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1-1-2000

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Johnsgard, Paul A., "ECOGEOGRAPHIC SPECTS OF GREATER PRAIRIE-CHICKEN LEKS IN SOUTHEASTERN NEBRASKA" (2000). *Nebraska Bird Review.* Paper 71.
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Johnsgard in Nebraska Bird Review (December 2000) 68(4). Copyright 2000, Nebraska Ornithologists' Union. Used by permission.

ECOGEOGRAPHIC ASPECTS OF GREATER PRAIRIE-CHICKEN LEKS IN SOUTHEASTERN NEBRASKA

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ABSTRACT

An analysis of the distribution of 104 Greater Prairie-chicken leks in Pawnee and Johnson counties indicates that the birds favor using those

mile-square sections having no more than two dwellings per section, ones that are located at least two miles from the nearest town, and at least a half-mile from the nearest lek. Relationships with the nearest water were not clear, but most leks were located at least a half-mile from it, perhaps reflecting a general avoidance of heavy cover during the display season.

INTRODUCTION

Although the great majority of Greater Prairie-chickens in Nebraska occur at the eastern edges of the Sandhills region, a small and relatively little-known population also occurs in the southeastern corner of the state. They occur primarily in Johnson and Pawnee counties, but with a few outlying flocks also present in southeastern Gage and southern Otoe counties. These birds represent the northernmost terminus of the large population associated with the Flint Hills of Kansas, probably the largest and most secure remaining population of Greater Prairie-chickens existing anywhere in North America.

This population had been protected from hunting since 1930, owing to its small size. In the fall of 2000 the area was opened to a restricted hunting season by the Nebraska Game & Parks Commission. This decision was based on a series of lek surveys performed by Game & Parks biologists (Taylor, 2000) during over the previous five years, indicating that somewhat over 100 active leks were present, nearly all within Johnson and Pawnee counties. They estimated that each of the 110 observed leks possibly supported an average of ten males, or a spring population of 1,100 males, and presumably a comparable number of females.

I have been interested in this population of Prairie-chickens since the 1960s, and took special interest in this situation. Through the kindness of Scott Taylor of Nebraska Game & Parks, and Jackie Canterbury, a contract employee of the agency, I was able to obtain copies of the mapped lek distributions in Johnson and Pawnee counties, and decided that a spacial analysis of these distributions might provide some clues as to the status and ecology of Prairie-chickens in this part of the state.

The county maps used in this study were standard Nebraska Dept. of Roads maps that illustrate not only all roads, but also indicate rivers, creeks and other larger water areas, plus the locations of individual dwellings outside of towns and villages. Nearly all the roads in these two counties were built along section lines, making it possible to subdivide each county into section-sized units of 640 acres each, allowing for convenient statistical comparisons.

Johnson and Pawnee counties both consist of rolling uplands with soils that were produced by a mixture of glacial till and loess accumulations. Soil types are very similar throughout the two counties, mostly being comprised of Wymore-Pawnee loam. The counties are in a well-watered part of the state that receives about 33 inches of precipitation annually, largely falling as

rain during the spring and summer. As a result, there are many creeks as well as two small rivers (Big and Little Nemaha) passing through these counties. Thus, few areas are more than a few miles from the nearest standing water or drainage way, although creek drainages may sometimes be dry for part of the year. Johnson County has a total area of 376 square miles, and supports five towns and villages. The county population as of 1998 was 4,500, or 11.9 persons per square mile. Total grasslands in the county, based on Game and Parks estimates from the 1970s, consist of 143 square miles, or 38 percent of the overall area. Game and Parks biologists counted 45 active leks in Johnson County during the late 1990s, representing a density of one lek per 3.2 square miles of grasslands. The overall county grouse density was one lek per 8.3 sq, miles.

Pawnee County has a total area of 432 square miles, and supports seven towns & villages. The county population as of 1998 was 3,300, or 7.6 persons per square mile Total grasslands in the county, based on Game and Parks estimates, consist of 193 square miles., or 45 percent of the overall area. Game biologists counted 59 active leks during the late 1990s, representing a density of one lek per 3.2 square miles of grasslands, the same estimate as for Johnson County. The overall county grouse density was one lek per 7.3 sq, miles.

Leks used by Greater Prairie-chickens tend to be situated on open grasslands, especially those that are somewhat elevated, with grassy cover of only moderate height, providing for unobstructed viewing in all directions (Johnsgard, 1973). Anderson (1969) reported that the birds prefer grass cover less than six inches high, with a combination of short grass and unobstructed surrounding vision being much more important aspects of site selection than any specific vegetational cover. There have also been other efforts to document the environmental variables associated with the locations of leks, such as one by Merrill et al. (1999). These authors concluded that lek locations in northwestern Minnesota are strongly dependent on land use, with leks positively associated with smaller amounts of residential-farmsteads, smaller amounts and patches of forest, and greater amounts of Conservation Reserve Program (CRP) lands. As of 2000, there were 43,000 acres (67 square miles) enrolled in the CRP program in Pawnee County, and 36,000 acres (56 square miles) enrolled in Johnson County (data courtesy Nebraska Agricultural Statistics Service). Such areas in these Nebraska counties might influence lek distributions in a similar manner to natural grasslands. However, an analysis of lek distribution relative to CRP lands, natural grasslands, and croplands here remains to be done and would be very useful.

METHODS

Using the county maps, the 104 mile-square sections containing leks in the two counties were marked. This left somewhat over 600 additional sections available for comparison. It was apparent from the outset that almost

no leks occurred within two miles of a town or village, so all those sections lying within such proximity to built-up areas were also excluded from consideration. Of the remaining sections, 100 were randomly selected as "no-lek" sections for comparison with "lek-present" sections. For both categories of sections, distances to the nearest lek, the nearest town or village, and the nearest water was determined. The no-lek sections were measured from the center of the section, and the lek-present sections were measured from the lek itself. Additionally, the number of occupied houses present on each selected section, as indicated by the maps, was counted. Populations in both these counties have been essentially stable for several decades, so it seems likely that these maps are suitable for such analysis purposes, even if slightly outdated.

RESULTS

Results are shown in the accompanying tables. Nearest-lek distances (Table 1) are closer in sections having leks than those without, suggesting that leks tend to be more aggregated than randomly distributed, probably because of the non-random distribution of suitable grassland habitats. Except for the low numbers of leks within a half-mile of each other, both frequency distributions resemble Poisson distributions. This suggests that, at least for distances greater than half a mile, the individual lek locations are neither positively nor negatively influencing one another.

Nearest distances to surface water (usually creek or river drainages) are shown in Table 2. Here, the slightly greater distances to water in lek sections than in sections lacking leks is probably insignificant. Or, it may reflect the fact that leks tend to be on elevated ground, usually well away from water. It may also reflect the fact that drainages tend to have brush or tree cover, a landscape feature generally avoided by displaying birds.

Nearest-town distances (Table 3) are somewhat surprising, in that the presence of a village or smaller town does not seem to prevent males from occupying leks up to within about two miles distance. Town size probably also plays a role here. Four villages with populations of less than 100 had their nearest leks an average of 1.6 miles away. Eight towns with populations of 100 or more had their nearest leks at an average of 4.9 miles away. Considering all 12 towns and villages, the nearest lek averaged 4.2 miles away.

The clearest distributional relationship in these data relates to the number of occupied residences per section in lek versus no-lek sections (Table 4). Clearly, sections without occupied dwellings were favored as lek sites, but a very few leks were present on sections with as many as four dwellings, the average being 1.0. By comparison, the mean number of occupied dwellings on the sections lacking leks was 1.9. This statistic is perhaps the most significant of those obtained, suggesting a negative relationship between human population density and the density of Prairie-chicken leks.

LITERATURE CITED

Anderson, R. K. 1969. Prairie chicken responses to changing booming-ground cover type and height. Journal of Wildlife Management. 33:636-43.
Johnsgard, P. A. 1973. Grouse and Quails of North America. Univ. of Nebraska Press, Lincoln.
Merrill, M. D., K. A. Chapman, K. A. Poiani, and B. Winter. 1999. Land-use patterns surrounding Greater Prairie-chicken leks in northwestern Minnesota. Journal of Wildlife Management. 63:189-98.
Taylor, J. S. 2000. Greater Prairie-chicken in southeast Nebraska. An overview of population status and management considerations. Unpublished report, Nebraska Game and Fish Commission, Lincoln.

Table 1. Percent Frequencies of Nearest-lek Distances (in miles)

Nearest lek	Lek present (N = 104)	No lek (N = 100)
0-0.5 mi.	7	0
0.6-1.0 mi.	20	9
1.1-1.5 mi.	36	40
1.6-2.0 mi.	18	10
2.1-2.9 mi.	14	17
3.1-3.9 mi.	3	8
4.0-4.9 mi.	1	8
5.0-5.9 mi.	0	5
6.0-6.9 mi.	1	2
7.0-9.9 mi.	0	0
Over 10 mi.	0	1
Ave (approx.)	1.6	2.3

Table 2. Percent Frequencies of Minimum Lek-to-water Distances (in miles)

Nearest Water	Lek present (N = 104)	No lek (N = 100)
0-0.5 mi.	36	52
0.6-1.0 mi.	30	40
1.1-1.5 mi.	26	8
1.6-2.0 mi.	6	0
2.0	2	0
Ave. (approx.)	0.8	0.7

Table 3. Percent Frequencies of Nearest-town Distances (in miles)

Nearest Town	Lek present (N = 104)	No lek (N = 100)
0-9 mi.	0	-*
1.0-1.9 mi.	6	_*
2.0-2.9 mi.	28	11
3.0-3.9 mi.	18	35
4.0-4.9 mi.	16	21
5.0-5.9 mi.	18	7
6.0-6.9 mi.	6	16
7.0-7.9 mi.	4	5
8.0+ mi.	4	5
Ave. (approx.)	4.2	-*

• Sections located within two miles of towns or villages were excluded from sample; thus average distances to nearest towns were not estimated.

Table 4. Percent Frequencies of Human Population Densities (houses per section) Relative to Lek Occurrence

Houses per section	Lek present N = 104)	No lek (N = 100)
0	40	14
1	26	28
2	27	30
3	5	19
4	2	5
Over 4	0	4
Ave.	1.0	1.9