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THE LESSER PRAIRIE CHICKEN
(*TYMPANUCHUS PALLIDICINCTUS*) IN SOUTHEASTERN
NEW MEXICO: A POPULATION SURVEY

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Abstract.—To provide an assessment of the current status of populations of the lesser prairie chicken (*Tympanuchus pallidicinctus*) in southeastern New Mexico, this study monitored 4,368 sites along 3,428 km of transects, which surveyed a total of 548,608 hectares, in search of active leks during April 2000 and 2001. Of 249 monitoring sites along 195 km of transects north of US380, vocalizations originating at active leks were heard at 46 sites on 31,232 hectares surveyed. Of 4,119 monitoring sites along 3,233 km of transects south of US380, one prairie chicken was observed at one site and vocalizations from one active lek were heard at two sites on 517,376 hectares surveyed. As has been documented in other parts of its range, the lesser prairie chicken in extreme southeastern New Mexico (area south of US380) appears to have experienced a significant decline in size of population.

The lesser prairie chicken (*Tympanuchus pallidicinctus*) has one of the most restricted distributions of any native North American grouse; its geographic range includes parts of southeastern Colorado, western Kansas, eastern New Mexico, western Oklahoma and northwestern Texas (Giesen 1998; Mote et al. 1999). Between 1963 and 1980, occupied range of this species declined 78%, and since the 1800s, occupied range has declined 92% (Crawford 1980; Taylor & Guthery 1980; Giesen 1998). Although no comprehensive study has been conducted to determine reasons for fluctuation in size of populations, it has been postulated that severe droughts in the 1930s, 1950s and early 1990s significantly reduced populations, and increased annual precipitation in the mid-1980s resulted in increases in populations (Mote et al. 1999; Bailey & Williams 2000). In addition to drought, one or a combination of other factors, such as predation, improper grazing practices, conversion of native habitat to cropland, chemical control of sand sagebrush (*Artemisia filifolia*) and shinnery oak (*Quercus havardii*) and hunting when populations were low, may have significantly reduced size of populations and geographic range of this species during the past 100 years (Ligon 1927; Crawford 1980; Taylor & Guthery 1980; Bailey & Williams 2000).

In New Mexico, Oklahoma and Texas, the lesser prairie chicken usually occupies habitats dominated by shinnery oak and bluestem (*Andropogon*) interspersed with sand dropseed (*Sporobolus cryptandrus*), three-awn (*Aristida*), grama (*Bouteloua*) and sagebrush (*Artemisia*) (Lee 1950; Copelin 1963; Jackson & DeArment 1963; Jones 1963; Crawford & Bolen 1976; Taylor & Guthery 1980; Riley et al. 1993). Within this habitat, lesser prairie chickens are most easily located and observed in spring, when males gather at leks to display, vocalize and mate with females (Giesen 1998). Sites where leks are formed are characterized by sparse vegetation and typically are located on high ground or ridges (Copelin 1963; Jones 1963; Taylor & Guthery 1980). Disturbances created by humans, such as roads, drill pads and herbicide treatments, also may serve as lekking sites (Davis et al. 1979; Taylor 1980; Locke 1992). During spring, females visit leks from late March through May. In New Mexico, average number of visitations and copulations peak during the first 3 weeks of April (Campbell 1972; Candelaria 1979; Davis et al. 1979); however, annual variation due to weather conditions, such as drought or late snowstorms, may delay the peak by 1-2 weeks (Merchant 1982; Giesen 1998).

As in other parts of its range, the history of the lesser prairie chicken in New Mexico has been one of frequent ups and downs; from abundance to near extinction (Lee 1953; Bailey & Williams 2000). Populations currently are low in New Mexico, and elsewhere in its range, as stated in the petition to list the lesser prairie chicken as threatened (Biodiversity Legal Foundation 1995) and in the response by Walsh (1998), but more information is needed before a final decision can be made about listing the species. Because vocalizations of males on leks are a reliable indicator of presence of this species, a survey to determine location of active leks would provide valuable insight into current status of populations. Purposes of research reported herein were to document the status of populations of the lesser prairie chicken in southeastern New Mexico by determining distribution of active leks, to use these data to formulate a possible explanation for periodic fluctuations in populations in the region, and to provide a current survey that would be useful in making management decisions about this species.

MATERIALS AND METHODS

The study area primarily was sandy-soiled, shinnery-oak habitat south of US380 and east of US285 in Chaves, Eddy and Lea counties, New Mexico (Fig. 1). However, this current survey also included some areas

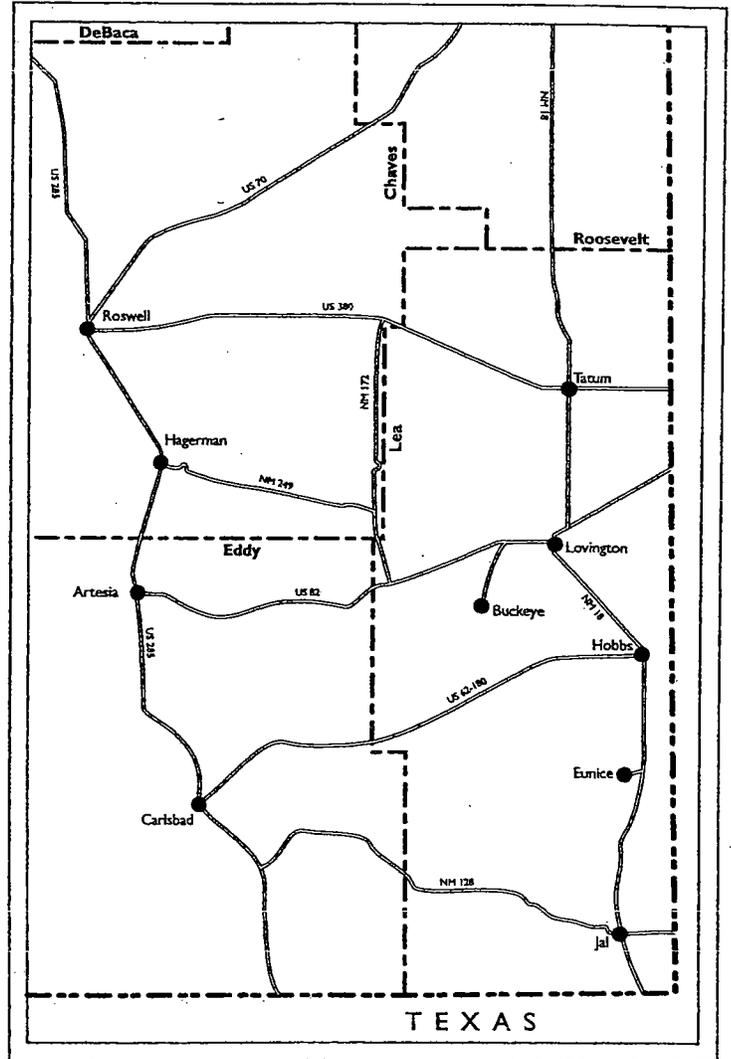
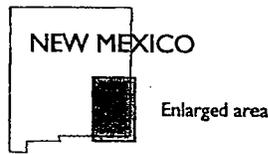


Figure 1. The study area primarily included sandy-soiled, shinnery-oak habitat south of US70 and east of US285 in southeastern New Mexico. Locations of counties, cities and highways are provided to clarify locations of specific geographic areas that are referred to in the text.

with finer-textured soils and other vegetation types, and some sites north of US380 in Chaves, Lea and Roosevelt counties, New Mexico.

Routes for transects were determined in consultation with biologists from the Bureau of Land Management, petroleum-industry personnel, ranchers and others, and by examination of topographic maps and field exploration; state and county roads, oil-field roads, pipeline roads, fenceline roads and roads used to monitor livestock operations were used as routes for transects. Along each transect, individual monitoring sites usually were located at 0.8 km intervals. In 2000 and 2001, surveys were conducted in April because lekking activity peaks in mid-April. Transects were begun 0.5-1 hour before sunrise. At each monitoring site along transects, surveyors listened for 3-5 minutes for calls made by lesser prairie chickens on leks. Weather conditions and GPS coordinates were recorded, then surveyors moved about 0.8 km, repeated this protocol and continued this process until ≤ 3 hours after sunrise. Number of hectares surveyed per transect was determined by multiplying approximate length of transect in miles by 640 (number of acres/square mile) and converting the resultant number of acres to hectares, assuming the transect surveyed a minimal area extending outward 0.8 km from the monitoring site.

RESULTS AND DISCUSSION

Although most of the study area was within the historical range of the lesser prairie chicken (Ligon 1927; Bailey & Williams 2000), the first recently documented occurrence of the lesser prairie chicken south of NM249 in southeastern New Mexico was in 1970 (Fig. 1), with the observation of several individuals and collection of one specimen west of Buckeye (collected November 1970 by C. Smith and deposited in the Eastern New Mexico University Natural History Museum). Beginning in 1985, several active leks were observed (Smith et al., 1998; Johnson & Smith 1999) and, in December 1987, two specimens were collected near the Eddy-Lea county line east of Carlsbad (one from T22S, R31E, Section 11, NE 1/4, Eddy County and one from T22S, R32E, Section 20, NW 1/4, Lea County; deposited in The University of New Mexico Museum of Southwestern Biology). In 1992, a lek was present south of Eunice, but it was not active after 1997 (Bailey & Williams 2000). Observations of lesser prairie chickens and collections of voucher specimens in the 1970s, 1980s and 1990s indicate there was putatively suitable habitat for this species in sandy-soiled, shinnery-oak habitat in southeastern New Mexico.

During April 2000 and 2001, 4,368 sites were monitored on 128 transects covering 3,428 km in Chaves, Eddy, Lea and Roosevelt counties (Table 1; Fig. 1). In 2000, a total of 92,672 hectares was surveyed on 26 transects located from north of US380 in Chaves County to south of NM128 in Eddy and Lea counties; this included 740 sites along 579 km of transects. Active leks were detected at 15 of 52 monitoring sites north of US380 in Chaves County, but no lek was detected at 688 monitoring sites south of US380 in Chaves, Eddy or Lea counties during 2000. In March 2000, prairie chickens were observed 17 km south of Maljamar, Eddy County, at a lek that had been active in previous years; no evidence of this species was detected on subsequent visits in April 2000 (J. S. Sherman pers. comm.). Also, in 2000, three active leks were present between US380 and NM249 in Chaves County (R. French pers. comm.).

In 2001, a total of 455,936 hectares was surveyed on 102 transects (Table 1). These 102 transects included re-surveying the 26 transects in 2000. For the 26 transects re-surveyed in 2001, no attempt was made to monitor at the same monitoring sites as in 2000. Thus, the 128 transects surveyed during 2000 and 2001 are each unique in space and time. In 2001, lesser prairie chickens were observed or active leks were detected at 31 of 197 monitoring sites north of US380 in Chaves, Lea and Roosevelt counties and at three of 3,431 monitoring sites south of US380 in Eddy and Lea counties (Table 1). South of US380, one lesser prairie chicken was observed 6 km south of Maljamar in Lea County, and one active lek was discovered about 8 km northeast of Eunice in Lea County. These two observations were the only evidence of lesser prairie chickens detected by the authors south of US380 in Chaves, Eddy or Lea counties. However, in April 2001, biologists from the Bureau of Land Management reported four or five active leks between US380 and NM249 in Chaves County (R. French pers. comm.) and one track of a prairie chicken was observed 17 km south of Maljamar in Eddy County (J. S. Sherman pers. comm.). As noted previously, prairie chickens were present 17 km south of Maljamar in March 2000 (J. S. Sherman pers. comm.), but visits to this area in April 2000 and 2001 yielded no additional evidence of this species. No active lek was at this site in 2001, but observation of a track 17 km south of Maljamar and a prairie chicken 6 km south of Maljamar indicates a few individuals were present in this part of the study area. During field surveys in 1994-1996, lesser prairie chickens were observed only near Maljamar and northeast of Eunice (Bailey & Williams 2000).

Table 1. Summary of transects surveyed to locate active leks of the lesser prairie chicken (*Tympanuchus pallidicinctus*) in southeastern New Mexico during April 2000 and April 2001. Highways are indicated on Fig. 1.

Survey Area	Number of Monitoring Sites	Length of Transects (km)	Number of Hectares Surveyed	Number of Monitoring Sites with Lesser Prairie Chickens
North of US380	249	195	31,232	46
South of US380 and North of NM249	193	150	24,064	0
South of NM249 and North of US62-180	1,122	875	140,032	0
South of US62-180 and North of NM128, excluding area East of NM18	1,592	1,250	199,936	1
South of NM128 and West of NM18	929	734	117,504	0
South of US62-180 and East of NM18	283	224	35,840	2
TOTAL	4,368	3,428	548,608	49

During lekking periods of 1998-2001, field surveys were conducted in southeastern New Mexico by the current authors and others. In 1998, Smith et al. (1998) surveyed about 130,100 hectares; in 1999, Johnson & Smith (1999) surveyed 62,576 hectares; in 2000, the current authors surveyed 92,672 hectares; and in 2001, they surveyed 455,936 hectares. Surveyors in 1998, and presumably in 1999, assumed that active leks could be detected within 1.6 km of the monitoring site; observations also indicate this is a valid assumption, but the current authors used a radius of 0.8 km in the conservative calculation of area surveyed in Table 1. If the same method was used for calculation of area surveyed as in 1998 and 1999 (Smith et al. 1998; Johnson & Smith 1999), total area surveyed in 2000 was 185,344 hectares and in 2001 the total was 911,872 hectares. Thus, using the estimate of a radius of 1.6 km sampled at each monitoring site, these four survey efforts scrutinized about 1,289,892 hectares primarily within the historical range of the lesser prairie chicken; this estimate includes overlap among transects. In addition to these surveys, field surveys were conducted by biologists from the Bureau of Land Management and biological consultants employed by petroleum companies throughout the study area (J. S.

Sherman pers. comm.). Survey efforts in 2000 and 2001 were coordinated with biologists from the Bureau of Land Management to reduce overlap of transects and associated duplication of effort; therefore, field surveys in 1998-2001 have provided a reasonable estimate of number of active leks in areas surveyed.

In 2000-2001, lesser prairie chickens were heard or observed at 46 of 249 monitoring sites north of US380 (Table 1); this area is inhabited by well-established populations of lesser prairie chickens (Bailey & Williams 2000). South of US380 and east of the Pecos River, lesser prairie chickens were present, but the few encounters of this species in this survey clearly indicates the current population is small.

It is postulated that populations of lesser prairie chickens observed south of NM249 during the 1970s, 1980s and 1990s initially were comprised of individuals that had dispersed southward from well-established populations in Chaves, Lea and Roosevelt counties. Following these dispersal events, populations south of NM249 may have stabilized or increased for a few years, but sub-optimal conditions (such as drought and overgrazing) in this area may have prevented long-term survival of viable breeding populations. With sub-optimal conditions, populations may have been reduced by attrition of adults and decreased reproductive success over a period of several years. What has been witnessed may be part of a dispersal/attrition cycle that, at this point, has size of populations similar to those before the peaks of the 1970s, 1980s and 1990s; that is, none to few birds south of NM249. Such a cycle may have occurred numerous times in the past. If this scenario is correct, it might help explain the significant decreases in size of populations of lesser prairie chickens south of NM249 in the 1970s, 1980s and 1990s.

A similar cycle of dispersal and attrition may explain lesser prairie chickens east of NM18 in the extreme eastern portion of the study area. Although the area east of NM18 always may have had active leks, it also is possible that this population may have been established by dispersing individuals from populations in adjacent Texas. Thus, in a dispersal/attrition scenario, similar to that postulated for populations in the western portion of the study area, lesser prairie chickens may disperse into, or from, adjacent populations in Texas. So little is known about populations northeast of Eunice, New Mexico, and in adjacent Texas that it may be premature to speculate on interrelationships among these populations.

CONCLUSIONS

During 2000 and 2001, the sandy-soiled, shinnery-oak region east of US285 and south of US380 in southeastern New Mexico was extensively surveyed to determine the status of populations of lesser prairie chickens. The massive quantity of survey data indicate that: (1) there were two active leks between US380 and NM249 in 2000 (R. French pers. comm.); (2) there was one active lek south of NM249 during 2000 (17 km south of Maljamar), that lek became inactive early in the spring 2000 lekking period and one prairie chicken track was observed there in 2001 (J. S. Sherman pers. comm.); (3) there were four or five active leks between US380 and NM249, in Chaves County, during 2001 (R. French pers. comm.); (4) one lesser prairie chicken was observed 6 km south of Maljamar in 2001, but no lek was detected (this study); (5) there was one active lek in the eastern portion of the study area during 2001, and that lek was active through April (8 km northeast of Eunice; this study). The authors believe that current distribution and relative abundance of lesser prairie chickens in southeastern New Mexico has been estimated accurately; currently, this species is rare south of NM249. It is possible that normal environmental extremes or human-induced disturbances have rendered the region inhospitable for long-term survival of the lesser prairie chicken. Studies are needed to ascertain reasons for dramatic fluctuations in populations of the lesser prairie chicken.

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LITERATURE CITED

- Bailey, J. A. & S. O. Williams, III. 2000. Status of the lesser prairie-chicken in New Mexico, 1999. *The Prairie Naturalist*, 32:157-168.
- Biodiversity Legal Foundation. 1995. Petition for a rule to list the lesser prairie chicken, *Tympanuchus pallidicinctus* as "threatened" within its known historic range under the Endangered Species Act, 16 U.S.C. Sec. 1531 et seq. (1973) as amended. Biodiversity Legal Foundation, Boulder, Colorado, 78 pp.
- Campbell, H. 1972. A population study of lesser prairie chickens in New Mexico. *The Journal of Wildlife Management*, 36:689-699.
- Candelaria, M. A. 1979. Movements and habitat-use by lesser prairie chickens in eastern New Mexico. M.S. thesis, New Mexico State University, Las Cruces, 41 pp.
- Crawford, J. A. 1980. Status, problems, and research needs of the lesser prairie chicken. Pp. 1-7, in *Proceedings of the prairie grouse symposium*, 17-18 September 1980 (P. A. Vohs, Jr. & F. L. Knopf, eds.). Oklahoma State University, Stillwater, 89 pp.
- Crawford, J. A. & E. G. Bolen. 1976. Effects of land use on lesser prairie chickens in Texas. *The Journal of Wildlife Management*, 40:96-104.
- Copelin, F. F. 1963. The lesser prairie chicken in Oklahoma. Oklahoma Wildlife Conservation Department, Technical Bulletin, 6:1-58.
- Davis, C. A., T. Z. Riley, R. A. Smith, H. R. Suminski & M. J. Wisdom. 1979. Final report: habitat evaluation of lesser prairie chickens in eastern Chaves County, New Mexico. Department of Fisheries and Wildlife Sciences, New Mexico State University, Agricultural Experiment Station, Las Cruces, 141 pp.
- Giesen, K. M. 1998. *Tympanuchus pallidicinctus*: lesser prairie-chicken. *The Birds of North America*, 364:1-19.
- Jackson, A. S. & R. DeArment. 1963. The lesser prairie chicken in the Texas Panhandle. *The Journal of Wildlife Management*, 27:733-737.
- Johnson, K. & H. Smith. 1999. Survey of the lesser prairie-chicken on Bureau of Land Management lands: Carlsbad Resource Area, NM, 1999. New Mexico Natural Heritage Program, Department of Biology, University of New Mexico, Albuquerque, 13 pp.
- Jones, R. E. 1963. Identification and analysis of lesser and greater prairie chicken habitat. *The Journal of Wildlife Management*, 27:757-778.
- Lee, L. 1950. Kill analysis for the lesser prairie chicken in New Mexico, 1949. *The Journal of Wildlife Management*, 14:475-477.
- Lee, L. 1953. Estimate state's prairie chicken population at twelve to fifteen thousand. *New Mexico Magazine*, 31(3):34-35, 42.
- Ligon, J. S. 1927. Wild life of New Mexico: its conservation and management. State Game Commission, Department of Game and Fish, Santa Fe, New Mexico, 212 pp.

- Locke, B. A. 1992. Lek hypotheses and the location, dispersion, and size of lesser prairie chicken leks. Ph.D. dissertation, New Mexico State University, Las Cruces, 50 pp.
- Merchant, S. S. 1982. Habitat-use, reproductive success, and survival of female lesser prairie chickens in two years of contrasting weather. M.S. thesis, New Mexico State University, Las Cruces, 62 pp.
- Mote, K. D., R. D. Applegate, J. A. Bailey, K. E. Giesen, R. Horton & J. L. Sheppard (eds.). 1999. Assessment and conservation strategy for the lesser prairie-chicken (*Tympanuchus pallidicinctus*). Kansas Department of Wildlife and Parks, Emporia, 51 pp.
- Riley, T. Z., C. A. Davis & R. A. Smith. 1993. Autumn-winter habitat use of lesser prairie-chickens (*Tympanuchus pallidicinctus*, Tetraonidae). *The Great Basin Naturalist*, 53:409-411.
- Smith, H., K. Johnson & L. DeLay. 1998. Survey of the lesser prairie chicken on Bureau of Land Management lands, Carlsbad Resource Area, NM, 1998. New Mexico Natural Heritage Program, Department of Biology, University of New Mexico, Albuquerque, 12 pp.
- Taylor, M. A. 1980. Lesser prairie chicken use of man-made leks. *The Southwestern Naturalist*, 24(4):706-707.
- Taylor, M. A. & F. S. Guthery. 1980. Status, ecology, and management of the lesser prairie chicken. United States Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station, General Technical Report, RM-77:1-15.
- Walsh, N. E. 1998. Endangered and threatened wildlife and plants; 12-month finding for a petition to list the lesser prairie-chicken as threatened and designate critical habitat. *Federal Register*, 63(110):31400-31406.

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