

**Survey for Active Lesser Prairie-Chicken Leks:  
Spring 2006**

**A Contribution of  
Federal Aid in Wildlife Restoration**

**Project W-138-R-4**

**New Mexico Department of Game and Fish**

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# **2006 Lesser Prairie-Chicken Surveys**

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In 2006, Lesser Prairie-Chickens (LPCH) were surveyed audibly and visually along public roads and on State Game Commission-owned Prairie Chicken Areas (PCAs). This was the ninth year of roadside route survey efforts. Eighty-seven leks were detected on 18 of 29 (62%) roadside routes surveyed. Trend analysis of the total number of leks detected have shown a statistically significant increase from 1998–2006 along these routes. Twenty-seven Prairie Chicken Areas (PCAs) were also surveyed. Over the last 11 years, both the number of leks detected and number of LPCH observed have steadily increased. Of the 183 leks detected on or near PCAs, >1,100 LPCH were observed on 100 leks. Average lek size was 11.17 birds/lek with an estimated minimum spring breeding population of about 9,400 birds. Annual rates of change in population trend suggest overall LPCH numbers are increasing in east-central New Mexico.

### **METHODS AND STUDY AREA DESCRIPTION**

Roadside route selection and survey procedures were previously described in Davis (2004).

#### **Roadside Surveys**

Roadside routes were first established in 1998. Survey routes were located within the known occupied and potential range of LPCH. The original boundary of the survey area included 182 townships, which were comprised of habitats consisting of sandy and deep sand range sites supporting shinnery oak and bluestem grasses. In 1999, the survey boundary was modified and consisted of twenty-nine townships; 19 routes from the 1998 survey and routes in 10 new randomly selected townships within the core of LPCH populations in east-central New Mexico. In 2003, 10 additional roadside routes were established in the northeastern part of the LPCH historical range, east and south of Clayton, NM and east and south of Amistad, NM (which were previously surveyed by NMDGF in 1999) and areas near reported sightings of LPCH.

#### **Prairie Chicken Areas (PCAs)**

The New Mexico State Game Commission owns and manages 29 PCAs ranging in size from 10.50 to 3171.15 ha (29 to 7,800 ac). They lie from 32 km (20 mi) south of Taiban (T2S, R28E) in the northwest to 4.8 km (3 mi) southeast of Tatum (T13S, R36E) in the southeast and from the Texas border (T7, 8, 9S, R38E) to 48 km (30 mi) northwest of Tatum (T10S, R31E) in the west. Surveys conducted on PCAs determine presence of LPCH leks over the entire area of each PCA, resulting in a “saturation” survey.

#### **Analysis**

Trends in the numbers of leks detected on roadside route surveys were measured with a simple linear regression model. Regression coefficients were calculated for each route. Roadside routes where no leks were detected were not included in the analysis. Significance of the mean regression coefficient was

valuated by calculating its probability of being different from zero (i.e., no trend) due to random sampling (Zar 1999:336). Changes in population trends were considered significant at  $P \leq 0.5$ .

Lek attendance data were obtained on PCAs by counting the number of LPCH attending leks. Mean lek size was calculated for all leks observed to assess population trends and a simple linear regression was calculated to assess changes in lek size over all years.

## RESULTS

### Roadside Surveys

**Northeastern New Mexico:** Northeastern New Mexico contains the smallest amount of suitable habitat (Ligon 1927, Frary 1957, Snyder 1967) and is defined as the area above 35 degrees north (Bailey and Williams 2000). The Department has received few verifiable reports of LPCH in the northeastern part of the LPCH historical range since 1993. From 2003–2005, no leks have been detected on the 10 roadside routes in northeast New Mexico, providing additional evidence that LPCH no longer occupy their historical range within Union, Harding, and portions of northern Quay counties.

**East-central New Mexico:** In 2006, 29 roadside routes were surveyed from March 26–April 18 (Table 1; Appendix B). This is during the peak lekking period for LPCH (Crawford and Bolen 1975, Haukos and Smith 1999, Davis 2003). Of these, 16 routes have been surveyed since 1998. Numbers of leks detected have fluctuated, ranging from a low of 23 in 1998 to a high of 64 in 2006 on these 16 routes, with no apparent trend (Figure 1). Twenty-six routes have been surveyed from 1999 to 2006. Total number of leks detected (range = 33–70 leks) has been stable over the last 9 years with a notable increase in 2006 (Figure 2). When the 29 routes are considered collectively, 15 (52%) routes appear stable or have slightly increasing lek numbers (Appendix A), with a statistically significant increase in the total number of LPCH leks detected over the last 9 years ( $\bar{x}_\beta = 0.14$  leks/yr  $\pm 0.31$  (SD);  $t_{0.5, (2), 22} = 2.30$ ;  $P = 0.03$ ;  $P(0.01 \leq \mu_1 - \mu_2 \leq 0.27) = 0.95$ ).

The core of remaining LPCH populations in New Mexico lies in south Roosevelt, north Lea, and northeast Chaves counties and contains the largest contiguous amount of available habitat. Roadside routes 17-27 occur within this area (Table 2). Trend analysis of the total number of leks detected have shown a statistically significant increase from 1998–2006 along these routes ( $\bar{x}_\beta = 0.26$  leks/yr  $\pm 0.38$  (SD);  $t_{0.5, (2), 9} = 2.27$ ;  $P = 0.05$ ;  $P(<<0.01 \leq \mu_1 - \mu_2 \leq 0.51) = 0.16$ ) (Appendix A).

Roadside routes 1-16 occur within the sparse and scattered LPCH populations in Curry, northern Roosevelt, and east DeBaca counties (see Bailey and Williams 2000). Although there was a notable increase in the number of leks detected on roadside routes 1–16 in 2003 and again in 2006 (Table 2), and the number of leks detected on route 1 have shown a significant increase over the last 9 years ( $r^2 = 0.63$ ;  $P = 0.02$ ), trend analysis from 11 of these routes on which at least 1 lek was detected (Appendix A) indicated no trend in lek numbers ( $\bar{x}_\beta = 0.08$  leks/yr  $\pm 0.20$  (SD);  $t_{0.5, (2), 9} = 1.38$ ;  $P = 0.20$ ;  $P(-0.05 \leq \mu_1 - \mu_2 \leq 0.22) = 0.95$ ).

Table 1. Lesser Prairie-Chicken leks detected on 29 roadside surveys in east-central New Mexico, 2000–2006.

	Year						
	2000	2001	2002	2003	2004	2005	2006
Leks detected	52	52	40	48	57	54	87
No. of routes with leks detected	14	16	13	16	13	16	18

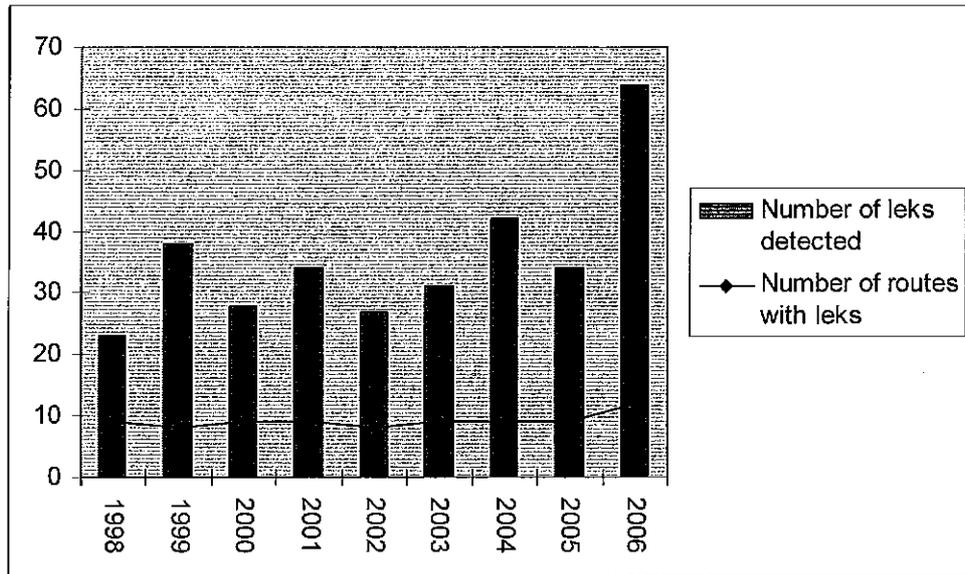


Figure 1. Lesser Prairie-Chicken lek activity on 16 roadside routes surveyed in east-central New Mexico, 1998-2006.

**Southeastern New Mexico:** The southeast area (below 33 degrees north) represents the southern periphery of LPCH range and may only be occupied during favorable climatic periods (Snyder 1967). Although 1 lek was detected on the 2 roadside routes (28-29) in southeast Chaves County where LPCH are sparse and scattered (Table 2), existing data from NMDGF survey efforts suggest populations south of Highway 380 remain low and continue to decline. Best et al. (2003) concluded anthropogenic factors have rendered LPCH habitat south of Highway 380 inhospitable for long-term survival of LPCH in southeastern New Mexico. Similarly, NMDGF survey data suggest quality of habitat may be limiting the recovery of these populations. While it is desirable to maintain and/or re-establish LPCH in their historical range within southeast New Mexico, populations in east Eddy and southern Lea counties are not considered necessary for continued viability of the species in New Mexico (Bailey 1999).

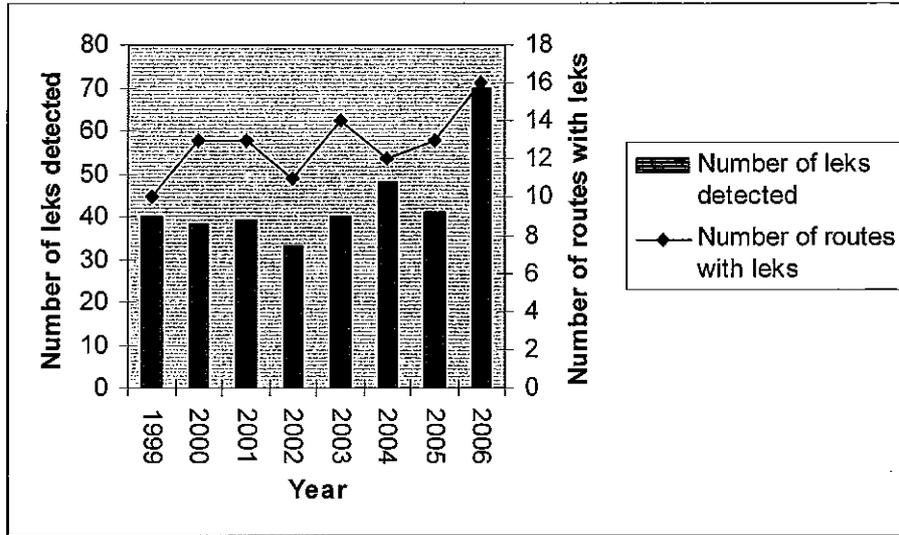


Figure 2. Lesser Prairie-Chicken lek activity on 26 of 29 roadside routes surveyed in east-central New Mexico, 1999-2006.

Table 2. Number of Lesser Prairie-Chicken leks detected on roadside routes where prairie-chicken populations were identified as sparse and scattered (Roadside Routes 1-16; Bailey and Williams 2000), in the core of currently occupied prairie-chicken range (Roadside Routes 17-27; Bailey and Williams 2000), and in southeast Chaves County, south of U.S. Highway 380 (Roadside Routes 28-29).

	Year								
	1998	1999	2000	2001	2002	2003	2004	2005	2006
Routes 1-16	1 <sup>a</sup>	2	9	8	5	10	7	8	15
Routes 17-27	23 <sup>b</sup>	37 <sup>b</sup>	43	43	31	38	50 <sup>d</sup>	45	71
Routes 28-29	3	3 <sup>c</sup>	0	1	1	0	0	1	1

<sup>a</sup>Routes 1-8, 11-12, and 14 were not surveyed in 1998.

<sup>b</sup>Route 18 was not surveyed in 1998 and Route 19 was not surveyed in 1998 and 1999.

<sup>c</sup>Route 29 was not surveyed in 1999.

<sup>d</sup>Route 24 was not surveyed in 2004.

### Prairie Chicken Management Areas (PCAs)

Surveys were conducted on 27 of 29 PCAs from March 25–April 21, 2006 (Appendix C). In 2006, 183 leks were detected either audibly or visually on or near PCAs (48 leks were detected on PCAs; 38 on State Trust Lands; 16 on public lands administered by the Bureau of Land Management; and 81 on private lands, respectively). During 2006, over 1,100 LPCH were counted on a total of 100 leks; an increase of 36% from the previous year (Table 3). Since 1996, the number of leks detected, number of leks observed, and number of LPCH observed have increased; but, survey effort and number of PCAs surveyed have also increased over that time period (Figure 3). However, over the last 11 years, the total number of leks detected and number of leks observed (on which counts were made) have also steadily increased when examining 15 PCAs that have been surveyed each year during that time period (Figure 4). Although there was a decrease in lek size in 2001,

opulation trends (indicated by average birds per lek) have shown a significant increase ( $r^2 = 0.64$ ,  $P = 0.003$ ) from 1996–2006, possibly indicating a reversal of the downward trends of the early 1990s (Figure 5).

Table 3. Number of LPCH leks detected on or near New Mexico PCAs, 1996–2006.

	Year										
	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
PCAs surveyed	15	16	16	16	19	27	26	26	27	26	27
Leks detected	11	10	32	27	55	69	132 <sup>a</sup>	102	113	135	183
Leks w/ individual birds counted	9	6	18	22	20	43	57	54	59	73	100
LPCH observed	31	24	111	172	238	343	533	571	561	726	1,117
Mean birds/lek	3.40	4.00	6.20	7.80	11.90	8.00	9.35	10.57	9.51	9.95	11.17

<sup>a</sup>The higher number of leks detected in 2002 occurred because the observer did not follow PCA survey protocol on the Milnesand PCA, which likely resulted in some leks being counted more than once.

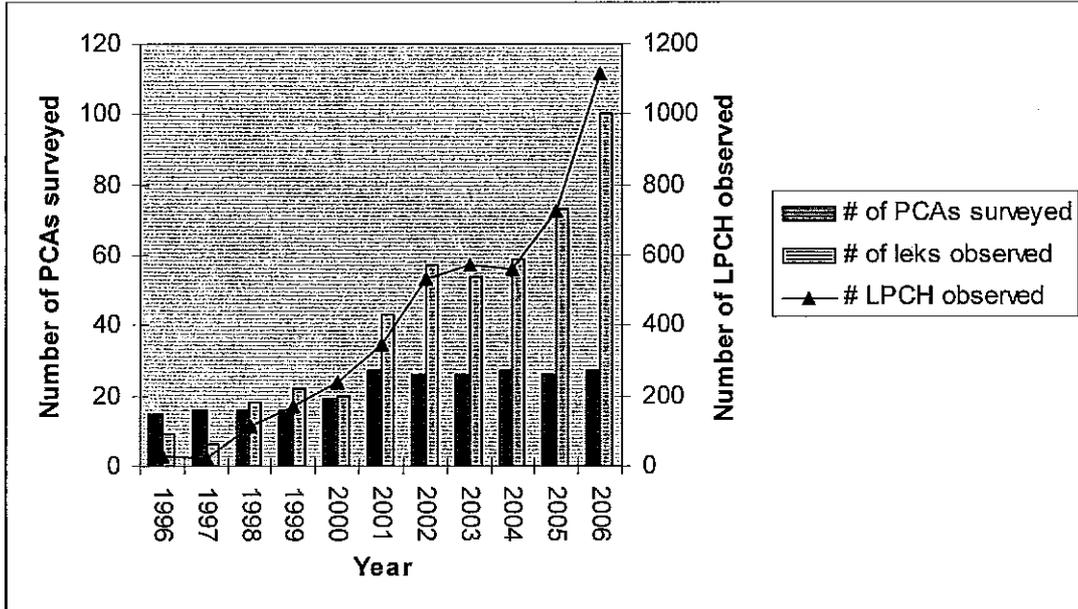


Figure 3. Prairie Chicken Areas surveyed, number of leks observed, and number of LPCH observed on or near PCAs in eastern New Mexico, 1996–2006.

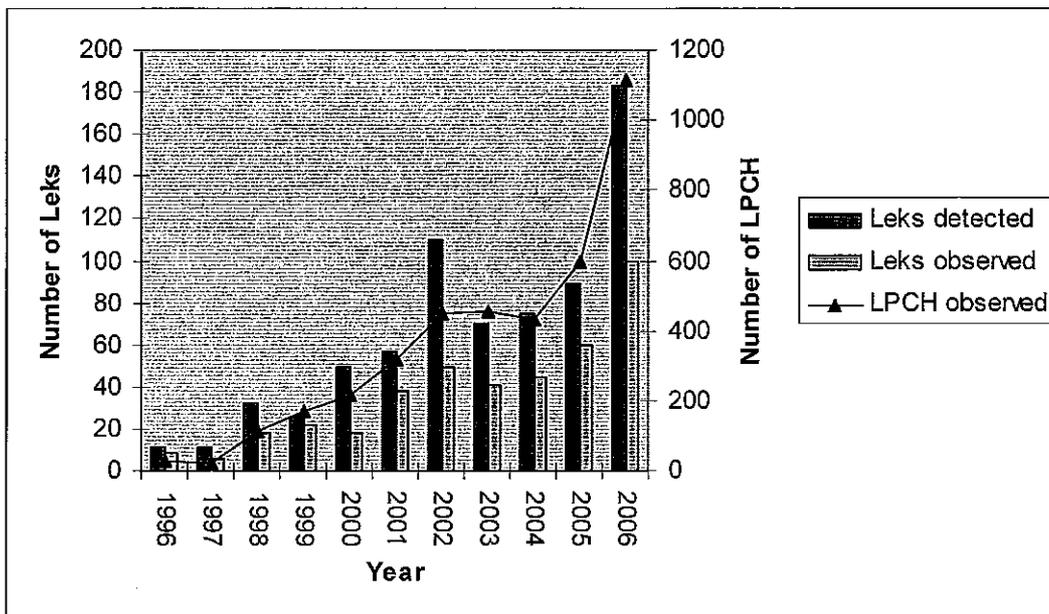


Figure 4. Lesser Prairie-Chickens counted on or near 15 PCAs in eastern New Mexico, 1996–2006.

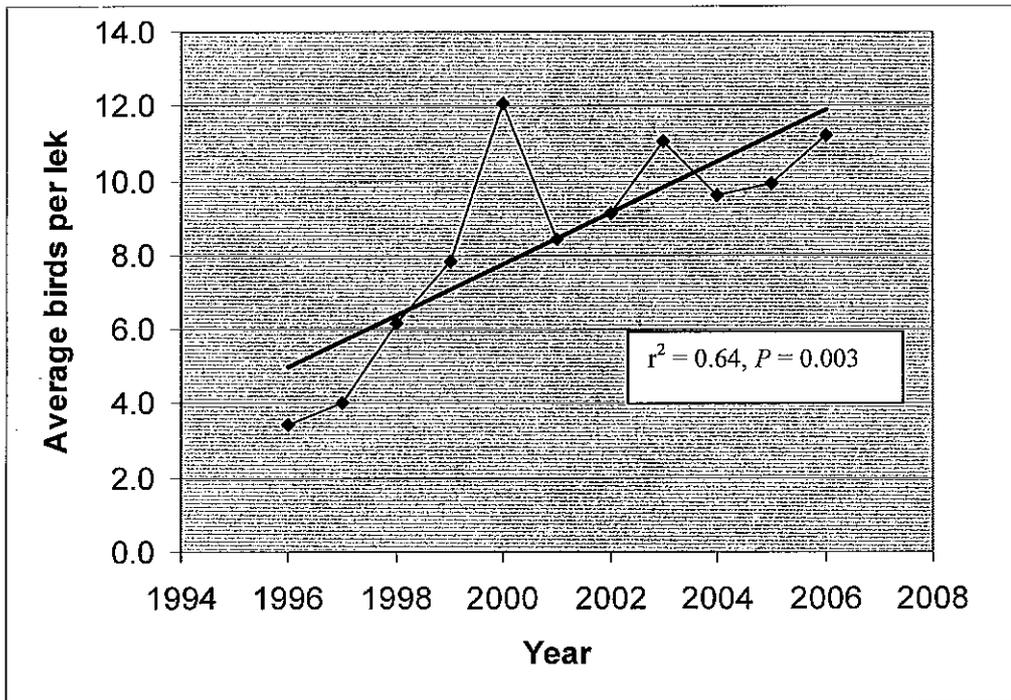


Figure 5. Changes in lek size (birds per lek) for LPCH observed on or near 15 PCAs surveyed annually in eastern New Mexico, 1996–2006.

## Current Status and Distribution

LPCH occupy at least 6 of the 12 counties within the historic distribution of LPCH in New Mexico (Figure 6). From 2001–2005, more than 400 LPCH lek sites were audibly located through survey efforts in eastern New Mexico (Davis 2006). Overall, annual rates of change in population trend suggest numbers are increasing within the core of the occupied range in east-central New Mexico. The total occupied range of LPCH in New Mexico is approximately 2,200 square miles and supports a minimum spring breeding population that is conservatively estimated to be about 9,400 birds (Davis 2006).

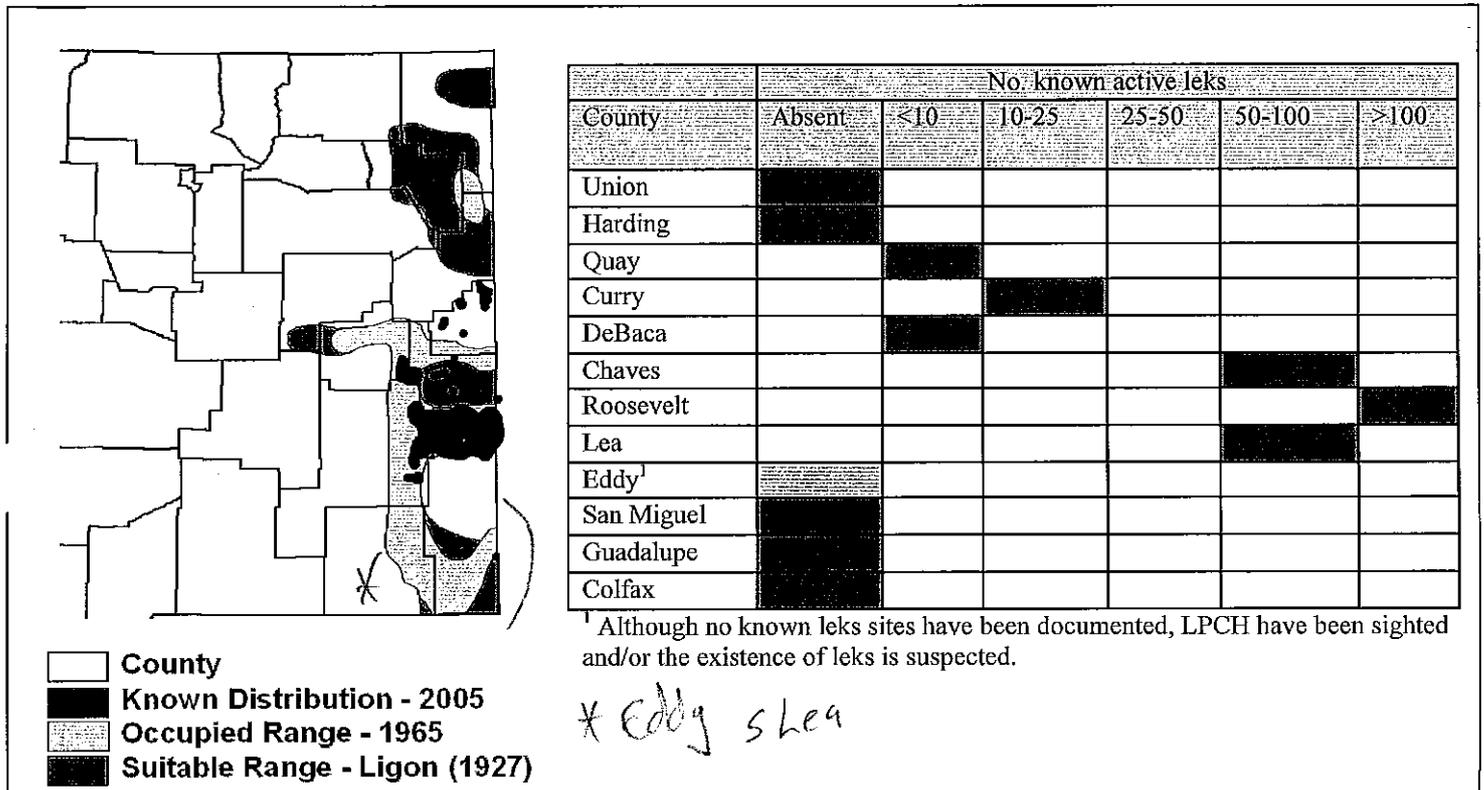


Figure 6. Occupied range (~2,200 mi<sup>2</sup>) of LPCH in eastern New Mexico, 2005.

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Appendix A. Trend analysis of the total number of LPCH leks detected on 29 roadside routes in east-central New Mexico, 1998–2006.

Roadside Route	Number of years	Trend	Regression coefficient ( $\beta$ )	95% CI ( $\beta$ )
1	8	Increasing*	0.32	0.08, 0.57
2	8	Decreasing	-0.06	-0.19, 0.07
3	8	No leks detected	--	--
4	8	Stable	0.00	-0.31, 0.31
5	8	No leks detected	--	--
6	8	Decreasing	-0.12	-0.27, 0.03
7	9	Decreasing	-0.07	-0.29, 0.16
8	8	Stable	0.00	-0.19, 0.19
9	9	No leks detected	--	--
10	9	Increasing	0.55	-0.15, 1.25
11	8	No leks detected	--	--
12	8	Increasing	0.15	-0.22, 0.53
13	9	Decreasing	-0.07	-0.22, 0.09
14	8	Increasing	0.12	-0.06, 0.30
15	9	No leks detected	--	--
16	9	Increasing	0.10	-0.01, 0.21
17	9	Decreasing	-0.23	-0.76, 0.29
18	9	Decreasing	-0.03	-0.36, 0.30
19	9	Increasing*	1.07	0.65, 1.49
20	9	Increasing	0.20	-0.78, 1.18
21	9	Increasing	0.17	-1.01, 1.35
22	7	Decreasing	-0.21	-1.58, 1.15
23	9	Increasing	0.38	-0.11, 0.87
24	8	Increasing	0.49	0.26, 1.24
25	9	Increasing	0.05	-0.69, 0.79
26	9	Increasing*	0.48	0.05, 0.91
27	9	Increasing*	0.47	0.09, 0.85
28	8	Decreasing	-0.22	-0.53, 0.09
29	8	Decreasing	-0.07	-0.26, 0.12

Mean regression coefficient for 29 roadside routes =  $0.14 \pm 0.31$  (SD)<sup>a</sup>;  $P < 0.05$

\*  $P \leq 0.05$

<sup>a</sup>Calculations exclude routes where no leks were detected.

Appendix B. Lesser Prairie-Chicken leks detected along 29 roadside routes in east-central New Mexico, 1998–2006.

Route number	Number of leks detected								
	1998	1999	2000	2001	2002	2003	2004	2005	2006
1	--	0	1	0	0	2	2	2	2
2	--	0	1	0	0	0	0	0	0
3	--	0	0	0	0	0	0	0	0
4	--	1	2	1	1	3	2	1	1
5	--	0	0	0	0	0	0	0	0
6	--	1	0	1	0	0	0	0	0
7	0	0	1	2	0	0	0	0	0
8	--	0	0	0	1	1	0	0	0
9	0	0	0	0	0	0	0	0	0
10	0	0	1	0	0	0	0	1	8
11	--	0	0	0	0	0	0	0	0
12	--	0	3	2	3	2	2	3	2
13	1	0	0	1	0	1	0	0	0
14	--	0	0	1	0	1	0	1	1
15	0	0	0	0	0	0	0	0	0
16	0	0	0	0	0	0	1	0	1
17	6	1	0	1	1	1	1	1	2
18	0	0	3	0	1	0	0	0	1
19	3	1	1	5	6	5	7	9	10
20	4	10	6	6	3	2	11	8	7
21	2	7	13	9	4	7	7	3	11
22	--	--	13	7	5	6	9	8	9
23	1	3	0	3	6	4	3	3	5
24	3	2	1	5	0	2	--	4	8
25	0	7	0	0	0	2	2	2	3
26	1	0	1	2	1	2	4	1	6
27	3	6	5	5	4	7	6	6	9
28	2	3	0	0	0	0	0	0	1
29	1	--	0	1	1	0	0	1	0
No. routes surveyed	18	27	29	29	29	29	28	29	29
No. routes w/ leks	11	11	14	16	13	16	13	16	18
No. leks detected	27	42	52	52	40	48	57	54	87
No. leks/route	1.5	1.6	1.8	1.8	1.4	1.7	2.0	1.9	3.0

Appendix C. Lesser Prairie-Chicken leks detected on or near PCAs in eastern New Mexico, April 1996–2006.

PCA	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Antelope Flats	--	--	--	--	--	--	--	--	--	--	--
Black Hills (East and West)	4	1	3	5	9	8	11	2	6	7	12
Bledsoe	--	--	--	--	--	2	3	3	4	5	9
North Bluit	0	1	1	2	2	2	7	1	7	6	9
South Bluit	0	0	1	1	0	2	2	5	1	4	9
East Bluit	--	--	--	--	--	1	1	1	2	2	1
Claudell	0	0	1	0	4	2	2	2	5	4	3
Crossroads 1	4	2	6	4	4	8	8	9	7	7	13
Crossroads 2	0	1	4	2	2	3	2	2	4	7	9
Crossroads 3	--	--	--	--	4	4	8	10	9	10	17
Crossroads 4	--	--	--	--	--	0	0	2	3	3	4
Crossroads 5	--	--	--	--	--	1	3	5	6	6	6
Farmer's	--	--	--	--	--	1	3	--	3	6	3
Gallina Wells 1	0	0	2	1	5	5	4	7	8	7	9
Gallina Wells 1A	--	--	--	--	1	2	1	3	2	3	2
Gallina Wells 1B	--	--	--	--	1	0	2	3	2	--	1
Gallina Wells 2	0	1	2	1	1	1	2	2	2	3	3
Gallina Wells 3	0	0	0	0	1	0	2	1	0	2	5
Gallina Wells 4	0	0	0	0	3	2	3	1	3	5	12
Gallina Wells 5	0	0	2	1	3	2	4	4	4	6	7
Gallina Wells 6	0	0	1	1	1	6	8	6	6	5	9
Liberty	0	1	0	1	1	1	2	2	1	2	4
Marshall	0	1	2	2	4	5	8	9	3	3	4
Milnesand	3	2	7	6	9	10	45 <sup>c</sup>	17	18	21	23
Tatum	--	--	--	--	--	0	--	--	--	--	--
Wayside	--	--	--	--	--	0	0	0	0	0	0
Pitchfork <sup>a</sup>	--	--	--	--	--	--	--	1	3	2	2
Little Dipper <sup>b</sup>	--	--	--	--	--	0	1	4	4	9	7
Totals	11	10	32	27	55	69	132	102	113	135	183

<sup>a</sup>Formerly Polaris

<sup>b</sup>Formerly NM 125.

<sup>c</sup>The higher number of leks detected in 2002 may be due to sampling error. In 2002, the observer did not follow PCA survey protocol, which may have led to a bias toward a higher number of leks detected.