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ASSESSMENT OF CONSERVATION RESERVE PROGRAM FIELDS WITHIN THE CURRENT DISTRIBUTION OF LESSER PRAIRIE-CHICKEN

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ABSTRACT—Populations of lesser prairie-chicken (*Tympanuchus pallidicinctus*) have declined by more than 90%, due primarily to the conversion of sand-sage and mixed-grass prairie to agriculture, overgrazing by domestic livestock, juniper encroachment, and fossil-fuel development. Degradation of native habitats has made restored cropland through the Conservation Reserve Program (CRP) potentially one of the best management options for lesser prairie-chicken. An estimated 1.4 million hectares of CRP exist within the lesser prairie-chicken range. We assessed 1,019 CRP fields representing more than 51,000 hectares within the current distribution of the lesser prairie-chicken. We sampled various grassland plantings including Farm Service Agency conservation practices 1, 2, 4, 4D, 10, and 25. In the context of lesser prairie-chicken habitat requirements for nesting and brood-rearing, our data suggest the following conservation practices (CP) have the highest potential for lesser prairie-chicken management: in Colorado and New Mexico, CP10 and CP2; in Oklahoma, CP2, followed by CPs 25 and 10; in northeast Texas, CP2, and in northwest Texas CPs 1, 10, and 2. Kansas CRP fields consistently displayed a high forb component and tall average grass height, habitat attributes that are consistent with the incidence of range expansion and population stability of the lesser prairie-chicken within that state. These field assessments are the first step in a process to target fields for CRP re-enrollment and to guide management to benefit lesser prairie-chicken.

Key Words: conservation practice, Conservation Reserve Program, grassland restoration, grassland structure, lesser prairie-chicken, prairie grouse

INTRODUCTION

The lesser prairie-chicken (*Tympanuchus pallidicinctus*) was once locally common throughout the southern Great Plains but now occurs in less than 10% of its former range (Hagen et al. 2004; Fig. 1). Lesser prairie-chicken populations have declined by approximately 97% since the 19th century (Taylor and Guthery 1980; Applegate and Riley 1998). The primary reasons for this population decline are conversion of rangeland to agriculture and overgrazing of remaining range (Woodward et al. 2001). Secondly, woody vegetation encroachment (especially *Juniper virginianus*) and brush control practices that reduce shrub cover can also be detrimental to populations of the lesser prairie-chicken in parts of its range (Boyd and Bidwell 2001). Several researchers have noted that although habitat conversion has apparently slowed throughout the species' range, its populations continue to decline (Woodward et al. 2001; Hagen et al. 2005). This decline may be due to degradation of remaining habitat, fragmentation by energy development, and collisions with fences and other barriers (e.g., Wolfe et al. 2007).

The lesser prairie-chicken utilizes several disparate habitat types throughout its life cycle (Hagen et al. 2004). Lesser prairie-chicken males conduct complex mating displays on areas of short vegetation or bare ground (leks) often located on knolls or ridges (Giesen 1998). Breeding lesser prairie-chicken hens seek relatively tall vegetation (>40 cm) for nesting in bunchgrasses (e.g., *Andropogon* spp.), usually with a component of shinnery oak (*Quercus havardii*), sand-sagebrush cover (*Artemisia filifolia*, Giesen 1994; Boyd and Bidwell 2001; Hagen et al. 2004), or various tall, relatively dense forbs (e.g., alfalfa). Brood-rearing habitat consists of areas with abundant bare ground (>60%) to facilitate chick movement. Vegetation in brooding areas is a combination of grasses (43%-60%), shrub cover (24%-43%), and forbs (13%-26%) with overall vegetation height 25-30 cm (Riley and Davis 1993; Jamison et al. 2002; Hagen et al. 2004). The forb component in brood-rearing areas is important, as it provides substrate for invertebrates, which make up the majority of the chick diet (Pitman et al. 2006a; Doxon and Carroll 2007). Under historic conditions, these three distinct patch types were readily available throughout the Great Plains, sustained by natural fire regimes and grazing by native herbivores (e.g., bison, prairie dogs).

Intensive grazing, cultivation practices, and energy development (e.g., oil drill pads) have resulted in an abundance of suitable lekking habitat; therefore, lek sites are generally not considered to be a limiting factor for lesser

prairie-chicken populations (Hagen et al. 2004). Several researchers have suggested that the critical demographic parameters for the lesser prairie-chicken are nesting success and chick survival, indicating the need for a management focus on suitable nesting and brood-rearing habitat for this species (Hagen 2003; Pitman et al. 2006b; Fields et al. 2006).

Currently, Conservation Reserve Program (CRP) lands provide important habitat for remaining populations of lesser prairie-chicken (Jamison et al. 2002), especially in Kansas, where the species has shown a positive response to habitat provided by CRP fields (Rodgers and Hoffman 2005). The importance of CRP to lesser prairie-chicken populations in other areas has not been studied extensively, but there is evidence to indicate that when fields are planted in a diverse native grass/forb mixture, suitable lesser prairie-chicken habitat can result (Hagen et al. 2004). Thus, the CRP has potential to sustain and/or help increase lesser prairie-chicken populations.

The goal of our study was to conduct a preliminary, broad-scale assessment of the condition (e.g., plant species, structure) of existing CRP grasslands within the current distribution of the lesser prairie-chicken. This assessment is the first step in an effort to target CRP fields for re-enrollment and effectively manage CRP for lesser prairie-chicken populations.

METHODS

Study Area

CRP surveys were conducted within the current range of lesser prairie-chicken. The Lesser Prairie-Chicken Interstate Working Group provided an up-to-date distribution map, and also provided input on the counties to be surveyed (Fig. 1). Based on this input, fields surveyed were located in four Colorado counties, 32 Kansas counties, four New Mexico counties, 15 counties in the western side of the Texas panhandle, eight counties in the eastern Texas panhandle, and nine counties in Oklahoma. The Texas panhandle was separated into two regions (hereafter northeast and northwest) based on input from biologists at the Texas Parks and Wildlife Department, as conservation practices were quite different between the two regions.

At the outset of this project, we determined that we would be able, on the basis of funding and field logistics, to survey a total of 1,040 CRP fields. To determine the number of fields within each state that would be surveyed, we multiplied 1,040 by the percentage of lesser prairie-

chicken area represented by each state. All surveys were conducted from public roadsides adjacent to CRP fields, owing to landowner privacy issues, the challenge of gaining access to more than 1,000 privately owned CRP fields, and the importance of assessing a large sample of fields.

Field Assessment

Prior to conducting formal surveys, our three observers were trained on eight different CRP fields in order to standardize data collection across observers and in order to train technicians on CRP field identification. CRP field sampling was conducted between June 15 and August 25, 2007. Fields were surveyed randomly within sample counties. We attempted to survey each CRP field from all four sides. On each side, we stopped at three to seven points along the road, depending on the length of the field, and viewed the field both with and without binoculars. Each field was observed for 10 to 20 minutes depending upon how many sides of the field could be accessed. For each field, we visually estimated the percentage of the following: grass cover, each species of grass (all species observed were identified and their percentage occurrence estimated), shrub cover, forb cover, and bare ground (not including canopy cover), as well as the overall average grass height in categories <35 cm, 35-65 cm, and >65 cm. Categories were delineated based on lesser prairie-chicken selection of vegetation heights >35 cm for nesting and brood-rearing (Rodgers and Hoffman 2005).

Surveyors recorded the location of surveyed fields with Global Positioning System (GPS) units along with field characteristics. Surveyors had no prior knowledge of the conservation practices of any field. After all surveys were complete, the Playa Lakes Joint Venture entered the field data, at both the state level and study area level, into a database and summarized them by conservation practices. No information was released on individual CRP fields.

Six grassland conservation practices were represented within our study area. These were defined by the Farm Service Agency as CP1, permanent introduced grasses and legumes; CP2, permanent native grasses; CP4, permanent wildlife habitat (e.g., corridors); CP4D, permanent wildlife habitat; CP10, already established grass and/or vegetative cover; and CP25, rare and declining habitat restoration.

RESULTS

We surveyed 1,019 of the 1,040 proposed CRP fields. Approximately 70% of fields were accessible from four

sides; the remainder were accessible from at least two sides. In our study area, Colorado had fields planted in CP2, CP4, CP4D, and CP10, Kansas had CP2, CP4, CP4D, CP10, and CP25, New Mexico had CP2 and CP10, Oklahoma had CP1, CP2, CP10, and CP25, and both northwest and northeast Texas had CP1, CP2, and CP10 fields.

CP2 (373 fields; 36% of fields surveyed) and CP10 (474 fields; 47%) were the most common conservation practices in this sampling area. We also surveyed CP1 (46 fields; 5%), CP4 (16 fields; 1%), CP4D (38 fields; 4%), and CP25 (72 fields; 7%).

Measures of grass, forb, and shrub cover, as well as grass species composition, were determined to have been consistent across observers throughout the study area. However, estimates of the bare ground component within fields was found to be relatively observer-biased, and therefore was removed from further analyses.

COLORADO

Dominant Grasses, Grass Structure, and Grass Species Richness

We surveyed 83 CRP fields in southeastern Colorado. Sideoats grama (*Bouteloua curtipendula*) and blue grama (*Bouteloua gracilis*) were most frequently the dominant grasses in all Colorado conservation practices (Fig. 2). These dominant grasses represented the majority of CP10 (85%; $N = 51$) and CP2 (55%; $N = 17$) fields, and all of the CP4D (100%; $N = 5$) fields. Within CP2 there was also a substantial amount of fields with western wheatgrass (*Pascopyrum smithii*) as the dominant grass (24%), while cheatgrass (*Bromus tectorum*) was dominant in 30% of CP4 ($N = 10$) fields (Fig. 2).

All fields surveyed in Colorado had at least one native grass species present. Just over 60% of CP10 and CP2 fields contained only native grass species (Fig. 3). Approximately 30% of CP4 fields contained all native species. In four of five (80%) CP4D fields surveyed, all grasses were native (Fig. 3).

In CP10, 41% of fields had an average grass height >35 cm (Fig. 4). Fifty-nine percent of CP2 fields and 60% of CP4D fields had an average grass height >35 cm. Only 20% of CP4 fields had an average grass height >35 cm (Fig. 4), and no fields were in the >65 cm category.

Colorado fields had a relatively high grass species richness in comparison with other states, with the exception of Kansas (Table 1). CP10 fields had an average of 3.12 grass species. CP2 fields had 3.41 species, and CP4

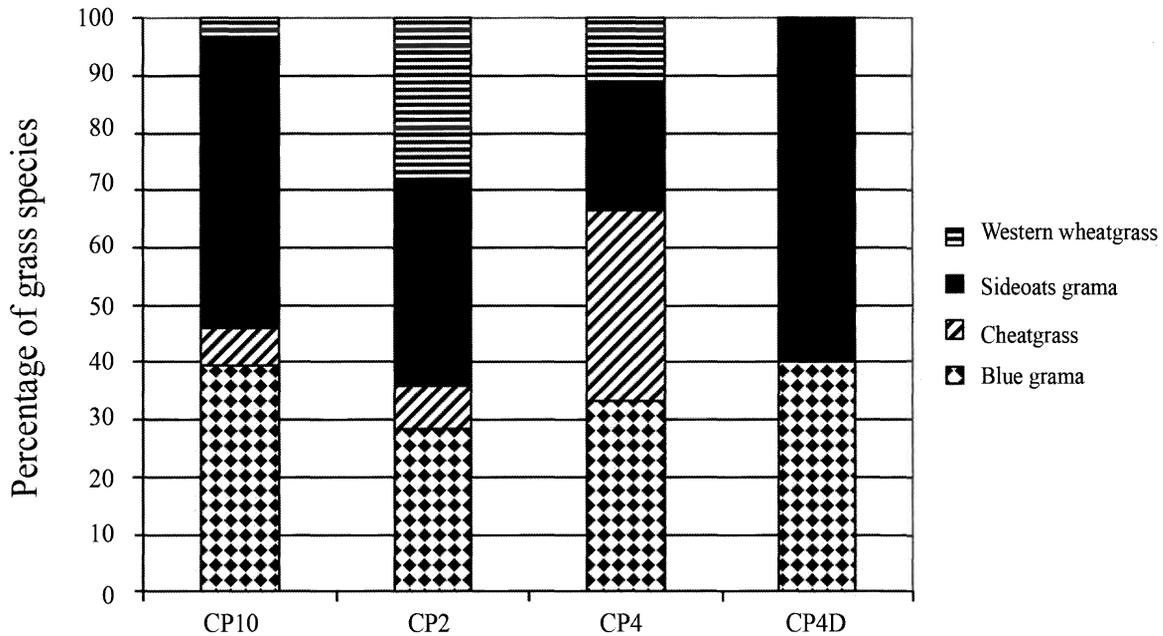


Figure 2. Comparison of dominant grass species in CRP fields within the current distribution of lesser prairie-chicken in southeastern Colorado. (Grass species comprising <2% in all conservation practices sampled were removed from figures.)

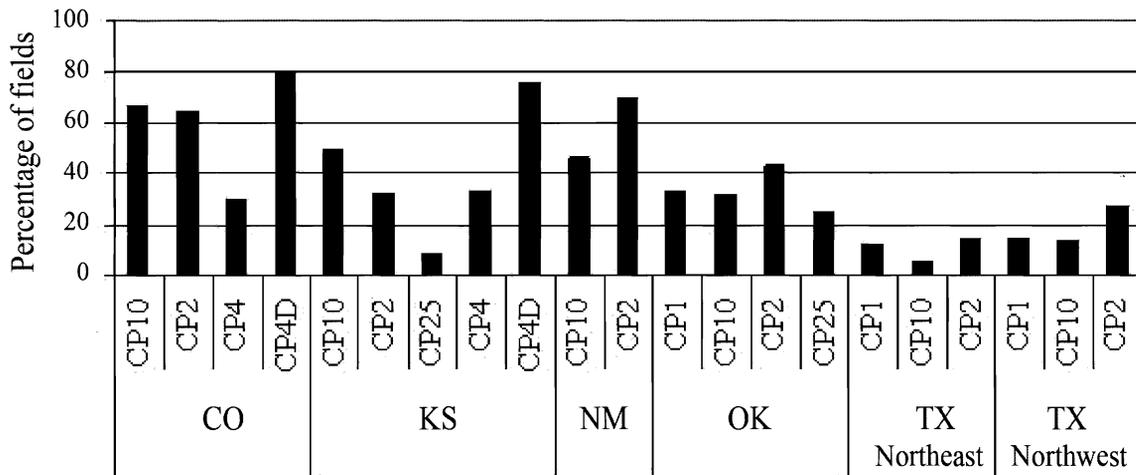


Figure 3. Percentage of fields in which all species of grass were native among the CRP fields sampled within current range of the lesser prairie-chicken in Colorado, Kansas, New Mexico, Oklahoma, and Texas. CP1 = permanent introduced grasses and legumes; CP2 = permanent native grasses; CP4 = permanent wildlife habitat, e.g., corridors; CP4D = permanent wildlife habitat; CP10 = already established grass and/or vegetation cover; and CP25 = rare and declining habitat restoration.

fields had 3.30 species. CP4D fields had a slightly lower average, with 2.80 grass species (Table 1).

Forb Cover. CRP fields in Colorado had a low forb component in comparison with fields in most other states. All

conservation practices contained an average of approximately 12% forbs (Fig. 5).

Shrub Cover. No CP4 or CP4D fields in Colorado contained shrubs. Two percent of CP10 fields and approximately 6%

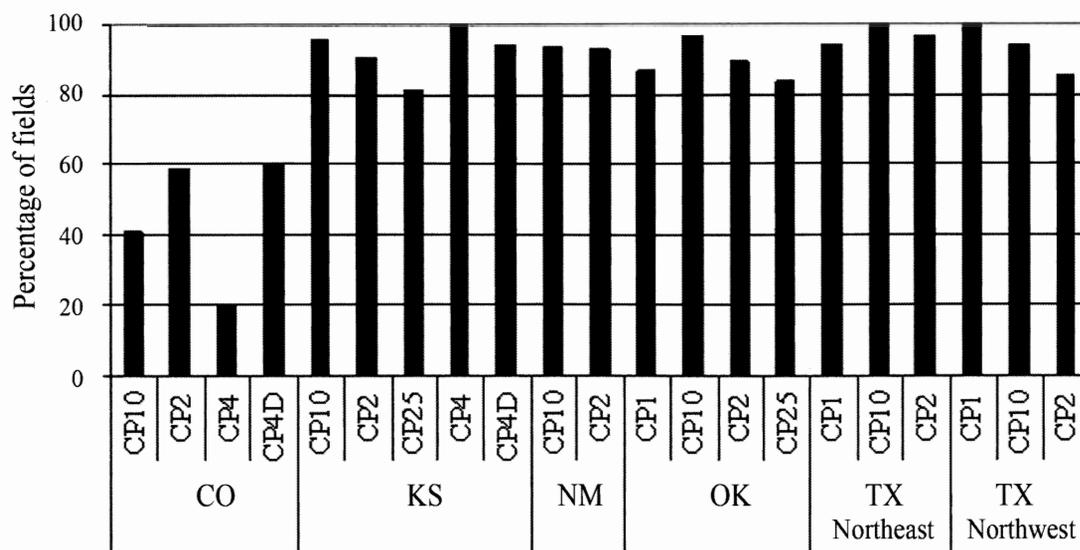


Figure 4. Percentage of fields with average grass height >35 cm among the CRP fields sampled within current range of lesser prairie-chicken in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

TABLE 1
GRASS SPECIES RICHNESS WITHIN CONSERVATION PRACTICES IN CRP FIELDS IN COLORADO,
KANSAS, NEW MEXICO, OKLAHOMA, AND TEXAS

State	Conservation practice	N	Grass species richness	Standard deviation	Standard error	Minimum number of species	Maximum number of species
CO	CP10	51	3.12	1.07	0.15	1	6
CO	CP2	17	3.41	1.18	0.29	1	6
CO	CP4	10	3.30	0.82	0.26	2	4
CO	CP4D	5	2.80	0.45	0.20	2	3
KS	CP10	156	4.63	1.63	0.13	0	7
KS	CP2	125	4.22	1.95	0.17	0	7
KS	CP25	60	3.58	1.74	0.22	0	7
KS	CP4	6	1.50	1.22	0.50	0	3
KS	CP4D	33	2.64	1.19	0.21	1	6
NM	CP10	106	2.42	1.12	0.11	0	6
NM	CP2	72	2.50	1.05	0.12	0	5
OK	CP1	15	2.07	1.28	0.33	1	5
OK	CP10	57	2.40	1.16	0.15	1	5
OK	CP2	62	2.42	1.11	0.14	1	6
OK	CP25	12	1.92	0.67	0.19	1	3
TX northeast	CP1	17	1.59	0.87	0.21	1	3
TX northeast	CP10	37	2.16	1.19	0.20	1	5
TX northeast	CP2	28	2.86	1.27	0.24	1	5
TX northwest	CP1	14	1.93	1.00	0.27	0	4
TX northwest	CP10	67	2.42	1.12	0.14	1	7
TX northwest	CP2	69	2.38	0.94	0.11	0	5

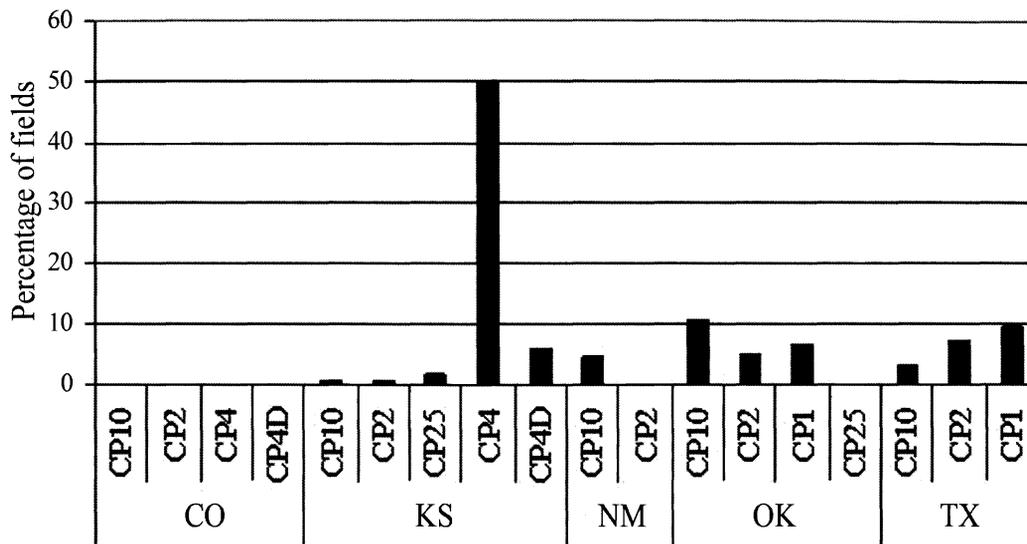


Figure 5. Comparison of grass and forb cover proportions in CRP fields within the current distribution of lesser prairie-chicken in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

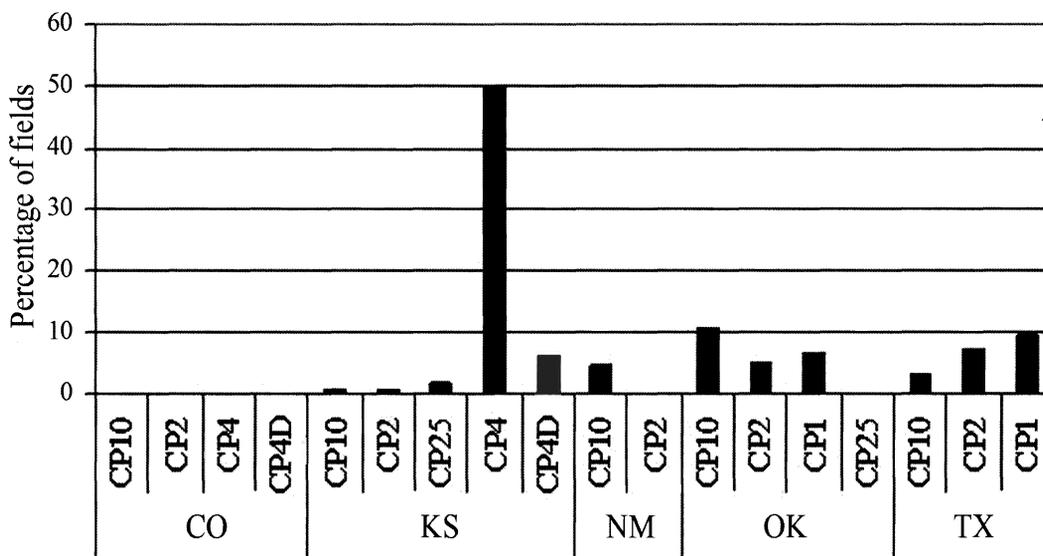


Figure 6. Percentage of CRP fields surveyed that have >10% shrub cover within the current distribution of lesser prairie-chicken in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

of CP2 fields contained shrubs. Of these, no fields contained >10% shrub cover (Fig 6).

KANSAS

Dominant Grasses, Grass Structure, and Grass Species Richness

We surveyed 380 CRP fields in Kansas. These fields displayed a high amount of variation in dominant grass

species (Fig. 7). CP10 fields ($N = 156$) were frequently dominated by sideoats grama (48%) and switchgrass (*Panicum virgatum*; 22%). CP2 ($N = 125$) also displayed a high proportion of fields with these two grasses (approximately 40%), but CP2 fields were also dominated by western wheatgrass (15%) and cheatgrass (12%; Fig. 7). CP25 ($N = 60$) and CP4 ($N = 6$) fields were frequently dominated by cheatgrass (>30%), but CP25 fields were also planted in western wheatgrass (18%) and sideoats grama (10%). CP4 fields had silver bluestem (*Andropogon saccharoides*;

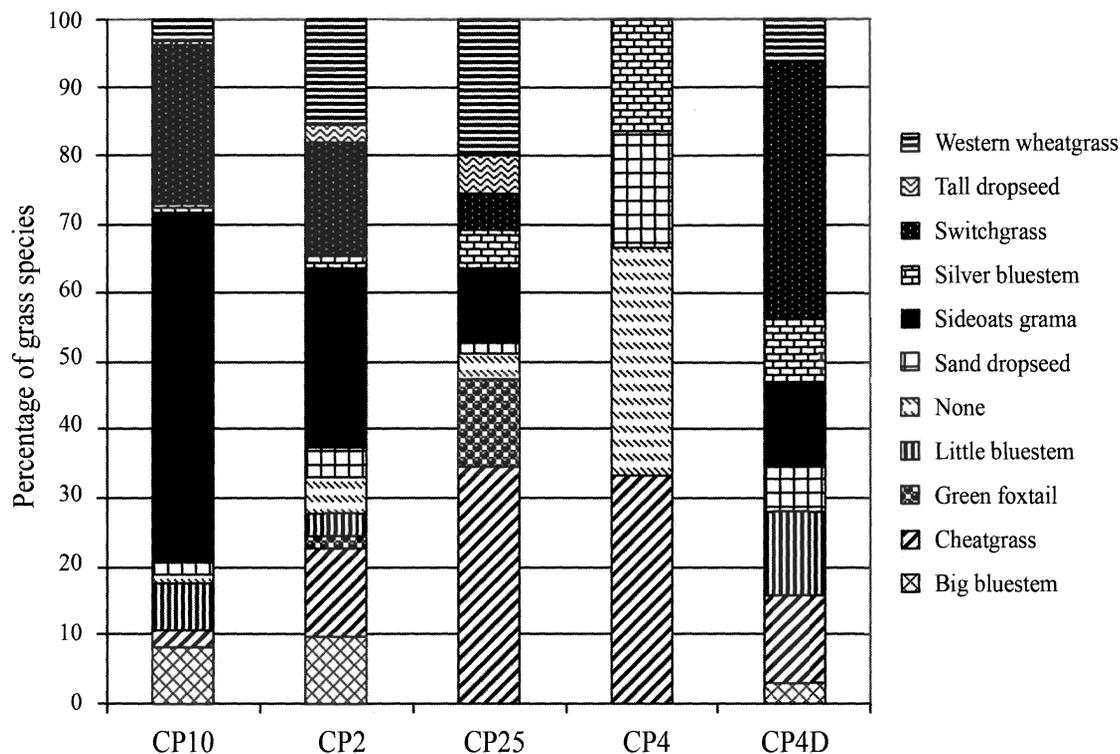


Figure 7. Comparison of dominant grass species in CRP fields within the current distribution of lesser prairie-chicken in southwestern Kansas. (Grass species comprising <2% in all conservation practices sampled were removed from figures.)

17%) and sand dropseed (*Sporobolus cryptandrus*; 16%) as dominant grasses, as well as frequently having no grass (30%; Fig. 7). CP4D ($N = 33$) fields in Kansas were frequently dominated by switchgrass (>30%), but also had sideoats grama (13%), little bluestem (*Andropogon scoparius*; 13%), and cheatgrass (13%; Fig. 7).

Over 80% of CP10, CP2, CP25, and CP4D fields in Kansas had at least one native grass species present. However, one-third of CP4 fields had no native grass species. Approximately 50% of Kansas CP10 fields contained all native grasses (Fig. 3). One-third of CP2 and CP4 fields had all native grass species. Only 8% of CP25 fields were all native, while 76% of CP4D fields contained all native grasses (Fig. 3).

Kansas CRP fields were consistently taller on average than Colorado fields. More than 80% of fields in all conservation practices had average grass heights >35 cm (Fig. 4).

Kansas CP10, CP2, and CP25 fields had the highest species richness of any fields in our study area, with averages of 4.63, 4.22, and 3.58, respectively (Table 1). We had a small sample of CP4 fields ($N = 6$), but these fields had a species richness of 1.50. CP4D fields an average species richness of 2.64 (Table 1).

Forb Cover. CRP fields in Kansas had a relatively high forb composition, with at least 20% forb cover in fields across all practices (Fig. 5). CP2 and CP4D had similar amounts of forbs, averaging 28% cover in fields. CP25 fields had approximately 35% forb cover, while CP10 fields had 20% (Fig. 5). CP4 fields averaged 52% forb cover (Fig. 5).

Shrub Cover. One CP2 field in Kansas contained shrubs; this field had >10% shrub cover (Fig. 6). Just over 3% of CP25 fields contained shrubs, but only one field (1.7%) had shrub cover >10%. Fifty percent of CP4 fields contained shrubs, all of which contained >10% shrub cover. Slightly more than 13% of CP10 fields contained shrubs; of these only 1 (0.6%) had more than 10% shrub cover (Fig. 6).

NEW MEXICO

Dominant Grasses, Grass Structure, and Grass Species Richness

We surveyed 178 CRP fields in New Mexico. While there was some variation in dominant grass species

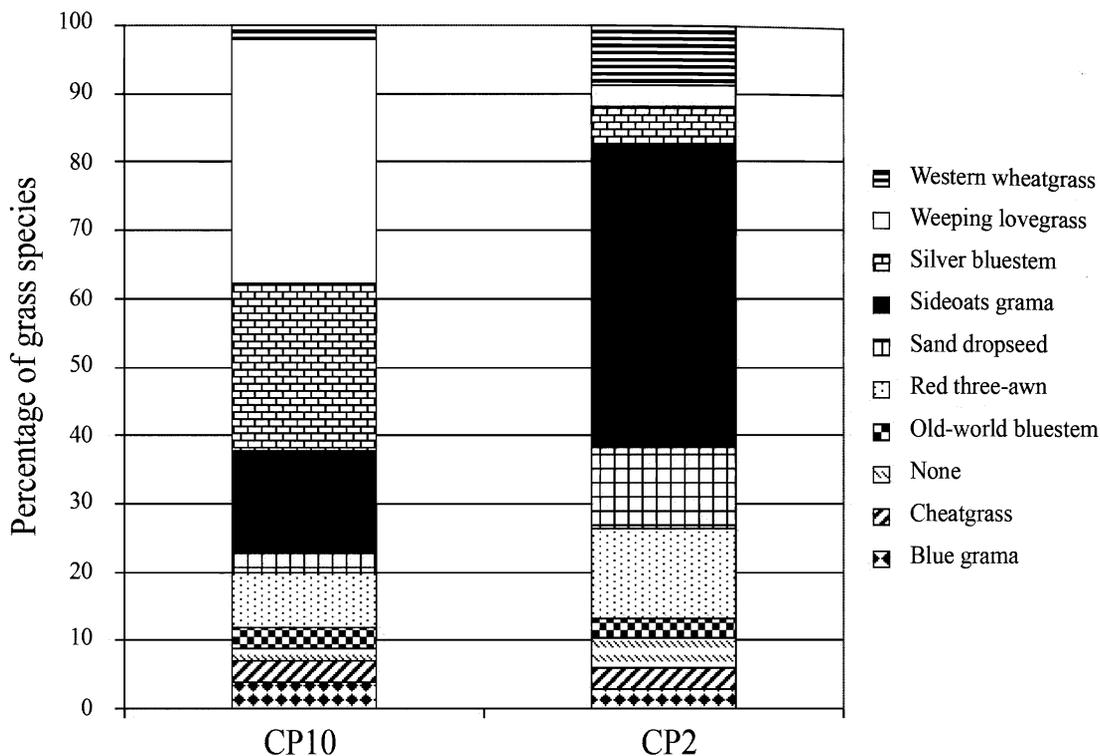


Figure 8. Comparison of dominant grass species in CRP fields within the current distribution of lesser prairie-chicken in eastern New Mexico. (Grass species comprising <2% in all conservation practices sampled were removed from figures.)

within New Mexico fields, a large proportion (70%) of CP10 ($N = 106$) was dominated by weeping lovegrass (*Eragrostis curvula*), silver bluestem, or sideoats grama (Fig. 8). Approximately 70% of CP2 ($N = 72$) was dominated by sideoats grama, sand dropseed, or three-awn (*Aristida* spp.). The remaining fields were dominated by one of seven other species (Fig. 8). Over 80% of CRP fields in New Mexico had at least one native grass species present. Forty-six percent of CP10 and 69% of CP2 fields contained all native grasses (Fig. 3). In both CP10 and CP2, 93% of fields had an average grass height >35 cm (Fig. 4).

New Mexico fields showed relatively low species richness (Table 1). CP10 fields averaged 2.42 species. CP2 fields had 2.50 grass species on average (Table 1).

Forb Cover. On average New Mexico CP10 fields were comprised of 21% forbs. CP2 fields had an average of 36% forbs (Fig. 5).

Shrub Cover. Almost 6% of CP10 fields in New Mexico contained shrubs. Almost 5% of CP10 fields had >10% shrub cover (Fig. 6). Just over 1% of CP2 fields contained shrubs; none had >10% shrub cover (Fig 6).

OKLAHOMA

Dominant Grasses, Grass Structure, and Grass Species Richness

We surveyed 146 CRP fields in Oklahoma. CP1 ($N = 15$) and CP10 ($N = 57$) fields in Oklahoma were frequently dominated by old-world bluestem (*Bothriochloa ischaemum*; 60% and 55%, respectively), followed by big bluestem (*Andropogon gerardii*; 27%) in CP1 and sideoats grama (19%) in CP10 (Fig. 9). In contrast, CP2 ($N = 62$) fields were dominated by sideoats grama (47%), with a lower proportion dominated by old-world bluestem (28%). Approximately 25% of CP25 ($N = 12$) fields were dominated by old-world bluestem; CP25 fields were also dominated by switchgrass, little bluestem, and cheatgrass (18% each; Fig. 9).

More than 25% of CP10, CP2, and CP25 fields, as well as almost 50% of CP1 fields, had no native grass species present. Also, Oklahoma had a relatively low percentage of fields with all native grass species (Fig. 3). In CP1 and CP10, approximately one-third of fields contained all native grasses. Just over 40% of CP2 fields had all native grasses. Twenty-five percent of CP25 fields contained

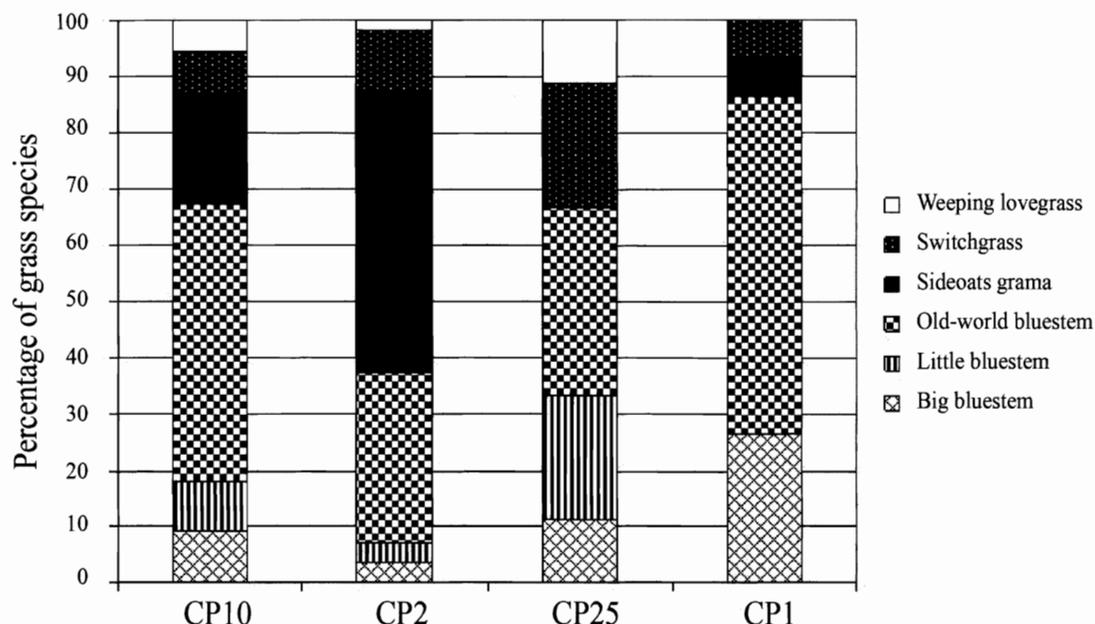


Figure 9. Comparison of dominant grass species in CRP fields within the current distribution of lesser prairie-chicken in western Oklahoma. (Grass species comprising <2% in all conservation practices sampled were removed from figures.)

all native grasses (Fig. 3). More than 80% of the fields in every conservation practice category had average grass heights >35 cm (Fig. 4).

Oklahoma fields had low species richness in comparison with Colorado and Kansas (Table 1). CP10 and CP2 fields had similar species richness, with 2.40 and 2.42, respectively. CP1 and CP25 fields had slightly lower averages, with 2.07 and 1.92 grass species, respectively (Table 1).

Forb Cover. Both CP1 and CP10 averaged approximately 10% forb cover (Fig. 5). There was higher forb cover in CP2 fields, with an average of 23%. CP25 fields averaged 46% forb cover (Fig. 5).

Shrub Cover. No CP25 fields in Oklahoma contained shrubs. Almost 25% of CP10 fields contained shrubs; 10.5% of CP10 fields had >10% shrub cover (Fig. 6). Thirteen percent of CP1 fields contained shrubs. Only one of these (6.7%) had >10% shrub cover. Almost 15% of CP2 fields contained shrubs; 4.8% of CP2 fields had >10% shrub cover (Fig. 6).

TEXAS

Dominant Grasses, Grass Structure, and Grass Species Richness

We surveyed 150 CRP fields in the northwest Texas region and 82 fields in the northeast. In northeast Texas,

CP1 ($N = 17$) fields were frequently dominated by weeping lovegrass (58%), followed by old-world bluestem (30%; Fig. 10). A high proportion of CP10 ($N = 37$) fields were also dominated by these two grasses (60%). CP2 ($N = 28$) fields were frequently dominated by these same grasses (41%) but also had a high proportion of western wheatgrass (14%) and silver bluestem (21%; Fig. 10).

Northwest Texas fields were commonly dominated by weeping lovegrass, especially in CP1 (43%; $N = 14$) and CP10 (41%; $N = 67$) fields (Fig. 10). Sideoats grama and three-awn were also common dominant grasses in this region. Dominant grasses in CP10 and CP2 ($N = 69$) fields in the northwest region of Texas were highly variable (Fig. 10).

More than 65% of fields throughout the Texas survey areas had at least one native grass species present, with the exception of CP1 in northeast Texas (60% of fields had no native grass species). In northwest Texas CP2, 28% of fields contained all native grasses. The remainder of both northeast and northwest Texas conservation practices had <20% of fields wherein all grass species were native (Fig. 3). A majority (>85%) of Texas CRP fields had average grass heights of >35 cm (Fig. 4).

Most fields in Texas had relatively low species richness (Table 1). In the northeast, CP1 fields had an average of 1.59 grass species. CP10 and CP2 fields had slightly higher species richness, with an average of 2.16 and 2.86 grass species, respectively. Fields in northwest Texas showed similar patterns, with CP1 fields having a species richness

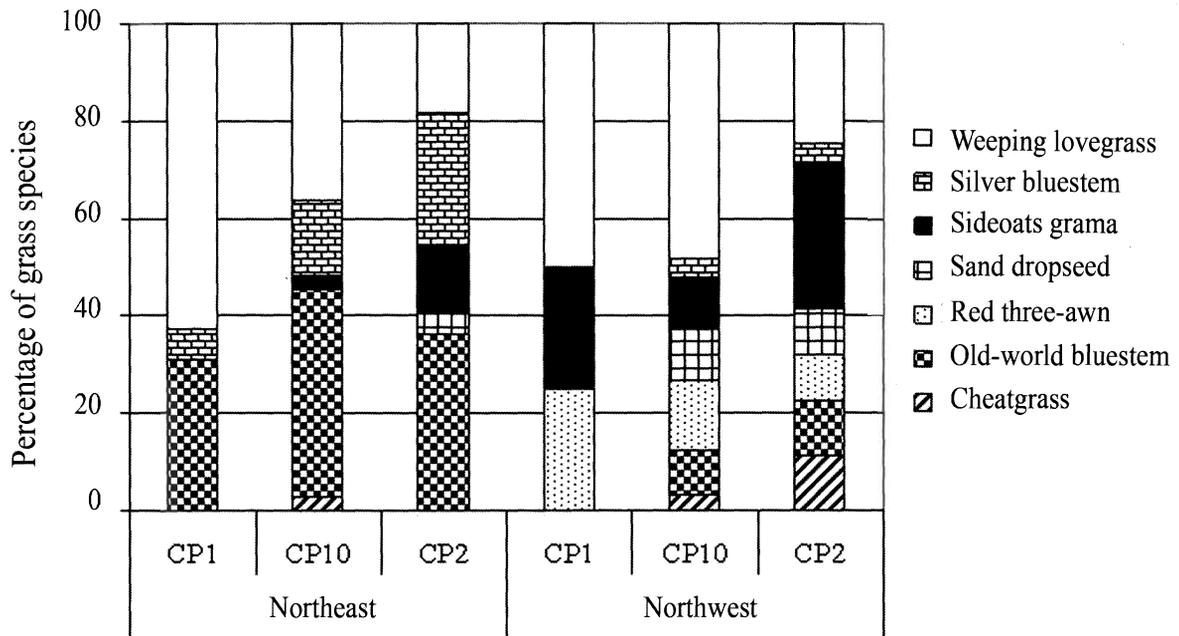


Figure 10. Comparison of dominant grass species in CRP fields within the current distribution of lesser prairie-chicken in the Texas panhandle. (Grass species comprising <2% in all conservation practices sampled were removed from figures.)

of 1.93 (Table 1). CP10 fields had a slightly higher richness than northeast region CP10 fields, with an average of 2.42, while CP2 fields in the northwest had a slightly lower average, 2.38 (Table 1).

Forb Cover. Northeast Texas CP1 fields had <10% forb cover (Fig. 5). Northeast CP10 fields also had a low forb cover (13%). CP2 fields had more forbs on average (28%; Fig. 5). Northwest Texas fields had a larger proportion of forb cover than northeast CP1 and CP10 fields (Fig. 5). CP1 fields had an average of 23% forb cover. CP10 fields were comprised of a similar proportion of forb cover (24%) but a slightly higher amount of grass (>50%). Northwest CP2 fields had an average of 32% forb cover (Fig. 5).

Shrub Cover. Over 21% of fields in all northeast Texas fields contained shrubs. In northwest Texas, 21% of CP1, 15% of CP10, and 7% of CP2 fields contained shrubs. Throughout Texas, 2.9% of CP10 fields, 9.7% of CP1 fields, and 7.1% of CP2 fields had more than 10% shrub cover (Fig. 6).

CONCLUSIONS

The CRP has been promoted as a potential tool with which to restore or enhance habitat for a suite of avian species (Best et al. 1998; Vickery and Herkert 2001), and as one of the best means with which to protect and

restore prairie grouse habitat (Riley 2004). In order to use this program effectively, managers must identify critical habitat elements required by focal species (Aldridge et al. 2004), and manage CRP fields accordingly.

For the lesser prairie-chicken, the most limiting habitat features tend to be the presence of tall (>40 cm) native vegetation, including both grasses and shrubs for nesting, and fields with a forb component for brood-rearing (Hagan et al. 2004; Pitman et al. 2006a). Although the CRP fields we measured displayed a high degree of variability, some patterns did emerge that will be of assistance in targeting future lesser prairie-chicken management practices.

We note that lesser prairie-chicken populations have shown a strong positive response in the state of Kansas to habitat provided by CRP (Rodgers and Hoffman 2005). Data collected during this assessment show that Kansas CRP fields are high in species richness (with the exception of CP4, *n* = 6), high in average forb cover (at least 20% in all conservation practices), and are usually dominated by one or more native grass species. Furthermore, more than 80% of all fields in all conservation practices in Kansas have an average grass height of >35 cm. CRP plantings in Kansas traditionally incorporated a higher diversity of plant species as well as more native grass species (Rodgers and Hoffman 2005). However, we also note that average rainfall in most of the Kansas study area is substantially higher than that of New Mexico, Colorado, and western Texas, thus we would advise caution

in making comparisons between the condition of Kansas CRP fields and that of more western states.

In Colorado, where the lesser prairie-chicken is undergoing continued declines (USFS and Colorado Division of Wildlife, unpublished data 2006), fields have species richness values similar to Kansas fields, though grass species composition generally differs. Due to the high proportion of fields dominated by blue grama, sideoats grama, and cheatgrass, average grass height in Colorado fields is relatively low, with approximately 50% of all fields in the <35 cm height category. Also, the overall proportion of forb cover is substantially lower, with an average of approximately 10% in all practices. We suggest that interseeding Colorado fields with appropriate forbs may help improve habitat for lesser prairie-chicken. While CP4 fields comprised only a small proportion of our overall sample in Colorado (10 of 83 fields), this field type appears to be the least useful for lesser prairie-chicken management, as 60% of CP4 fields were blue grama or cheatgrass dominated. Another 10% were dominated by squirreltail (*Elymus elymoides*). This resulted in a majority of CP4 fields occurring in the <35 cm height category. We suggest that efforts for managing CRP with lesser prairie-chicken in mind focus more on CP10 and CP2 fields in Colorado.

In New Mexico, CP10 and CP2 fields were the only grassland planting types present in our study area. Approximately 65% of CP10 fields were dominated by weeping lovegrass, silver bluestem, and sideoats grama, all warm-season grasses that may potentially provide suitable lesser prairie-chicken habitat (T. McDaniel, pers. comm.). Most of the CP10 fields had average grass height >35 cm, and the average forb cover was 21%, further indications of potentially useful habitat. However, weeping lovegrass is an introduced species, and CRP fields seeded with this grass were often low in overall grassland species richness. In CP2, most fields were dominated by native grasses and were >35 cm in height, and CP2 had a higher average forb component (36%). These data suggest that both practices offer potential for future lesser prairie-chicken management in New Mexico.

In Oklahoma, old-world bluestem was often the dominant grass species in all conservation practices. Almost 60% of fields dominated by this introduced species were monocultures. Thus, we propose that management of CRP fields in Oklahoma focus on fields that have other dominant grass species. Particularly, CP1 fields were frequently dominated by old-world bluestem, and had a low overall forb component and relatively low species richness, indicating that CP1 in Oklahoma may not have high

potential for future lesser prairie-chicken management. In Oklahoma, CP2 fields may be the most useful for the lesser prairie-chicken, followed by CP25 and CP10. CP2 fields were dominated primarily by sideoats grama, had an average forb cover of >20%, and were mostly >35 cm in height.

CRP fields in northeast Texas were commonly dominated by weeping lovegrass and old-world bluestem. CP2 fields may have the highest potential for lesser prairie-chicken management, as most (72%) of these fields were dominated by native grasses and had a relatively high species richness. CP2 fields also had the highest average forb cover (>25%) and most fields were >35 cm in height.

In northwest Texas, fields in all practices appear to have potential for lesser prairie-chicken management. The majority of fields are dominated by native grasses. CP2 and CP10 fields have species richness of 2.38 and 2.42, respectively. In all practices, most fields are >35 cm in height and have an average forb cover of >20%.

Mid-contract CRP management practices that may be beneficial to lesser prairie-chicken include moderate grazing, prescribed burning (with caution; see Boyd and Bidwell 2001), light disking, and especially, interseeding with forbs and native grasses where appropriate. We note that weeping lovegrass and old-world bluestem-dominated fields, which were common especially in New Mexico, Oklahoma, and Texas, were often (>30% of fields) monocultures of these dominant grasses and would benefit from management to increase vegetation diversity. We also note that while forbs were present in most CRP fields in all states, the forb component tended to be comprised of kochia (*Kochia scoparia*), Russian thistle (*Salsola tragus*), curly-cup gumweed (*Grindelia squarrosa*), and other forbs that may be of limited use to lesser prairie-chicken. We suggest that managers take into account the quality and structure of forbs when targeting fields for lesser prairie-chicken management.

Our data provide a picture of current CRP conditions within lesser prairie-chicken range at the field level. Several authors have suggested that it is necessary to view lesser prairie-chicken management and conservation in a landscape context, due to the species' large annual home range and population response to broad-scale landscape changes (Crawford and Bolen 1976; Fuhlendorf et al. 2002). Changes to, and anthropogenic use of, the landscape, as well as habitat quality provided by CRP, are issues that need to be addressed before applying our preliminary data to lesser prairie-chicken management (Pitman et al. 2005; Guidice and Haroldson 2007).

Recent literature highlights the necessity of an adaptive approach to prairie grouse conservation (Aldridge et al. 2004; Applegate et al. 2004). The CRP offers a unique opportunity to apply an experimental approach to lesser prairie-chicken management. Biologists can work with CRP administrators and landowners to manage these grasslands using a variety of different tools, and can monitor the effects of these activities on lesser prairie-chicken populations. CRP conditions and lesser prairie-chicken management must be analyzed and developed at the local level to ensure that management actions are appropriate to site-level conditions. One approach that may be useful is to emulate successful lesser prairie-chicken management efforts in Kansas while incorporating site-specific information into adaptive designs. We anticipate that the data presented will contribute to the foundation of lesser prairie-chicken habitat information and help provide a baseline for future management activities throughout the species' range.

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