

Fall-Winter Movements, Ranges, and Habitat Use of Lesser Prairie Chickens

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Source: *The Journal of Wildlife Management*, Vol. 44, No. 2 (Apr., 1980), pp. 521-524

Published by: [Allen Press](#)

Stable URL: <http://www.jstor.org/stable/3807993>

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Ohio Division of Wildlife, The Ohio State University, U.S. Fish and Wildlife Service, and Wildlife Management Institute. We thank K. E. Bednarik, wetlands biologist, Ohio Division of Wildlife, for assistance in obtaining the geese reared in Ohio.

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Received 31 July 1978.

Accepted 4 August 1979.

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FALL-WINTER MOVEMENTS, RANGES, AND HABITAT USE OF LESSER PRAIRIE CHICKENS

Lesser prairie chickens (*Tympanuchus pallidicinctus*) occur in extensive blocks of rangeland in New Mexico, Colorado, Kansas, Oklahoma, and Texas. The minimum area necessary to maintain stable populations within such rangeland is unknown (Litton 1978); this information may be essential for preserving these birds if future habitat losses are as severe as those in the past. Purposes of this study were to investigate fall-winter movements and ranges, estimate the minimum acceptable size of a management unit, and identify habitat use and preference of lesser prairie chickens in western Texas.

The study was conducted 16.6 km southwest of Sundown in northern Yoakum County during October 1977 through February 1978. The 5,200-ha study area

was within a 6.4- to 9.7-km wide band of level to strongly sloping, stabilized sandhills (Dittmore and Hyde 1960). Seven vegetation types occurred on the area: shinnery oak (*Quercus havardii*)—sand sagebrush (*Artemisia filifolia*), shinnery oak, mesquite (*Prosopis glandulosa*)—shinnery oak, mesquite—blue grama (*Bouteloua gracilis*), shinnery oak—little bluestem (*Schizachyrium scoparium*), reverted cropland, and cultivated sunflowers (Taylor 1978).

A rocket net positioned on leks and at water was used to capture 19 birds during fall 1977. Solar-powered transmitters weighing 18 g and operating at discrete frequencies between 150.850 and 151.125 MHz were attached to each bird. An AVM Model LA11S 12-channel receiver with a 1.2-m Yagi antenna was used to

Table 1. Mean distance (m) between daily locations of lesser prairie chickens during fall and winter 1977-78.

Month	Male						Female					
	Adult			Immature			Adult			Immature		
	N ^a	\bar{x}	SE	N	\bar{x}	SE	N	\bar{x}	SE	N	\bar{x}	SE
Oct	5	451	72	18	663	130	16	298	106			
Nov	91	676	67	41	1,045	106	74	454	56	18	1,226	179
Dec	96	697	50	64	1,069	101	80	652	63	20	410	116
Jan	54	591	59	24	497	110	22	680	75	20	482	119
Feb	15	390	64				15	383	70	15	267	43

^a Number of day-to-day movement distances obtained.

locate each bird once daily during either morning (1st 25% of daylight, 220 locations), midday (middle 50% of daylight, 420 locations), or evening (last 25% of daylight, 220 locations). Locations, identified by triangulation from landmarks and by approaching birds closely, were plotted on topographic maps. Mean daily movements were estimated by month, and ranges were calculated for birds with 15 or more locations per month. Ranges were calculated by joining the outermost points of location (Mohr 1947) and measuring the resulting area.

The total area used by the 19 birds was defined by connecting the outermost points of all locations obtained. The proportion of this area occupied by each vegetation type was used to generate expected frequencies of locations within types. Relative preference was calculated following Ivlev (1961).

Daily movements of all birds increased

from October through December and decreased markedly from January through February (Table 1). Increased fall movements coincided with termination of fall display activities and the start of sunflower use. Previously, Campbell (1972) found that grain fields influenced fall and winter movements of lesser prairie chickens. Immature males moved extensively and the longest movements were recorded in November and December. A juvenile male traveled 12.8 km in 4 days. This relatively long-distance movement was interpreted as dispersal (Taylor 1978). The maximum daily movement recorded for any bird was 4,040 m (adult male).

Juvenile males had the largest monthly range of all birds, particularly in November and December (Table 2). The single juvenile female ranged most extensively in November and less through February (the lowest range recorded for any bird). Decreased ranges during January and

Table 2. Fall and winter home ranges (ha) of lesser prairie chickens, 1977-78.

Month	Male						Female					
	Adult			Immature			Adult			Immature		
	N ^a	\bar{x}	SE	N	\bar{x}	SE	N	\bar{x}	SE	N	\bar{x}	
Nov	4	365	185	1	786		4	160	58	1	495	
Dec	4	235	49	3	1,945	846	4	202	47	1	94	
Jan	3	178	79	2	331		1	308		1	85	
Feb	1	50					1	62		1	35	

^a Number of birds.

Table 3. Percentages of radiotelemetry locations at various distances from the lek where trapped, 1977–78.

Month	Distance (km)				
	≤0.8	0.9–1.6	1.7–3.2	3.3–4.8	>4.8
Oct	27 (27) ^a	28 (55)	42 (79)	3 (100)	
Nov	28 (28)	25 (53)	39 (92)	8 (100)	
Dec	22 (22)	30 (52)	37 (89)	6 (95)	5 (100)
Jan	17 (17)	36 (53)	38 (91)	1 (92)	8 (100)
Feb	2 (2)	52 (54)	46 (100)		

^a Cumulative percentage.

February may have been associated with a general lack of cover. During summer 1978, approximately 70% of the study area had a 15–26% canopy cover of shinnery oak (Taylor 1978). Oak leaf drop in early winter on the heavily overgrazed study area may have forced the birds into types affording the most cover, i.e., shinnery oak–sand sagebrush and shinnery oak–little bluestem. Jones (1963) found that the half-shrub life-form (e.g., sand sagebrush) was heavily used during winter, and that leaves of sand sagebrush also provided important winter food for lesser prairie chickens.

The percentages of locations at various distances from the lek where an individual was captured remained stable during November through February (Table 3).

About half of all locations were within 1.6 km of the lek through all months. Only during December and January did birds (juvenile males) range farther than 4.8 km from the display ground. All birds were within 3.2 km during February, when the spring display period started. Similarly, Copelin (1963) found 61% of all sightings of banded lesser prairie chickens in Oklahoma within 1.6 km of display grounds and 93% within 4.8 km.

Use of vegetation types was not proportional to occurrence ($P < 0.01$). Shinnery oak–sand sagebrush and shinnery oak–little bluestem were preferred over other noncultivated types (Table 4). Use of shinnery oak–sand sagebrush increased through February, when shinnery oak was avoided. Sunflowers were used intensively in December and January, as evidenced by approximately 100 lesser prairie chickens in the sunflower field on 11 December. Radio-equipped males frequented the field in flocks. The single radio-equipped female entered and exited alone. Mesquite–shinnery oak and mesquite–blue grama types bordered the sunflower field and were used only preceding flights into the field. Reverted cropland was avoided during fall and winter. Use of this vegetation type

Table 4. Observed and expected frequencies of radiolocations of lesser prairie chickens in 7 vegetation types.

Type	Proportion of study area	Obs (N)	Exp (N)	Relative preference ^a
Shinnery oak–sand sagebrush	0.42	590	361.2	+2.4
Shinnery oak	0.27	99	232.2	-4.0
Mesquite–shinnery oak	0.12	55	103.2	-3.0
Mesquite–blue grama	0.07	45	60.2	-1.5
Sunflower	0.01	23	8.6	+4.6
Reverted cropland	0.06	5	51.6	-8.2
Shinnery oak–little bluestem	0.02	43	17.2	+4.3
Roads, oil leases, and other unused areas	0.03	0	25.8	-1.0
Total	1.00	860	860	

^a $10 (\% \text{ use} - \% \text{ availability}) / (\% \text{ use} + \% \text{ availability})$.

coincided with increased daily movements, and was probably related to food searches and increased fall movements of juveniles. Coincident with increased juvenile movement, more vegetation types were used during the late fall and early winter than earlier or later.

Some diurnal use patterns among vegetation types were evident. The shinnery oak-sand sagebrush type was used more during midday throughout the study, possibly for protection from wind, cold, and predators. Probably as the result of a relative deficiency of cover, shinnery oak was avoided during midday. Use of shinnery oak during mornings and evenings may have been associated with mast feeding. Sunflowers were highly preferred in the evenings during December and January, when seeds were abundant.

Analysis of radiotelemetry data in the shinnery oak sandhills in west Texas suggests 32 km² as a minimum management unit for lesser prairie chickens. About 90% of the locations during months of low food and cover availability were within a 3.2-km radius of the lek where individuals were captured. Areas of approximately 72 km² would be optimum, as virtually all locations were within 4.8 km of the display ground. Sell (1979) recommended a management unit of 2,000 ha for lesser prairie chickens, based on spring and summer ranges and distances of nests from display grounds. Our recommendations based on winter ranges should be suitable for all seasons in the shinnery oak sandhills of western Texas.

Acknowledgments.—The Noxious Brush and Weed Control Program, Department of Range and Wildlife Management, Texas Tech University, supported this study. This is manuscript T-9-210, College of Agricultural Sciences, Texas Tech University.

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Received 30 March 1979.

Accepted 13 August 1979.