and Boag (1981) reported that juvenile male Sharp-tailed Grouse of the plains subspecies (*T. p. jamesii*) used elevated vantage points to observe displaying adults in the fall prior to establishing territories on the lek. They believed that the elevated positions gave the juvenile males immunity from attack by territorial males.

Columbian Sharp-tailed Grouse may also select lek sites on the basis of food availability. Sharp-tailed Grouse displayed at leks in the fall (late August through September). Marks and Marks (1987b) also reported male Sharp-tailed Grouse displaying at leks in western Idaho in the fall. Moyles and Boag (1981) suggested that most of the recruitment (68%) of young (six months of age) male Plains Sharp-tailed Grouse to a lek occurred during the fall. In south central Wyoming some plant species, such as needle grass (*Stipa* spp.), are senescent, while others, such as bluegrass (*Poa* spp.) and dandelion (*Taraxacum officinale*), are still somewhat succulent by fall. These species were present at most Sharp-tailed

Grouse leks and are fall foods of Sharp-tails (Jones 1966). Blus (1967) reported one case of Plains Sharp-tailed Grouse shifting their lek in response to available forage in the spring, and Sisson (1976) believed that there was a relationship between lek location and winter foraging areas. Sage Grouse, on the other hand, do not typically display at leks in the fall and switch to a diet composed predominantly of sagebrush at this time (Wallestad 1975).

Several authors have reported that Sage Grouse may change the location of the lek following habitat disturbance (shrub removal) (Dalke et al. 1963, Connelly et al. 1981). Sage Grouse switched to disturbed sites, but only when there were relatively few openings in the surrounding habitat (Connelly et al. 1981). Sexton and Gillespie (1979) reported that Plains Sharp-tailed Grouse moved to a burned area, but the burn included historic lek site. Short-term benefits of fire include more nutritious vegetation (Barbour et al. 1980: 381, Wright and Bailey 1980) and a reduction in litter (Sexton and Gillespie 1979, Wright and Bailey 1980), which makes new growth more visible.

Our data suggest that while Sage Grouse leks may be enhanced by cover-reducing treatments, such treatments would be less beneficial on Columbian Sharp-tailed Grouse leks because Sharp-tailed Grouse use leks with more shrub cover than do Sage Grouse. Boyce (1981) suggested that areas with a high degree of patchiness provide better quality grouse habitat than do areas with uniform vegetation. Large treatments would reduce habitat and thus be detrimental to both species (Martin 1970, Klebenow 1972, Oedekoven 1985). While the lek is an important component of grouse habitat, other habitat features that provide nesting, brooding, and wintering requirements also need to be considered in management of these species.

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LITERATURE CITED

- ALDRICH, J. W. 1963. Geographic orientation of American Tetraonidae. *J. Wildl. Manage.* 27: 529-545.
- AUTENRIETH, R. E. 1986. Sage Grouse. Pages 763-779 in R. L. DiSilvestro, ed., *Andubon Wildl. Rep.*, 1986. R. R. Donnelly and Sons, Co., New York.
- BARBOUR, M. C., J. H. BURK, AND W. D. PITTS. 1980. *Terrestrial plant ecology*. Benjamin/Cummings Publ. Co., Inc., Menlo Park, California. 604 pp.
- BLUS, L. J. 1967. Sharp-tailed Grouse relations to a food source near a dancing ground. *Condor* 69: 532-533.
- BOYCE, M. S. 1981. Robust canonical correlation of Sage Grouse habitat. Pages 152-159 in D. E. Capen, ed., *The use of multivariate statistics in studies of wildlife habitat*. USDA For. Serv. Gen. Tech. Rept. RM-87. Rocky Mtn. For. Range Expt. Sta., Fort Collins, Colorado. 249 pp.
- CONNELLY, J. W., W. J. ARTHUR, AND O. D. MARKHAM. 1981. Sage grouse leks on recently disturbed sites. *J. Range Manage.* 34: 153-154.
- DALKE, P. D., D. B. PYRAH, D. C. STANTON, J. E. CRAWFORD, AND E. F. SCHALATTERER. 1963. Ecology, productivity, and management of Sage Grouse in Idaho. *J. Wildl. Manage.* 27: 811-841.
- EMMONS, S. 1980. Lek attendance of male sage in North Park, Colorado. Unpublished thesis, Colorado State University, Fort Collins. 69 pp.
- HART, C. M., O. S. LEE, AND J. B. LOW. 1950. The Sharp-tailed Grouse in Utah. Utah Department of Fish and Game, Publ. 3. 79 pp.
- HARTZLER, J. E. 1974. Predation and the daily timing of Sage Grouse leks. *Auk* 91: 532-536.
- HEADY, H. F., R. P. GIBBENS, AND R. W. POWELL. 1959. A comparison of the charting, line intercept, and line point methods of sampling shrub types of vegetation. *J. Range. Manage.* 12: 180-188.
- JOHNSGARD, P. A. 1983. *Grouse of the world*. University of Nebraska Press, Lincoln. 413 pp.
- JONES, R. 1966. Spring, summer and fall foods of the Columbian Sharp-tailed Grouse in eastern Washington. *Condor* 68: 536-540.
- _____. 1968. A board to measure cover used by Prairie Grouse. *J. Wildl. Manage.* 32: 28-31.
- KLEBENOW, D. A. 1972. The habitat requirements of Sage Grouse and the role of fire in management. *Proc. Tall Timbers Fire Ecol. Conf.* 12: 305-315.
- KLOTT, J. H. 1987. Use of habitat by sympatrically occurring Sage Grouse and Sharp-tailed Grouse with broods. Unpublished thesis, University of Wyoming, Laramie. 82 pp.
- KOBRIGER, C. D. 1965. Status, movements, habitats and foods of Prairie Grouse on a Sandhills refuge. *J. Wildl. Manage.* 29: 788-800.
- MARKS, J. S., AND V. S. MARKS. 1987a. Influence of radio collars on survival of sharp-tailed Grouse. *J. Wildl. Manage.* 51: 468-471.
- _____. 1987b. Habitat selection by Columbian Sharp-tailed Grouse in west central Idaho. *USDI, Bur. Land Manage.* Boise, Idaho. 115 pp.
- MARTIN, N. S. 1970. Sagebrush control related to habitat and Sage Grouse occurrence. *J. Wildl. Manage.* 34: 313-320.
- MOYLES, D. L. J., AND D. A. BOAG. 1981. Where, when and how male Sharp-tailed Grouse establish territories on arenas. *Canadian J. Zool.* 59: 1576-1581.
- OEDEKOVEN, O. O. 1985. Columbian Sharp-tailed Grouse population, distribution, and habitat use in south central Wyoming. Unpublished thesis, University of Wyoming, Laramie. 58 pp.
- OTT, L. 1984. *An introduction to statistical methods and data analysis*. 2d ed. PWS Publ., Boston, Massachusetts. 775 pp.
- ROGERS, G. E. 1969. *The Sharp-tailed Grouse in Colorado*. Colorado Div. Game, Fish and Parks, Tech. Publ. 23. 94 pp.
- ROTHENMAIER, D. 1979. Sage Grouse reproductive ecology: breeding season movements, strutting ground attendance and site characteristics, and nesting. Unpublished thesis, University of Wyoming, Laramie. 97 pp.
- SEXTON, D. A., AND M. M. GILLESPIE. 1979. Effects of fire on the location of a Sharp-tailed Grouse arena. *Canadian Field-Nat.* 93: 74-76.
- SISSON, L. H. 1976. *The Sharp-tailed Grouse in Nebraska*. Nebraska Game and Parks Comm., Lincoln. 88 pp.
- WALLESTAD, R. O. 1975. Life history and habitat requirements of Sage Grouse in central Montana. Montana Department of Fish and Game, Helena. 65 pp.
- WALLESTAD, R. O., AND P. SCHLADWEILER. 1974. Breeding season movements and habitat selection of male Sage Grouse. *J. Wildl. Manage.* 38: 634-637.
- WARD, D. J. 1984. Ecological relationships of Columbian Sharp-tailed Grouse leks in Curlew National Grasslands, Idaho, with special emphasis on effects of visibility. Unpublished thesis, Utah State University, Logan. 63 pp.
- WILEY, R. H., JR. 1978. The lek mating system of the Sage Grouse. *Sci. Amer.* 238(5): 114-125.
- WILKINSON, L. 1986. *SYSTAT: the system for statistics*. SYSTAT, Inc., Evanston, Illinois. 522 pp.
- WRIGHT, H. A., AND A. W. BAILEY. 1980. Fire ecology and prescribed burning in the Great Plains—a research review. *USDA For. Serv. Gen. Tech. Rept. INT-77, Intermtn. For. Range Expt. Sta., Ogden, Utah.* 60 pp.