Survey of the Lesser Prairie-chicken on Bureau of Land Management Lands

Carlsbad Resource Area, NM

1999

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Introduction

Range-wide, the Lesser Prairie-chicken (LPCH, *Tympanuchus pallidicinctus*) is reduced to eight percent of its original distribution. Over five states, just three percent of the estimated historic population remains (Giesen, 1998). Occupied range has declined 78% since 1963 (Giesen, 1998; Taylor and Guthery, 1980). Historically, crop conversion, drought, and grazing practices have accounted for population declines.

The range-wide decline of the species prompted a 1995 petition to the US Fish and Wildlife Service to list the LPCH as threatened (Biodiversity Legal Foundation, 1995). On June 9, 1998, the U.S. Fish and Wildlife Service published a twelve-month finding on the petition to list the LPCH. "Protection of the LPCH under the Federal Endangered Species Act is justified", states the ruling, and this species remains a candidate for future listing (Department of the Interior, 1998). The necessity of reviewing species of higher priority precludes the listing of the LPCH for at least one year from the date of the finding.

The decline of the Lesser Prairie-chicken in New Mexico has been recognized since the 1930's, when hunting of the species was first prohibited (Peterson and Boyd, 1998). In the northeast portion of the state, the LPCH is considered extirpated from Harding, Quay and Union counties. In east-central and southeast New Mexico the LPCH is believed to occur in only 34% of its historic range (NMDGF, unpublished data). In 1998, the NMDGF prepared a report on the status of LPCH nesting habitat. Of the suitable, historic range identified by J. Bailey and J. Klingel (unpublished data) only 4% (13) of 334 sites were rated as good potential nesting habitat.

The Roswell Field Office of the Bureau of Land Management has surveyed LPCH populations on the Caprock Wildlife Habitat Management Area (Caprock WHMA) for 28 years. These surveys on the Caprock have been used as an index of the species' status in New Mexico. Based on the negative trend in this population, the New Mexico Department of Game and Fish (NMDGF) discontinued the seasonal hunts of 1996-1999. The NMDGF has recently recommended that the species be listed as threatened in New Mexico under the New Mexico Wildlife Conservation Act (New Mexico Department of Game and Fish, 1999).

In 1985 the Bureau of Land Management (BLM) Carlsbad Field Office initiated surveys of LPCH leks. Four initial leks were counted, and by 1987 twenty active leks were tallied. In the 15-year history of the study, there have been 33 different leks detected in Eddy and Lea counties. The purpose of this study was to survey areas of potentially suitable habitat within the Carlsbad Field Office Area (CFO) for LPCH activity. We also include results of 1999 lek site surveys conducted by the Carlsbad Field Office.

Methods

Lek Surveys

John Sherman of the Carlsbad BLM surveyed traditional lek sites, while New Mexico Natural Heritage Program (NMNHP) biologists conducted road surveys in areas having

suitable LPCH habitat, but not previously known to include active lek sites. On 19 April, NMNHP personnel also visited the site of QP-22, the one lek that was active in 1998.

Road Surveys

Because only one historical lek was active in 1998, BLM and NMNHP biologists agreed to focus efforts in areas of the CFO that had not been previously surveyed for LPCH and where suitable lekking/nesting habitat existed.

Road survey routes were determined by locating the most suitable lek habitat. GAP analysis maps (New Mexico State University, 1996) were useful, overlaid with maps showing roads and oil fields. Habitat assessments were based on presence of clearings or openings that could serve as lek sites, as well as suitability of surrounding habitat for nesting. We also focused on areas having a minimum of pump noise and traffic disturbance. We conducted road surveys in two main areas, Los Medanos (3-12 April), south of Querecho Plains, and Loco Hills (13-23 April), North of Querecho Plains. Routes were mapped on Hobbs and Jal 1:100,000 field maps and then converted into GIS in ArcView.

Road surveys were conducted during the four-hour window of highest lek activity. Surveys began as early as first light and were generally concluded by 0800 h, from 3 April to 23 April, 1999, during the peak lek activity period. Landscape features and noise sometimes impair lek detection, but under acceptable conditions surveyors can confidently detect an active lek at least one mile away. Road transects typically entailed 2-5-minute listening stops at intervals of less than one mile. In suitable prairie-chicken habitat or when listening conditions were less than optimal due to wind, stops were made at intervals as small as 0.3 mile. A map supplement to this report, of USGS 7.5 x 15 minute quadrangles, shows road routes. A one-mile buffer is drawn around each route, to indicate the survey area. Area in hectares covered on each quadrangle was computed using ArcView.

Database

Survey data from historic lek sites were added to the NMNHP Access database. This database includes 15 years of Carlsbad data, in addition to the 28 years of Roswell BLM surveys and four years of results from NMDGF Prairie-chicken Management Areas. The database was queried to provide population trend information. A lek survey consists of a count of males, females, and birds of unknown sex. The highest single count at each lek was summed by year. This sum is the total number of birds surveyed (Number of LPCH, Fig. 1). This count will typically be a conservative estimate of the maximum lek size, because of variation in lek attendance, primarily by females. "Leks visited" (Fig. 1) provides a measure of investigator effort. We define average number of birds per lek (Fig. 2) and percent of leks active (Fig 2) as two separate measures of activity. We include percent of leks active from 1991 on, because visits to unoccupied leks were not noted in prior years.

Results

Lek Surveys

In 1998, there was only one active booming ground on the Querecho Plains; otherwise, all remaining historic leks were inactive (see Appendix 1 for 1999 data sheets). The 1998 count

at Querecho Plains #22 (QP-22), never exceeded six known individuals. In 1999, only three males were observed at QP-22. In addition, on two occasions (4/13/99, 4/15/99) John Sherman heard males booming east of the traditional site of lek EU-23. These detection were entered into the database as an estimate of two males at EU-23, and a count of one male at EU-23. This gives a total estimate of five birds (total count of four) in the CFO for 1999, two fewer than counted in 1998 (Figure 1).

The surveyor noted impacts on lek survey data sheets. Of 32 leks sites visited, only two were described as natural. Oil and gas activity was noted at 17 sites, with notable noise levels at 12 of the 17. Oil/gas combined with cattle impacts were noted at 12 sites. One site had no comments regarding impacts. Excluding this one site, 94% of traditional lek sites visited were impacted by oil/gas alone or oil/gas combined with grazing. Of particular concern are the observations that "heavy" to "severe" livestock utilization was present at six sites (19%), and two were so heavily grazed that dunes had become destabilized due to vegetation loss. Extreme noise from pumpjacks was noted at ten lek sites (31%). One of the two traditional leks that is still active (QP-22) is located at one of the two remaining sites described as "natural". The other active lek (EU-23) had moved east from the traditional site, which was impacted by oil and gas activity.

Road Transects

The road surveys covered approximately 247 road miles of potential LPCH habitat (Table 1, Quad. maps). The area of coverage via road survey was 62,576 ha. Each route was unique, and we made no effort to resample negative routes. The results of the roadside surveys were completely negative.

Table 1. Areas and road miles surveyed in 1999 Lesser Prairie-Chicken Road Surveys.

7.5' Quad	Mileage (mi.)	Area Surveyed (ha)
Bootleg Ridge	29.14	13,041
Grama Ridge	7.8	4,668
Greenwood Lake	12.45	5,476
Henshaw Tank	63.71	18, 586
Laguna Gatuna	21.03	8,754
Lea	1.76	1,738
Livingston Ridge	2.03	1,728
Loco Hills	25.22	11,641
Los Medanos	5.7	3,972
Maljamar	17.31	11,293
Maljamar Northeast	7.46	4,070
The Divide	53.18	19,380
total:	246.79	62,576

Database

A database summary of 15 years of surveys at the CFO shows that the Carlsbad population has declined dramatically and is nearly extirpated (Figure 1). In spite of increasing effort every year since 1989, the number of birds detected in the lek surveys has fallen every year since 1993, except for 1997, in which numbers increased slightly. The total for 1999 is an all-time low, in a year when effort was at an all-time high.

The number of birds per lek has also fallen dramatically (Figure 2), although it appears not as sharply as the number of birds. This probably occurs because there is a critical number of males necessary for a lek to exist. When only a few birds remain, males may tend to abandon a lek and join a larger one. Supporting this hypothesis is the fact that the percent of leks active has fallen sharply (Figure 2), more in accord with the decline in total bird numbers (Figure 1) than with the decline in birds per lek.

Discussion

Carlsbad Resource Area

These data suggest that the CFO population of prairie-chickens is in imminent jeopardy of extirpation. The Carlsbad population peaked at 160 individuals in 1987. Populations declined between 1997 and 1998 (Smith et al. 1998), a breeding cycle over which the Caprock WHMA population experienced a 100% increase (Johnson and Smith 1998), and Game and Fish Prairie-chicken Management Area (PCA) counts rebounded by 500% (Johnson et al., 1998). Between 1998 and 1999, the Caprock population declined, and the PCAs remained similar, while the Carlsbad lek count again declined. The area has probably always been on the edge of the species' range, and populations may never have been comparable in size to ones further north. Excessive habitat alteration and, more recently, drought, apparently have proved more than this small population could withstand.

Causes of Decline

The High Plains Bluestem Subtype-1 (HPBS-1), dominated by shinnery oak (*Quercus havardii*) and sand bluestem (*Andropogon hallii*), is critical to nest success of Lesser Prairie-chickens (Riley et al. 1992). An evaluation of brood foraging sites revealed that LPCH broods were found exclusively in the HPBS, dominated by shinnery oak and three-awn grasses (*Aristida* spp.; Riley and Davis, 1993). When birds are forced to nest in areas of reduced cover, nesting success is reduced (Davis et al. 1979, LPCIWG 1999 and references therein). Range management practices that do not leave adequate cover in bunchgrasses therefore contribute to the decline of the LPCH.

From 1968 to 1993, the BLM has treated 78,376 acres of CFO shinnery oak communities with the herbicide tebuthiuron. Preliminary results of an ongoing nest habitat study on the Caprock WHMA, which underwent a tebuthiuron application program, show that nesting hens are using untreated pastures or untreated areas of treated pastures (Johnson et al. 1998, Johnson unpublished). In a separate study, hens were found to prefer nesting in uncontrolled shinnery pastures as well (Peterson and Boyd, 1998). Brush control, by eliminating vast

areas of nesting and brood-rearing habitat, has also apparently impacted Carlsbad LPCH populations.

Oil and gas development is evident throughout LPCH range in New Mexico; however, well density and noise-related impacts on the CFO are particularly significant. We cannot overstate the potential severity of sound disturbance on a species that is reliant on vocal communication. Booming males signal their whereabouts to females and attract hens for copulation through displays and vocalizations (Giesen, 1998). Noise pollution from un-muffled pump jacks is only one form of disturbance attributable to oil and gas development. Habitat fragmentation, road construction, vehicle traffic, and oil-well-wastewater sites may also impact the LPCH of this region.

Across the five state range, population fragmentation and disappearance has been common (Biodiversity Legal Foundation, 1995). Not only is the health of individual populations at risk, but genetic connection between populations is necessary to maintain overall species viability. Without useable corridors, neighboring populations experience inbreeding, a symptom of small, isolated populations. This loss of connectivity can lead to "adaptive decline and extinction" (Mills and Allendorf, 1996).

Research Recommendations

1. There is little chance of the natural re-establishment of this LPCH population. Therefore, the primary research goal at this time should be to examine the management practices that led up to this demise. This should include continued efforts to understand the impact of grazing, brush control, and oil and gas development on traditional nesting areas. It is critical that the Carlsbad managers communicate the findings of this inquiry to all managers presiding over similar resource development within LPCH habitats.

2. It is clear that BLM lands in the CFO area are now nearly devoid of LPCH. It is possible that private land or state land in the area may still harbor the species, particularly if impacts have been less than on BLM land. However, the majority of land in the area is BLM-owned. State parcels are mostly a section in size, and almost none of the land is private. Nevertheless, it is important to survey private and state land in the area to determine if any suitable habitat or birds remain. If habitat on BLM land were restored, re-establishment of birds from a source population to the north might be possible. Population genetic studies can aid in determining whether reintroduction from an extant population might be feasible.

3. A comprehensive map of the habitat subtypes supporting the LPCH would also streamline management efforts. Such a map would require land satellite imagery refined by remote-sensing techniques; if the subtypes were readily apparent this tool could be widely applied to assess range quality.

4. Further understanding of predator impacts on LPCH populations is necessary. There is evidence of high predation rates on the Caprock WHMA (Davis et al. 1979, Johnson et al. 1998). A further study of mammalian, avian, and reptilian depredation could reveal new management strategies. Continued analysis of LPCH parasites and diseases is recommended.

Conclusions

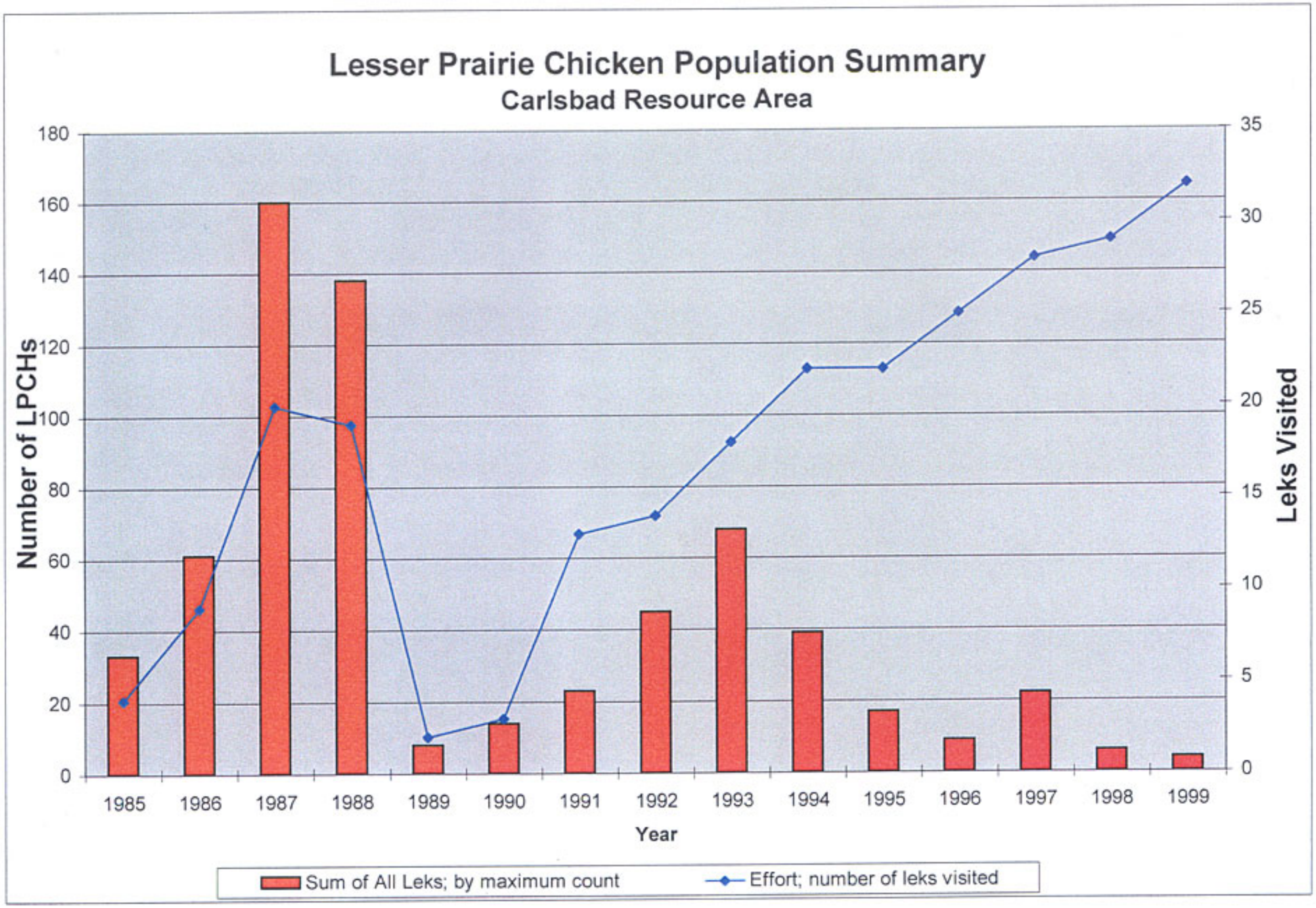
The extirpation of the LPCH from the CFO is likely; however, the population decline was foreseeable and preventable. Extreme impact from human activities, including livestock management and oil/gas development, has apparently led to the decline of the Lesser Prairie-chicken at Carlsbad. The CFO needs to be evaluated from an ecosystem standpoint and rehabilitated to prevent further biodiversity losses. Measures to salvage this population will benefit other species inhabiting the shinnery oak-bluestem grassland.

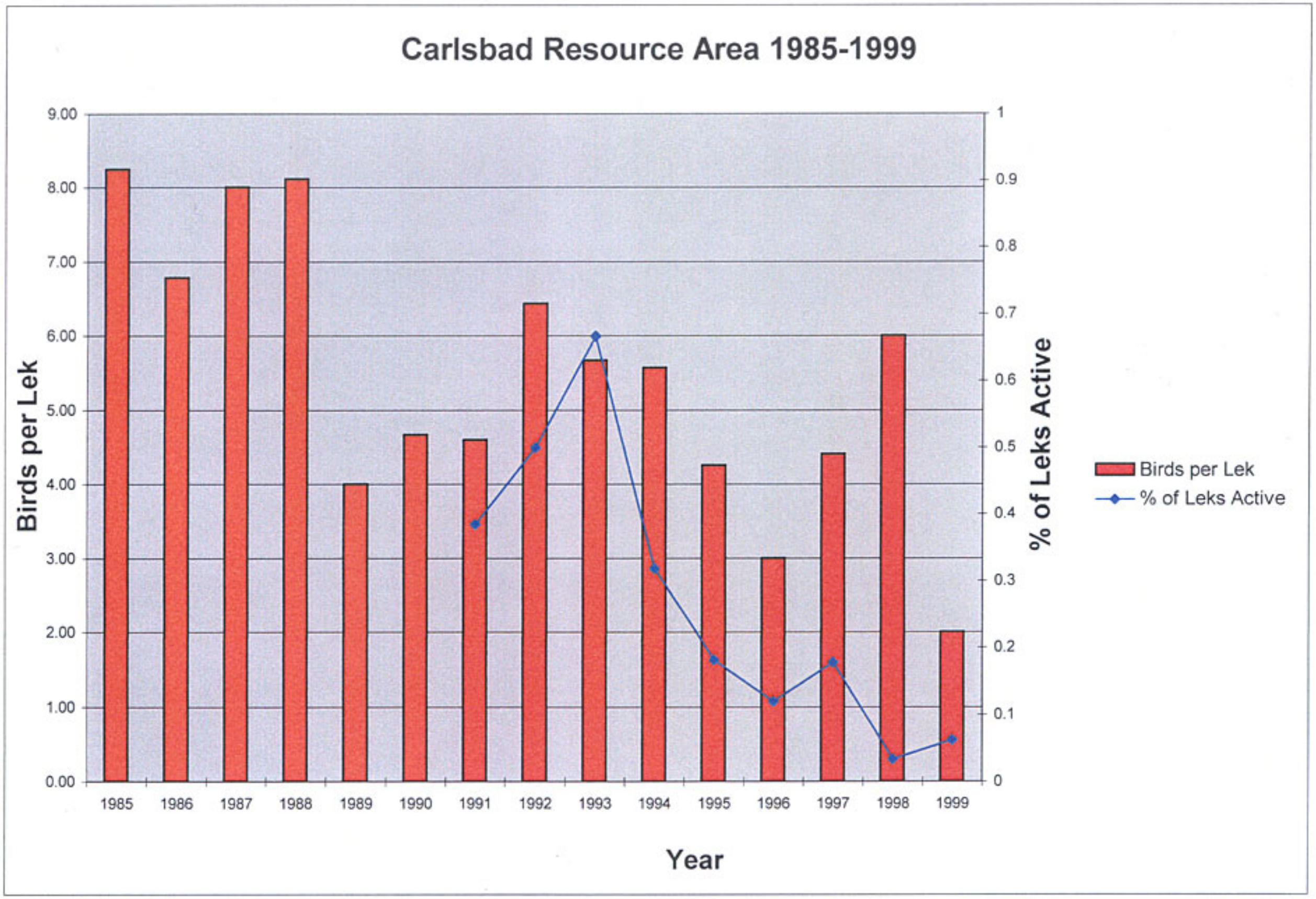
The fate of the LPCH is not sealed on the CFO. The PCA program, managed by the NMDGF, illustrates an effective conservation practice. Land allotments equal to or greater than a section appear to have been successful as breeding exclosures in LPCH nesting habitat. To facilitate a natural recovery or re-introduction on the CFO, it would be important to remove noise disturbance and restore altered habitats.

Figure Legends

Figure 1. Sums of maximum numbers of LPCH counted at all BLM leks, 1985-1999. The blue line connects points showing the number of lek sites visited.

Figure 2. The annual population count was divided by number of active leks to gather a mean lek attendance figure, 1985-1999. The blue line connects points showing the percent of visited leks which were active, 1991-1999. Prior to 1991, negative survey records were not kept.


Lesser Prairie Chicken Population Summary
Carlsbad Resource Area
Number of LPCHs
Leks Visited
180
160
140
120
100
80
60
40
20
0
35
30
25
20
15
10
5
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Year
Sum of All Leks; by maximum count
Effort; number of leks visited


Carlsbad Resource Area 1985-1999
Birds per Lek
% of Leks Active
Year
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
Birds per Lek
% of Leks Active

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List of Appendices

Appendix 1. Data sheets from 1998 surveys of CFO historic leks.