ASSESSMENT OF CRP FIELDS WITHIN CURRENT LESSER PRAIRIE-CHICKEN RANGE

November 2007

Dana Ripper and Tammy VerCauteren
Rocky Mountain Bird Observatory
PO Box 1232
Brighton, CO 80601-1232
303.659.4348
www.rmbo.org
Tech. Report # PPR-LEPC-ED07-01

FUNDING PROVIDED BY

ENVIRONMENTAL DEFENSE

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Suggested Citation:
Ripper, D., and T. VerCauteren. 2007. Assessment of CRP fields within current Lesser Prairie-Chicken range. Tech. Report # PPR-LEPC-ED07-01, Rocky Mountain Bird Observatory, Brighton, CO, 42 pp.

Cover Photo:
Sideoats grama: Texas Prairies Public Gallery, Picasa web albums.
Lesser Prairie-Chicken artwork: David Allen Sibley from The National Audubon Society: *The Sibley Guide to Birds* published by Alfred A. Knopf, Inc., New York.

Contact Information:
Dana Ripper dana.ripper@rmbo.org
Tammy VerCauteren tammy.vercauteren@rmbo.org
RMBO
230 Cherry Street
Fort Collins, CO 80521

Funding Provided by:
Environmental Defense
Center For Conservation Incentives
2334 North Broadway
Boulder, CO 80304

Executive Summary
Populations of Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*; LEPC) have declined by more than 90%. The main factors precipitating this decline have been the conversion of sand-sage and mixed-grass prairie to agriculture, juniper encroachment, excessive cattle grazing, and fossil-fuel and suburban development. Conservation Reserve Program (CRP) fields contribute greatly to the remaining habitat of the LEPC; however, approximately three million acres of CRP within the current LEPC distribution will soon expire, and potentially be re-converted to cropland.

Rocky Mountain Bird Observatory (RMBO) was contracted by Environmental Defense's Center for Conservation Incentives to assess CRP fields within the current range of the LEPC. We conducted surveys of 1019 CRP fields representing more than 126,000 acres in Colorado, Kansas, New Mexico, Oklahoma, and Texas. Grassland plantings (Farm Service Agency Conservation Practices 1, 2, 4, 4D, 10, and 25) were sampled in proportion to their availability on the landscape. Fields displayed a high amount of variability in dominant grass species, grass species richness, and average forb cover, especially between states; however, some patterns did emerge.

When data were examined by Conservation Practice (CP), we found that CP1 fields were frequently dominated by weeping lovegrass and old-world bluestem, had a low species richness, and a relatively low average forb cover. CP2 fields showed a high variability in dominant grass species, although 30% of fields were dominated by sideoats grama. CP2 fields had a relatively high species richness and a high average forb cover. CP4 fields were commonly dominated by sideoats grama, cheatgrass, and blue grama, had a moderate species richness, and an relatively high average forb cover. CP4D fields were most often dominated switchgrass, sideoats grama, and little bluestem and a high average forb cover. CP10 fields were frequently dominated by sideoats grama, weeping lovegrass, and old-world bluestem, but overall showed high variability. CP10 fields had a high species richness and a moderate forb cover of 16.8%. Finally, approximately 30% of CP25 fields were cheatgrass-dominated, but the remaining 70% of fields were highly variable in dominant grass species. CP25 fields had the highest species richness and average forb cover.

Other patterns emerged when data were examined at the state level. In Colorado, fields were dominated mainly by sideoats and blue grama, had a species richness of 3.12, and an average grass-to-forb ratio of 6:1. Kansas CRP fields were variable in dominant grass species, had an overall species richness of 3.31, and a grass-to-forb ratio of 1.8:1. New Mexico CRP fields were generally dominated by weeping lovegrass, silver bluestem, or sideoats grama. They had a species richness of 2.46 and an overall grass-to-forb ratio of 1.8:1. CRP in Oklahoma was mostly dominated by old-world bluestem and sideoats grama, had a species richness of 2.20, and a grass-to-forb ratio of 4.9:1. Texas fields were commonly dominated by weeping lovegrass, old-world bluestem, and sideoats grama, had a species richness of 2.22, and a grass-to-forb ratio of 4.3.

Overall, our findings suggest that all practices in Colorado, Kansas, New Mexico, and the northwest region of Texas have potential for LEPC management. In Oklahoma and northeast Texas, we suggest that CP2 fields may be most suited to future management efforts. This assessment of CRP condition is the first step in a process to help land managers target LEPC conservation efforts. Information collected will be placed in a landscape-level context to identify priority areas for CRP re-enrollment with the goal of maintaining and improving LEPC habitat.

Introduction

The Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*; hereafter LEPC) was once locally common throughout the southern Great Plains, but now occurs than 10% of its former range (Hagen et al. 2004; Figure 1). The primary reasons for this species' population decline are conversion of rangeland to agriculture and over-grazing of remaining range (Woodward et al. 2001). Unlike most bird species, the LEPC utilizes several different habitat types throughout its life cycle: short vegetation or bare ground for mating display grounds (leks), relatively tall vegetation for nesting (>35 cm), and grass/forb mixed habitat for brood-rearing (Hagan et al. 2004). 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).

Currently, Conservation Reserve Program (CRP) lands provide important habitat for remaining LEPC populations (Jamison et al. 2002), especially in Kansas (Rodgers 2000). The importance of CRP to LEPC 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 LEPC habitat results (Hagen 2001). Thus, CRP has potential to sustain and/or help increase LEPC populations; however, a majority of CRP fields are expiring over the next 10 years and will potentially be re-converted to agriculture. Three million of these acres are within current LEPC range.

Rocky Mountain Bird Observatory (RMBO) was contracted by Environmental Defense to assess the condition (e.g., plant species, structure) of existing CRP grasslands within the current distribution of the LEPC. Data collected will be integrated with a Geographic Information System (GIS) model to identify areas where CRP enhancement could benefit LEPC populations. Area biologists will be consulted to identify what conservation practices (CPs) should be the focus of further efforts, and what management prescriptions are needed to improve habitat for LEPC. This information will then be used to target CRP acres for re-enrollment.

Methods

Study Area

CRP surveys were conducted only within the current range of LEPC. The LEPC Interstate Working Group provided an up-to-date distribution map (Figure 1), and also provided input on the counties to be surveyed (Figure 2). Based on this input, fields surveyed were located in four Colorado counties, 36 Kansas counties, five New Mexico counties, 16 counties in the western side of the Texas panhandle, 14 counties in the eastern Texas panhandle, and nine counties in Oklahoma. Texas was separated into two regions based on input from biologists at the Texas Parks and Wildlife Commission, as CPs were quite different between the two regions.

Based on funding and logistics, we determined at the outset of this project that we would be able to survey a total of 1040 CRP fields. We multiplied this number by the percentage of LEPC area represented by each state to determine the number of fields within each state that would be surveyed. GIS data layers provided to Playa Lakes Joint Venture (PLJV) by the Farm Service Agency (FSA) allowed PLJV staff to randomly select fields to be surveyed. A second set of fields was also randomly selected in order to have alternate options if we could not access fields within the primary selection. Field maps were generated by PLJV that indicated each field to be surveyed, the field

number, and road information to allow navigation. Surveyors were not provided with further information about selected fields (e.g., CP, ownership) in order to avoid bias as well as to protect landowners and FSA data.

Conservation Practices
Six grassland CPs were represented within our study area. These were defined by the FSA as:

- CP1: Permanent introduced grasses and legumes
- CP2: Permanent native grasses
- CP4: Permanent wildlife habitat (corridors etc.)
- CP4D: Permanent wildlife habitat
- CP10: Already established grass/vegetative cover
- CP25: Rare and declining habitat restoration

Colorado had fields planted in CP2, CP4, CP4D, and CP10. Kansas had CP2, CP4, CP4D, CP10, and CP25. New Mexico had only CP2 and CP10. Oklahoma had CP1, CP2, CP10, and CP25. Both northwest and northeast Texas had CP1, CP2, and CP10 fields.

Field Assessment
CRP fields were visited between 15 June and 25 August, 2007. Surveys were conducted from roadsides, allowing us to cover the five-state LEPC area and collect a representative sample of each field type. We attempted to survey each 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 obtained a visual estimate of:

- Percent of field in grass
- Percent of field in each species of grass (all species observed were identified and their percent occurrence estimated)
- Overall average grass height, in categories <35 cm, 35-65 cm, and >65 cm. Categories were delineated based on LEPC selection of vegetation heights > 35 cm for nesting and brood-rearing (Rodgers and Hoffman 2005).
- Percent of field in shrubs, with shrub species identified
- Percent of field in forbs
- Percent of field in alfalfa vs. percent other forbs
- Percent bare ground, not including canopy cover
- Number of trees, recorded as 0, 1, 2-5, and >5

We also recorded any structures that might be present in or adjacent to the field, and any water sources within the field. Please see attachment A, the field data sheet.

All data were entered into Excel spreadsheets. Field data were organized by PLJV according to CP. These data allowed us to generate descriptive statistics and graphical representations of current conditions within the various CPs in our study area.

Results

We surveyed 1019 of the 1040 proposed CRP fields (Table 1). CPs were sampled in proportion to their respective acreage within our study area (Table 1). CP2 (373 fields; 36% of fields surveyed) and CP 10 (474 fields; 47%) were the most common 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%) in proportion to their availability on the landscape (Table 1).

ALL STATES

Dominant Grass Species

Data for all CPs were pooled across states, allowing us to examine the amount of variability within planting practices (Figure 3). Weeping lovegrass (*Eragrostis curvula*) and old-world bluestem (*Bothriochloa* sp.) frequently (75%) dominated CP1 fields. Thirty percent of fields planted in CP2 and CP10 mixtures had sideoats grama (*Bouteloua curtipendula*) as the dominant species; the remaining fields in these plantings were highly variable in regards to the dominant grass species (Figure 3). CP4 and CP25 fields were frequently dominated by cheatgrass (*Bromus tectorum*, 30% of fields). Approximately 50% of CP4D fields were dominated by switchgrass (*Panicum virgatum*) or sideoats grama (Figure 3).

CP1 fields (N = 46) were located only in Texas and Oklahoma. In both northeast and northwest Texas, 40-50% of CP1 fields were dominated by weeping lovegrass (Figure 3). In Oklahoma, smooth brome (*Bromus inermus*) was frequently the dominant grass (60%; Figure 4).

CP2 (N = 373) fields had substantial variation between states. Plantings in Colorado, Oklahoma, and New Mexico were frequently dominated by sideoats grama (30, 45, and 40% respectively; Figure 5). Kansas fields had sideoats grama (23%), western wheatgrass (*Pascopyrum smithii*; 15%), and switchgrass (16%) as the dominant grasses. Northeast Texas CP2 fields were commonly dominated by silver bluestem (*Andropognon saccharoides*; 21%) and old-world bluestem (30%), while northwest Texas CP2 fields had a wide variety of dominant grasses, including sideoats grama (21%) and weeping lovegrass (20%) (Figure 5).

Kansas and Colorado were the only states that contained CP4 and CP4D plantings within our study area. Approximately 30% of CP4 fields (N = 16) in both states had cheatgrass as the dominant grass species (Figure 6). Almost 35% of Kansas CP4 fields did not contain grass (Figure 6). CP4D fields (N = 38) in Colorado were dominated by either blue grama (*Bouteloua gracilis*) or sideoats grama (Figure 7). Kansas CP4D fields were highly variable, but about 35% were dominated by switchgrass (Figure 7).

CP10 was the most numerous field type surveyed (N = 474). Colorado and Kansas CP10 fields were frequently dominated by sideoats grama (>40%); however, Colorado fields were also commonly dominated by blue grama (37%; Figure 8). Oklahoma and northeast Texas CP10 fields had a high proportion of old-world bluestem (>40%; Figure 8). Northeast Texas, northwest Texas, and New Mexico fields frequently had weeping lovegrass (>30%) as the dominant grass.

Kansas and Oklahoma were the only states that had CP25 plantings (N = 72) within our study area (figure 9). There was a large amount of variation in dominant grasses in Kansas fields, but cheatgrass and western wheatgrass accounted for almost 40% of fields. Oklahoma CP25 fields commonly had old-world bluestem, switchgrass, little bluestem (*Schizachyrium scoparium*), or cheatgrass as the dominant grass species (Figure 9).

Grass Species Richness

We used all grass species identified in each field to measure species richness within conservation practices. CP1 had the lowest richness, with an average of 1.85 grass species per field (Table 2). CP4 and CP4D had a moderate amount of richness, with 2.63 and 2.66 grass species per field, respectively. The highest species richness was found in CP2, CP10, and CP25 fields, which had an average of 3.11, 3.20, and 3.31 grass species, respectively (Table 2).

Forb and Shrub Composition

Almost all of the fields surveyed (>80%) had forbs present. However, the average percentage of forb cover differed considerably between states and CPs. Fields in Colorado had a low average forb cover, about 12% in all practices (Figure 10). Kansas and New Mexico fields had at least 20% forb cover in all planting types. Oklahoma fields showed high variability in the amount of average forb cover; CP1 fields had less than 10% forb cover, while CP25 fields had more than 40% (Figure 10). Northeast Texas CP1 fields had approximately 7% average forb cover, while CP2 fields had 27% and CP10 fields had 13%. Northwest Texas CP1 and CP10 fields had slightly over 20% forb cover, while CP2 fields averaged 32% (Figure 10).

Fields containing shrubs were uncommon in most CPs. Kansas CP4 fields had the highest incidence of shrub presence, with 50% of fields containing some amount of shrub cover. Approximately 20% of northeast Texas fields in all CPs contained shrubs, as did CP1 fields in northwest Texas. Colorado and New Mexico both had a very low incidence of shrub presence. More than 20% of Oklahoma CP10 fields contained shrubs, while <15% of CP1 and CP2 fields contained shrubs.

The 20 northeast Texas fields that contained shrubs averaged 8.1% shrub cover, while northwest Texas had 17 fields with an average of 9.1% shrub cover. The 24 Oklahoma fields with shrubs averaged 9.4% shrub cover. Kansas had 32 fields with a shrub component; these fields had an average of 8.0% shrub cover. Colorado had only 2 fields with shrubs; these had an average of 2% and 8% cover. New Mexico had 7 fields that contained shrubs and the highest average shrub cover, 20.1%.

COLORADO

Dominant Grass Species

Sideoats grama and blue grama were most frequently the dominant grasses in all Colorado CPs (Figure 11). 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 as the dominant grass (24%), while cheatgrass was dominant in 30% of CP4 (N = 10) fields (Figure 11).

Grass Structure

The majority of CRP fields in Colorado fell within the <35 cm or 35-65 cm height categories. In CP10, 59% of fields had average grass heights within the <35 cm category, while 41% of fields fell within the 35-65 cm category (Figure 12). CP2 fields showed almost equal distribution in the <35 cm (41%) and 35-65 cm (47%) categories, and 12% of fields had average grass heights of >65 cm. CP4 fields fell mostly within the <35 cm category (80%), and did not have any fields in the >65 cm category (Figure 12).

Sixty percent of CP4D fields had grass in the 35-65 cm height category, and 40% of fields in the <35 cm category (Figure 12).

Grass Species Richness
Colorado fields had a relatively high grass species richness in comparison with other states, with the exception of Kansas (Table 3). CP10 fields had an average of 3.12 grass species. CP2 fields had 3.41 species, and CP4 fields had 3.30 species. CP4D fields had a slightly lower average, with 2.80 grass species (Table 3).

Forb Composition
CRP fields in Colorado had a low forb component in comparison with fields in most other states. All practices in Colorado had an average grass to forb ratio of approximately 6:1. In all CPs, fields were comprised of 60 to 70% grass, and about 10% forbs (Figure 13). No alfalfa was found in any fields in Colorado.

KANSAS

Dominant Grass Species
CRP fields in Kansas had a high amount of variation in dominant grass species both within and between Conservation Practices (Figure 14). CP10 fields (N = 156) were frequently dominated by sideoats grama (48%) and switchgrass (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%; Figure 14). 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 (17%) and sand dropseed (*Sporobolus cryptandrus*; 16%) as dominant grasses, as well as frequently having no grass (30%; Figure 16). CP4D (N = 33) fields in Kansas were frequently dominated by switchgrass (>30%), but also had sideoats grama (13%), little bluestem (13%), and cheatgrass (13%; Figure 14).

Grass Structure
Kansas had a relatively high proportion of fields within the >65 cm height category (Figure 15). Most (67%) CP10 fields and CP2 fell within this category. CP25 fields were more evenly distributed within the height categories with 19% of fields <35 cm, 43% of fields 35-65 cm, and 38% of fields >65 cm (Figure 15). There were no CP4 fields in the <35 cm category. More than 70% of CP4 fields were 35-65 cm in height. CP4D fields fell mostly within the 35-65 cm (45%) and >65 cm (48%) height categories (Figure 14).

Grass Species Richness
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 3). We had a small sample of CP4 fields (N = 6), but these fields had a species richness of 1.50. CP4D fields (N = 33) an average species richness of 2.64 (Table 3).

Forb Composition
CRP fields in Kansas had a relatively high forb composition, with at least 20% forb cover in fields across all practices (Figure 16). Grass to forb ratio ranged from 0.5:1 in CP4 fields to 3:1 in CP10 fields. CP2 and CP4D had similar amounts of forbs, averaging 28% cover in fields. CP25 fields had around 35% forb cover, while CP10 fields had 20%

(Figure 16). CP4 fields averaged 52% forb cover; this exceeded grass cover by 22% (Figure 16).

In Kansas, some fields contained alfalfa. Within CP10, 3% of fields contained alfalfa, while 8.5% of CP2 fields and slightly less than 2% of CP25 fields had alfalfa. Alfalfa was not present in CP4 and CP4D fields.

NEW MEXICO

Dominant Grass Species

While there was some variation in dominant grass species within New Mexico fields, a large proportion (70%) of CP10 (N = 106) was dominated by weeping lovegrass, silver bluestem, or sideoats grama (Figure 17). 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 (Figure 17).

Grass Structure

Most New Mexico fields fell within the 35-65 cm height category (Figure 18). In CP10, 65% of fields were in this category, while 28% of fields had an average height of >65 cm. Over 90% of CP2 fields were in the 35-65 cm category, while 8% were in the <35 cm category (Figure 18).

Grass Species Richness

New Mexico fields showed relatively low species richness (Table 3). CP10 fields averaged 2.42 species. CP2 fields had 2.50 grass species on average (Table 3).

Forb Composition

CP10 fields in New Mexico had a grass to forb ratio of 2.3:1. On average, these fields were comprised of 50% grass and 21% forbs (Figure 19). CP2 fields had a grass to forb ratio of 1.2:1, having on average 42% grass and 36% forbs (Figure 19). New Mexico fields did not contain alfalfa.

OKLAHOMA

Dominant Grass Species

CP1 (N = 15) and CP10 (N = 57) fields in Oklahoma were frequently dominated by old-world bluestem (60% and 55% respectively), followed by bluestem (27%) in CP1 and sideoats grama (19%) in CP10 (Figure 20). 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; Figure 20).

Grass Structure

Grass structure in Oklahoma fields varied widely across CPs (Figure 21). CP1 fields frequently were within the 35-65 cm (47%) and >65 cm height categories (40%). Most CP10 fields were in the 35-65 cm category (67%), with most of the remaining fields having grasses >65 cm (29%). CP2 fields were also frequently in the mid-height category (66%) but 12% of fields fell in the <35 cm category and 22% were >65 cm in height. CP25 fields had 50% of fields in the >65 cm category. Of the remaining fields, 33% were 35-65 cm in height, and 17% were in the <35 cm category (Figure 21).

Grass Species Richness
Oklahoma fields had low species richness in comparison with Colorado and Kansas (Table 3). 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 3).

Forb Composition
Most CP types in Oklahoma had relatively low forb cover. The grass to forb ratios in CP1 and CP10 were 8.7:1 and 7.1:1, respectively. Both types of fields averaged approximately 80% grass cover and 10% forb cover (Figure 22). There was higher forb cover in CP2 fields, with an average of 66% grass and 23% forb cover (2.8:1). CP25 fields had grass to forb ratio of 0.95:1. CP25 fields averaged 46% forb and 44% grass cover (Figure 22). Slightly more than 13% of CP1 fields and 4.8% of CP2 fields contained alfalfa.

TEXAS

Dominant Grass Species
In the northeast Texas region, CP1 (N = 17) fields were frequently dominated by weeping lovegrass (58%), followed by old-world bluestem (30%; Figure 23). 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%; Figure 23).

Northwest Texas fields were commonly dominated by weeping lovegrass, especially in CP1 (43%; N = 14) and CP10 (41%; N = 67) fields (Figure 24). 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 (Figure 24).

Grass Structure
Fields in the northeast Texas panhandle had a substantial proportion in the upper grass height categories (Figure 25). Most (65%) CP1 fields in the northeast were within the >65 cm height category, while 29% were in the mid-height category. No CP10 fields were within the <35 cm category; more than 60% of CP10 fields were 35-65 cm (Figure 25). Northeast CP2 fields showed similar proportions, with 61% in the mid-height category, 35% in the tall category, and only 4% in the <35 cm category (Figure 25).

Fields in all CPs in the northwestern region fell mostly (>60% in all CPs) into the mid-height category (Figure 26). The remainder (38%) of CP1 fields were >65 cm. CP10 fields had a higher proportion in the >65 cm category (32%) than in the low height category (7%). In CP2, the proportions of fields in the >65 cm category (19%) was similar to that in the <35 cm category (16%; Figure 26).

Grass Species Richness
Most fields in Texas had relatively low species richness (Table 3). 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 of

1.93 (Table 3). 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 3).

Forb Composition

Forb cover proportions differed considerably across practices in Texas. In northeast Texas CP1 fields, the grass to forb ratio was 12.2:1, with more than 80% average grass cover and <10% forb cover (Figure 27). CP10 fields in the northeast region also had a high grass to forb ratio, 5.9:1. CP2 fields had more forbs on average (28%) and a much lower ratio, 2.3:1 grass:forbs. Some northeast region fields contained alfalfa, within CP1 (5.9% of fields) and CP10 (2.7%).

Northwest Texas fields had a larger proportion of forb cover than northeast CP1 and CP10 fields (Figure 27). In the northwest, CP1 fields had a 2:1 grass to forb ratio, with an average of 23% forb cover. CP10 fields were comprised of a similar proportion forb cover but a slightly higher amount of grass (>50%), with a grass to forb ratio of 2.2:1. Northwest CP2 fields had a grass to forb ratio of 1.4:1, with an average of 32% forb cover. No alfalfa was documented in northwest Texas fields.

Discussion

For LEPC populations, the most limiting habitat features tend to be the presence of tall (>35 cm) native vegetation for nesting and fields with a forb component for brood-rearing (as opposed to bare areas for lek sites; Hagan et al. 2004). Although CRP fields had a high degree of variability in all habitat variables measured, some patterns did emerge that will be of assistance in targeting future LEPC management practices. With the consideration that LEPC populations are expanding in the state of Kansas, due mainly to habitat provided by CRP (Rodgers 2000), we suggest that Kansas fields may provide a model for acceptable management. Data collected during this assessment show that Kansas CRP fields are high in species richness (with the exception of CP4), high in average forb cover proportions, and are usually dominated by more than one native grass species. Furthermore, the majority of fields in all CPs in Kansas have an average grass height of >35 cm.

In Colorado, where LEPC is undergoing continued declines (USFS and Colorado Division of Wildlife, unpub. data, 2006), fields have species richness values similar to Kansas fields. However, the overall proportion of forb cover is substantially lower, with an average of approximately 10% in all practices. Also, 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 a large percentage of fields in all CPs in the <35 cm height category. We suggest that interseeding Colorado fields with appropriate forbs may help improve habitat for LEPC. 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 LEPC 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 LEPC 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 native warm season grasses that could potentially provide suitable LEPC habitat. Most of the CP10 fields had average grass height above 35 cm, and the average forb cover was 21%, further indications of potentially useful habitat. The majority of CP2 fields were also 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 LEPC management.

In Oklahoma, old-world bluestem was often the dominant grass species in all CPs. Almost 60% of fields dominated by this introduced species often had no other grass species present. 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, suggesting that CP1 in Oklahoma may not have high potential for future LEPC management. In Oklahoma, CP2 fields may be the most useful for LEPC, 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. Management of CP2 should focus on fields in this practice not dominated by old-world bluestem.

CRP fields in northeast Texas were commonly dominated by weeping lovegrass and old-world bluestem. CP2 fields may have the highest potential for LEPC management, as most (72%) of these fields were dominated by native grasses with a relatively high species richness (2.86). 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 LEPC 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%.

Our data provide a picture of current CRP conditions within LEPC range. Mid-contract CRP management practices that may be beneficial to LEPC include moderate grazing, prescribed burning, light disking, and inter-seeding with forbs and native grasses where appropriate. We would like to 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 were potentially of limited use to LEPC. We suggest that managers take into account the quality and structure of forbs when targeting fields for LEPC management. Inter-seeding should include such native forbs as scurf-pea (*Psoralea / Pediomelum* spp.), sunflower (*Helianthus* spp.), and prairieclover (*Petalostemonas* spp.), as well as alfalfa, which can act as a beneficial surrogate for native legumes.

Future efforts spearheaded by ED, RMBO, and PLJV will include ranking CRP fields presented in this report in terms of their quality as LEPC habitat. These assessment data will be placed into a landscape context to determine priority areas for CRP management and re-enrollment.

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Table 1. CRP fields surveyed within available conservation practices in the five-state study area.

Conservation Practice / State	CP1	CP2	CP4	CP4D	CP10	CP25	Total
Colorado	0	17	10	5	51	0	**83**
Kansas	0	125	6	33	156	60	**380**
New Mexico	0	72	0	0	106	0	**178**
Oklahoma	15	62	0	0	57	12	**146**
Texas NE	17	28	0	0	37	0	**82**
Texas NW	14	69	0	0	67	0	**150**
TOTAL	***46***	***373***	***16***	***38***	***474***	***72***	***1019***
Acres	**4,133**	**42,099**	**2,153**	**3,516**	**69,278**	**5,340**	**126,519**

Table 2. Grass species richness within conservation practices with data pooled from all states.

CP	N	Grass Species Richness	SD	SE	Min Species	Max Species
CP1	46	1.85	1.05	0.16	0	5
CP2	373	3.11	1.64	0.08	0	7
CP4	16	2.63	1.31	0.33	0	4
CP4D	38	2.66	1.12	0.18	1	6
CP10	474	3.20	1.67	0.08	0	7
CP25	72	3.31	1.73	0.20	0	7

Table 3. Grass species richness within conservation practices in CRP fields in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

State	CP	N	Grass Species Richness	SD	SE	Min Species	Max 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 ne	CP1	17	1.59	0.87	0.21	1	3
TX ne	CP10	37	2.16	1.19	0.20	1	5
TX ne	CP2	28	2.86	1.27	0.24	1	5
TX nw	CP1	14	1.93	1.00	0.27	0	4
TX nw	CP10	67	2.42	1.12	0.14	1	7
TX nw	CP2	69	2.38	0.94	0.11	0	5

Figure 1. Current and historic distributions of the Lesser Prairie-Chicken. Current information provided by the Lesser Prairie-Chicken Interstate Working Group, October 2006.

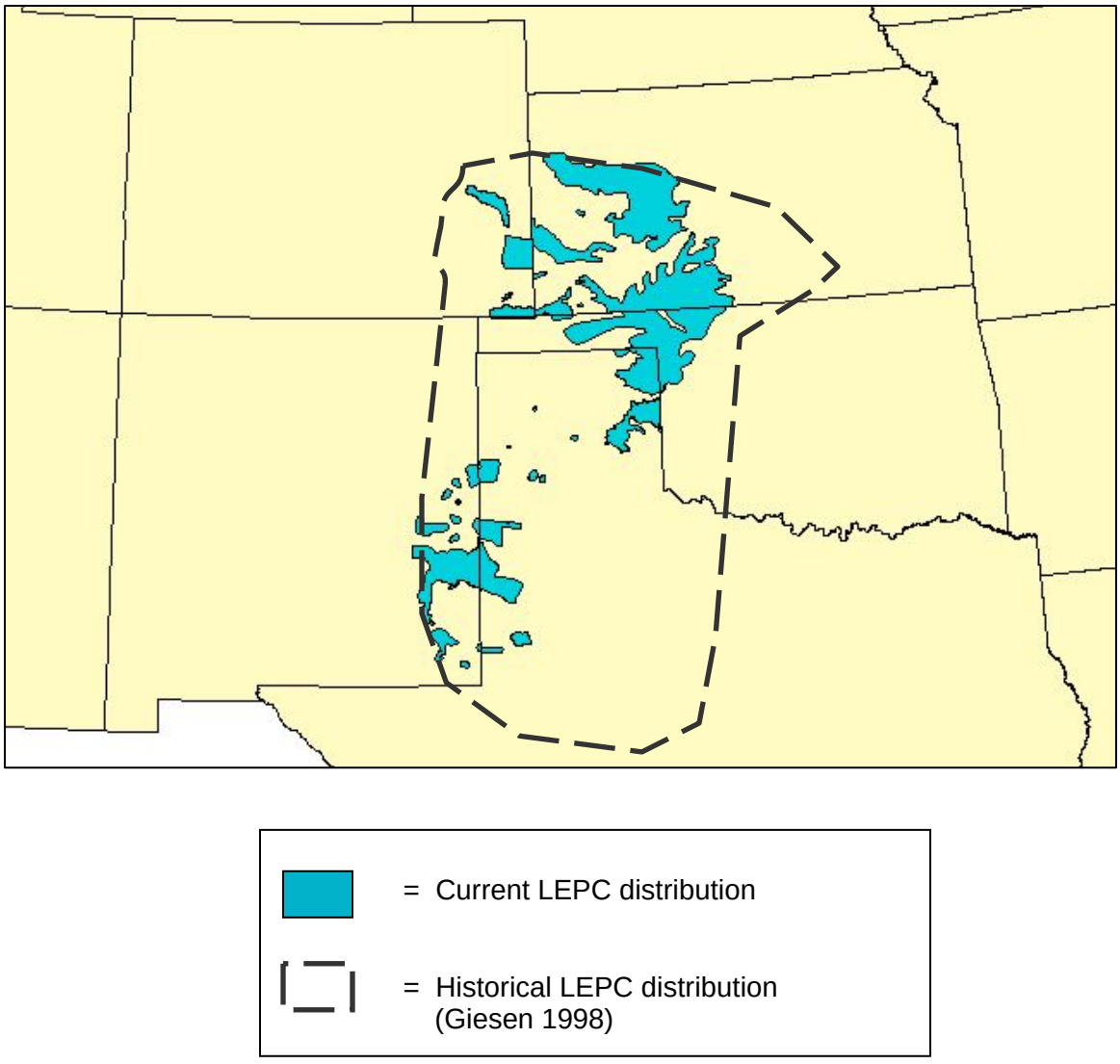


Figure 2. Location of counties that received CRP survey efforts throughout current Lesser Prairie-Chicken distribution.

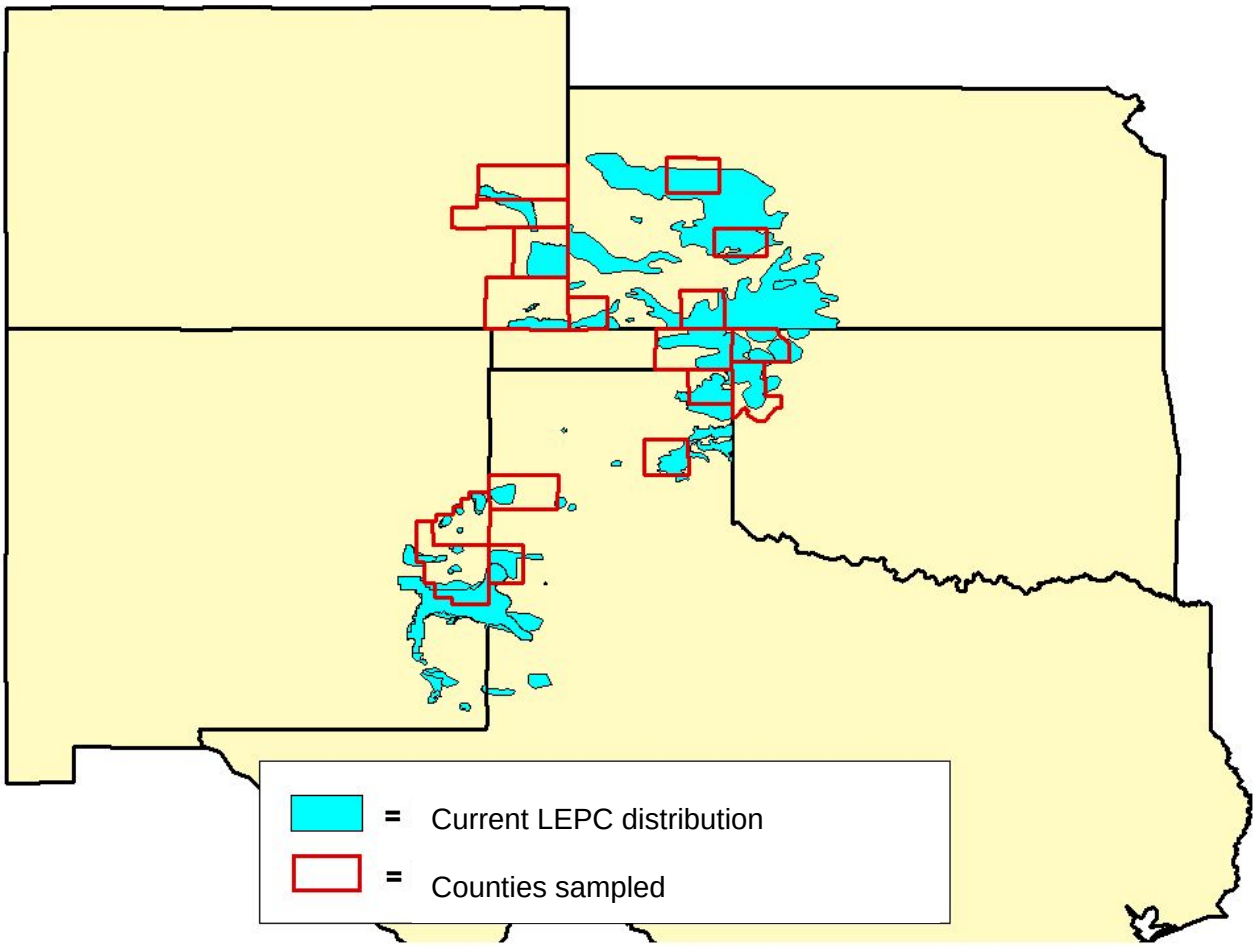


Figure 3. Comparison of dominant grass species in CRP fields in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

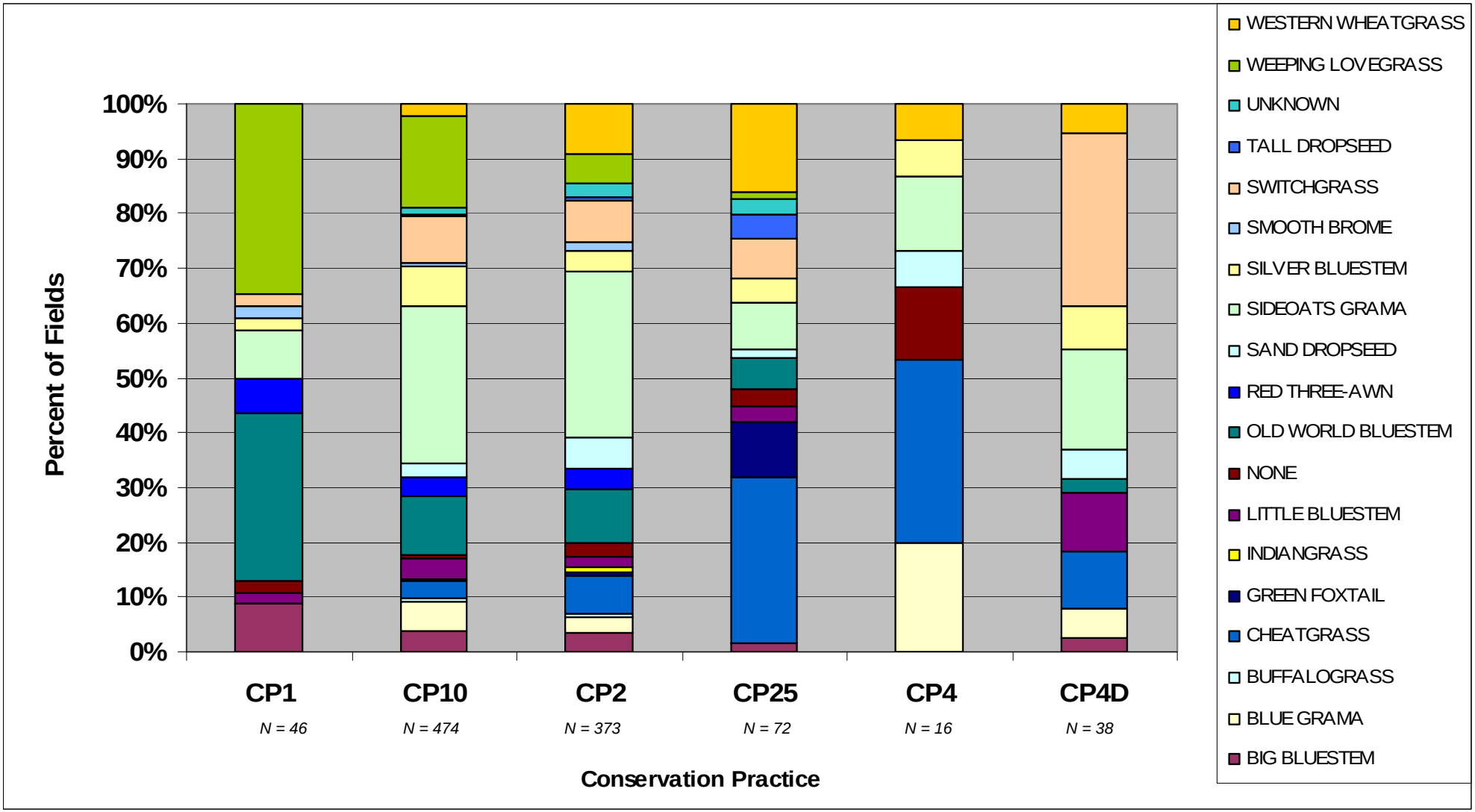
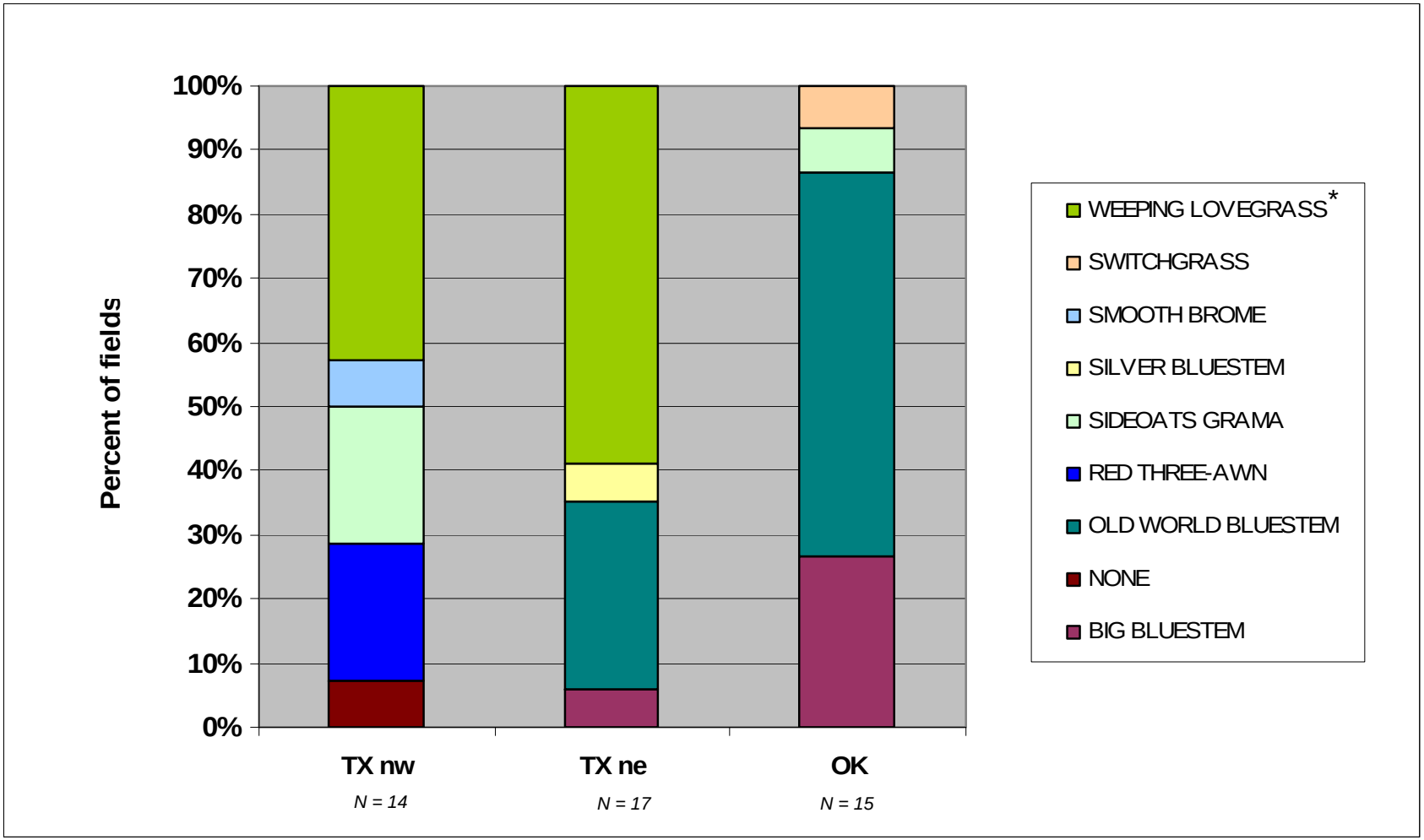


Figure 4. Comparison of dominant grass species within Conservation Practice (CP) 1 fields in Oklahoma and Texas.



* Grass species are presented in the same color throughout all figures. Grasses are ordered in the legend as they appear in the bar graph from top to bottom.

Figure 5. Comparison of dominant grass species with Conservation Practice (CP) 2 fields in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

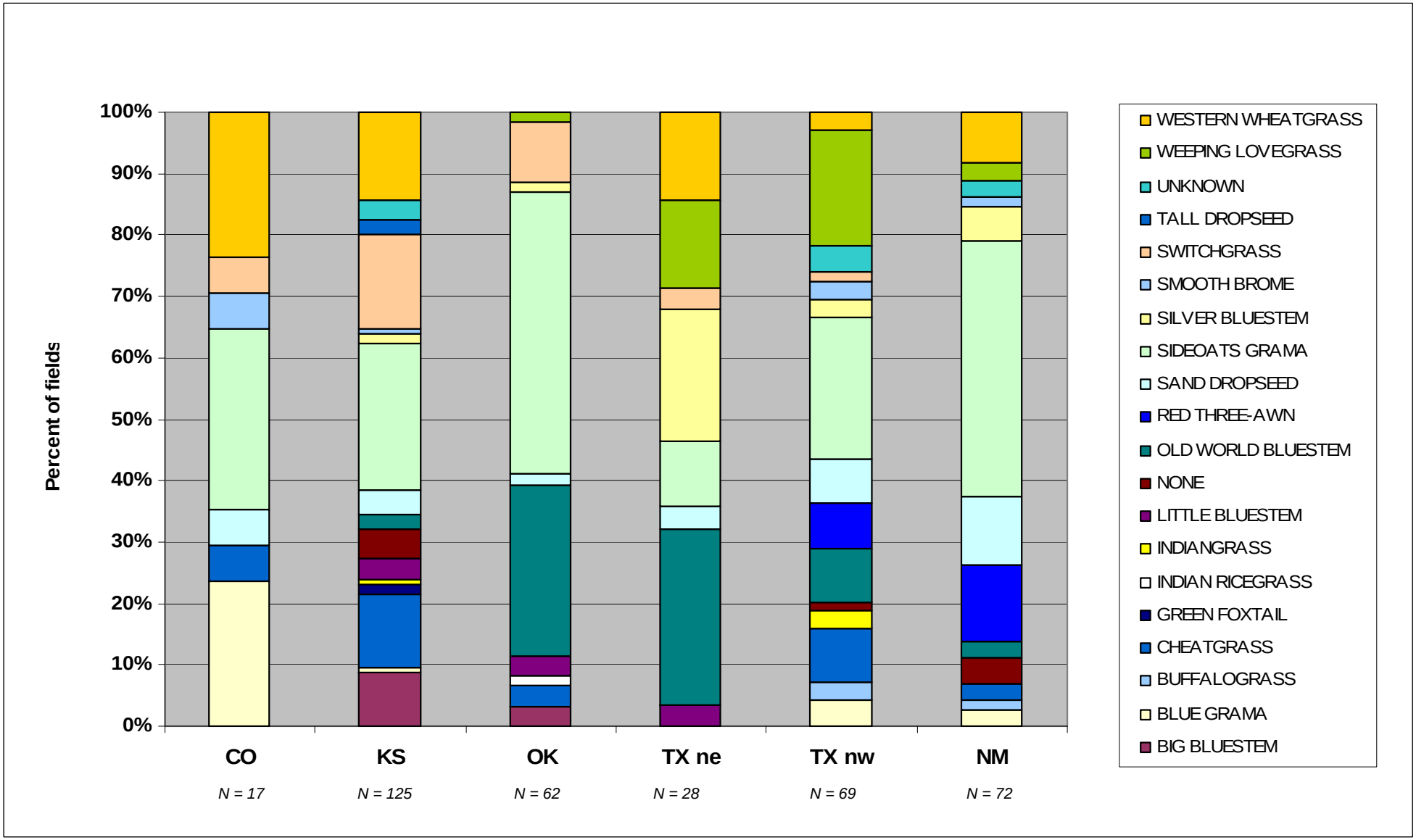


Figure 6. Comparison of dominant grass species with Conservation Practice (CP) 4 fields in Colorado and Kansas.

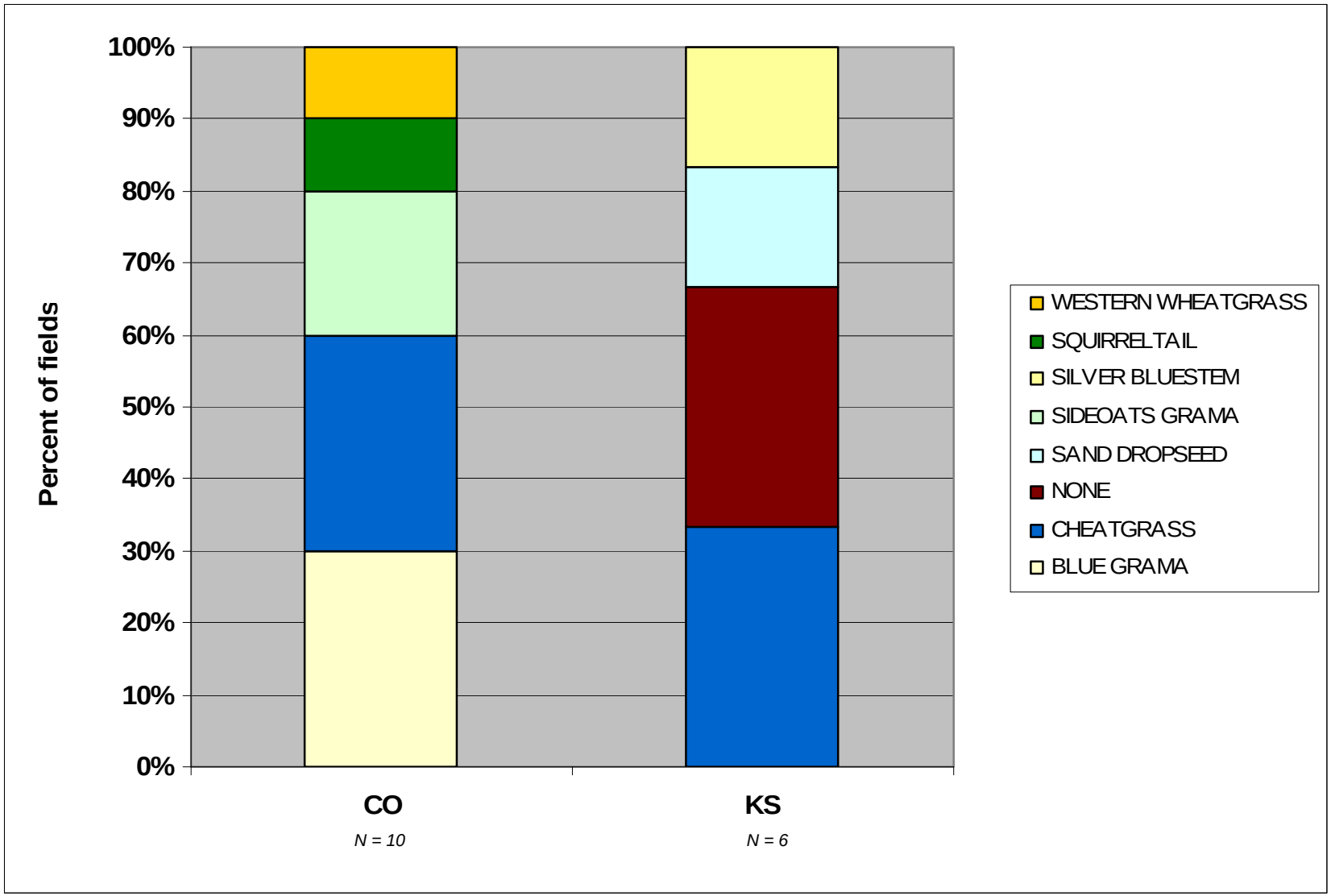


Figure 7. Comparison of dominant grass species within Conservation Practice (CP) 4D fields in Colorado and Kansas.

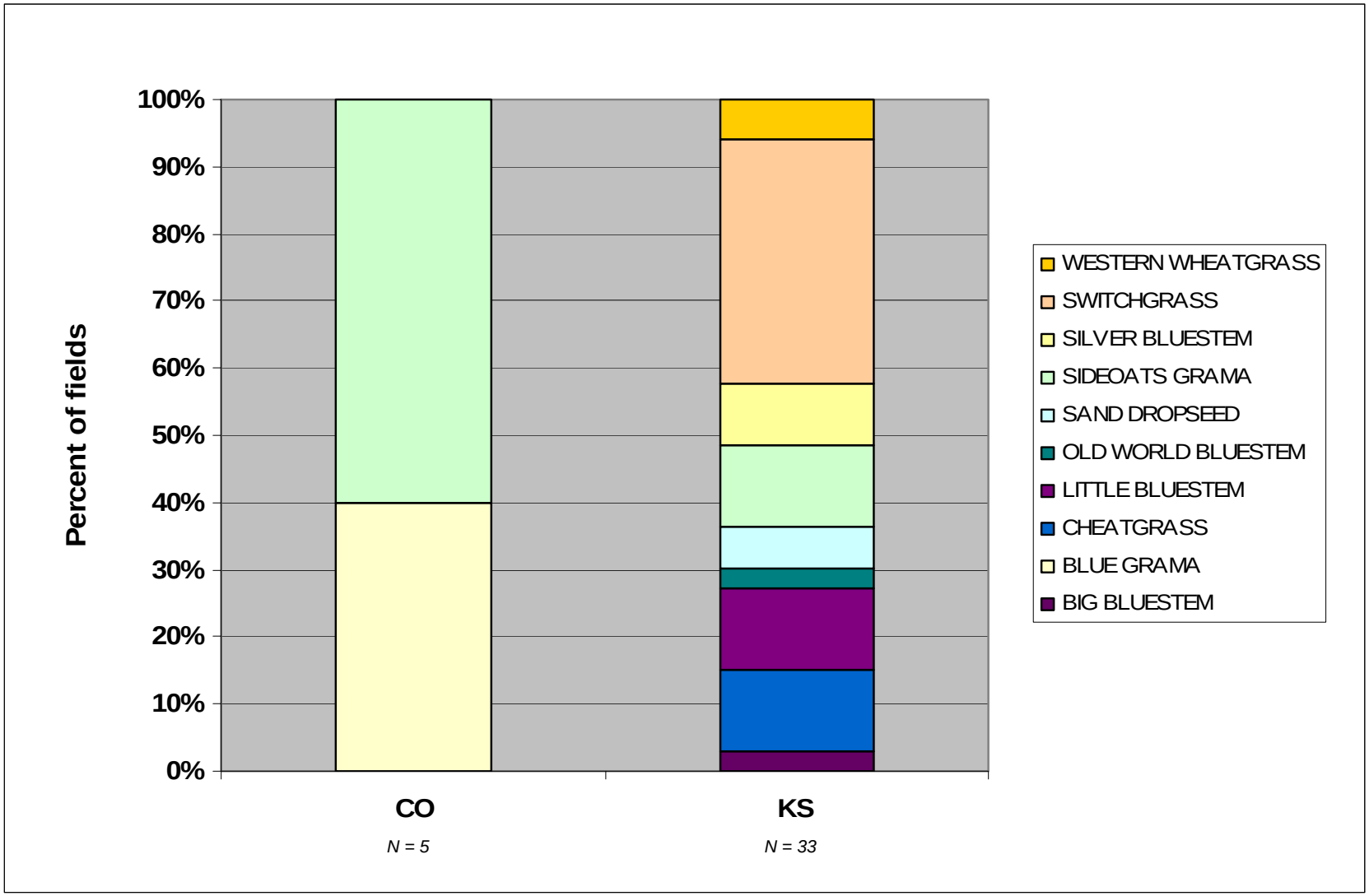


Figure 8. Comparison of dominant grass species within Conservation Practice (CP) 10 in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

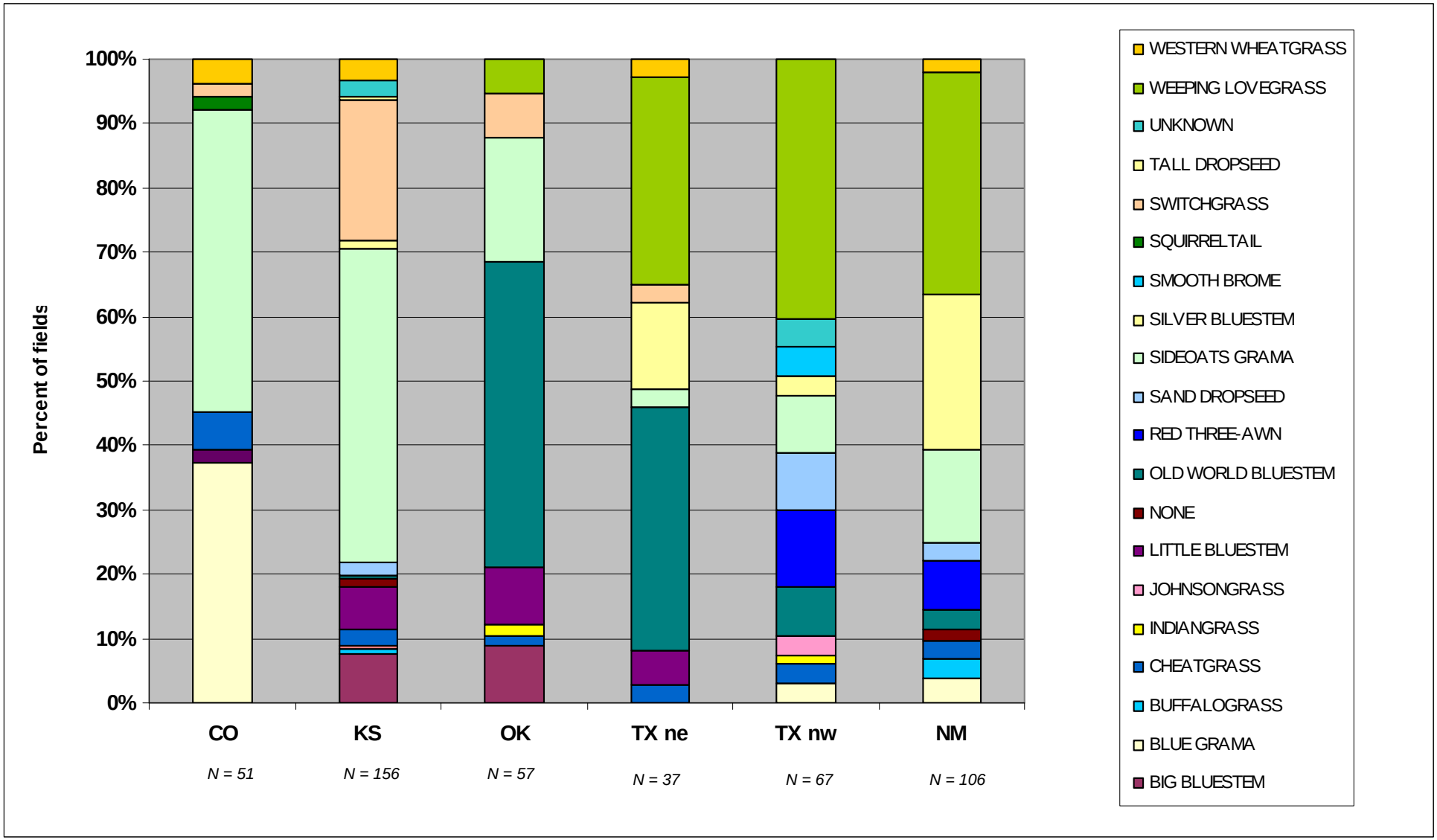


Figure 9. Comparison of dominant grass species within Conservation Practice (CP) 25 fields in Kansas and Oklahoma.

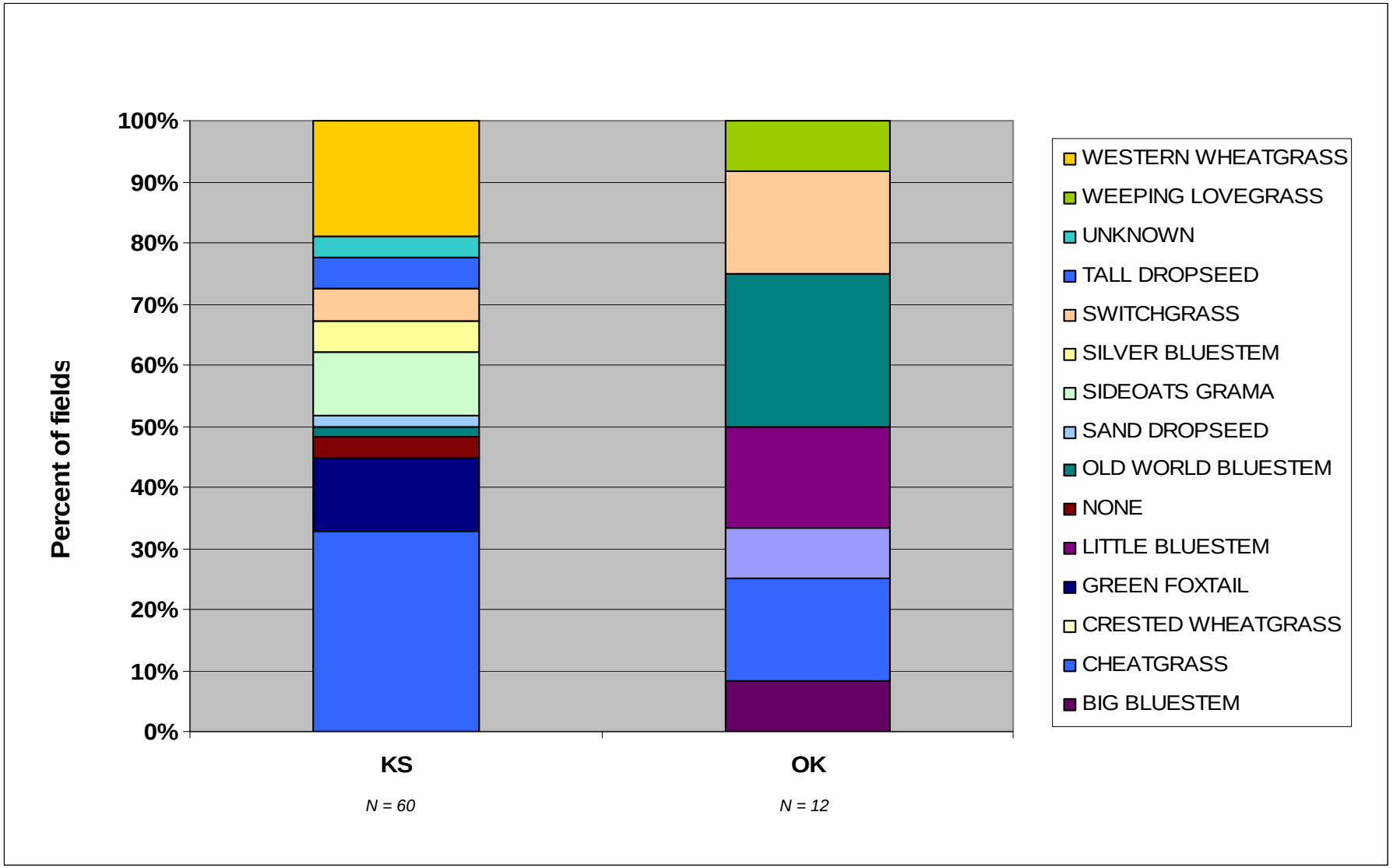


Figure 10. Comparison of grass and forb cover proportions in CRP fields in Colorado, Kansas, New Mexico, Oklahoma, and Texas.

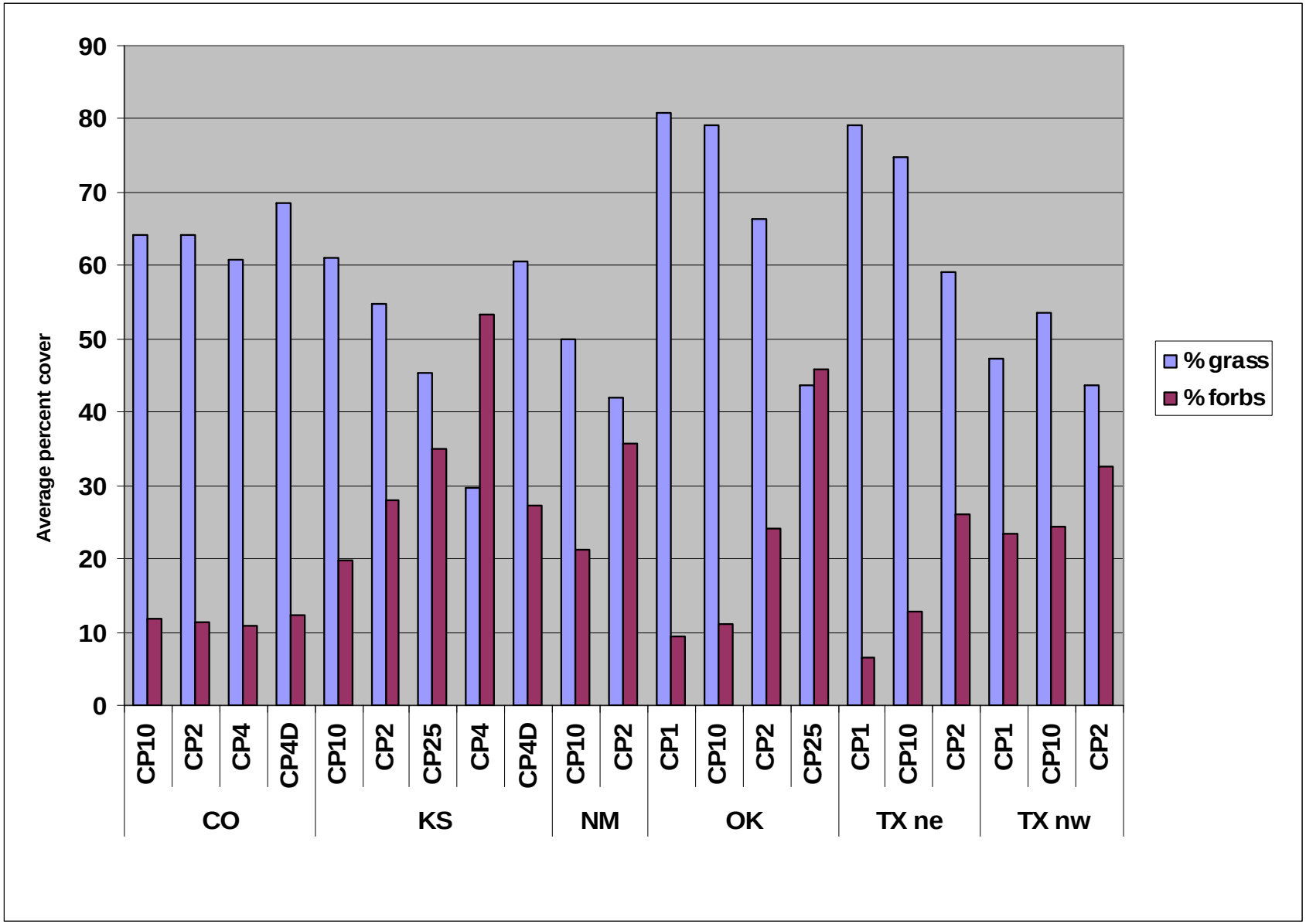


Figure 11. Comparison of dominant grass species in CRP fields in Colorado.

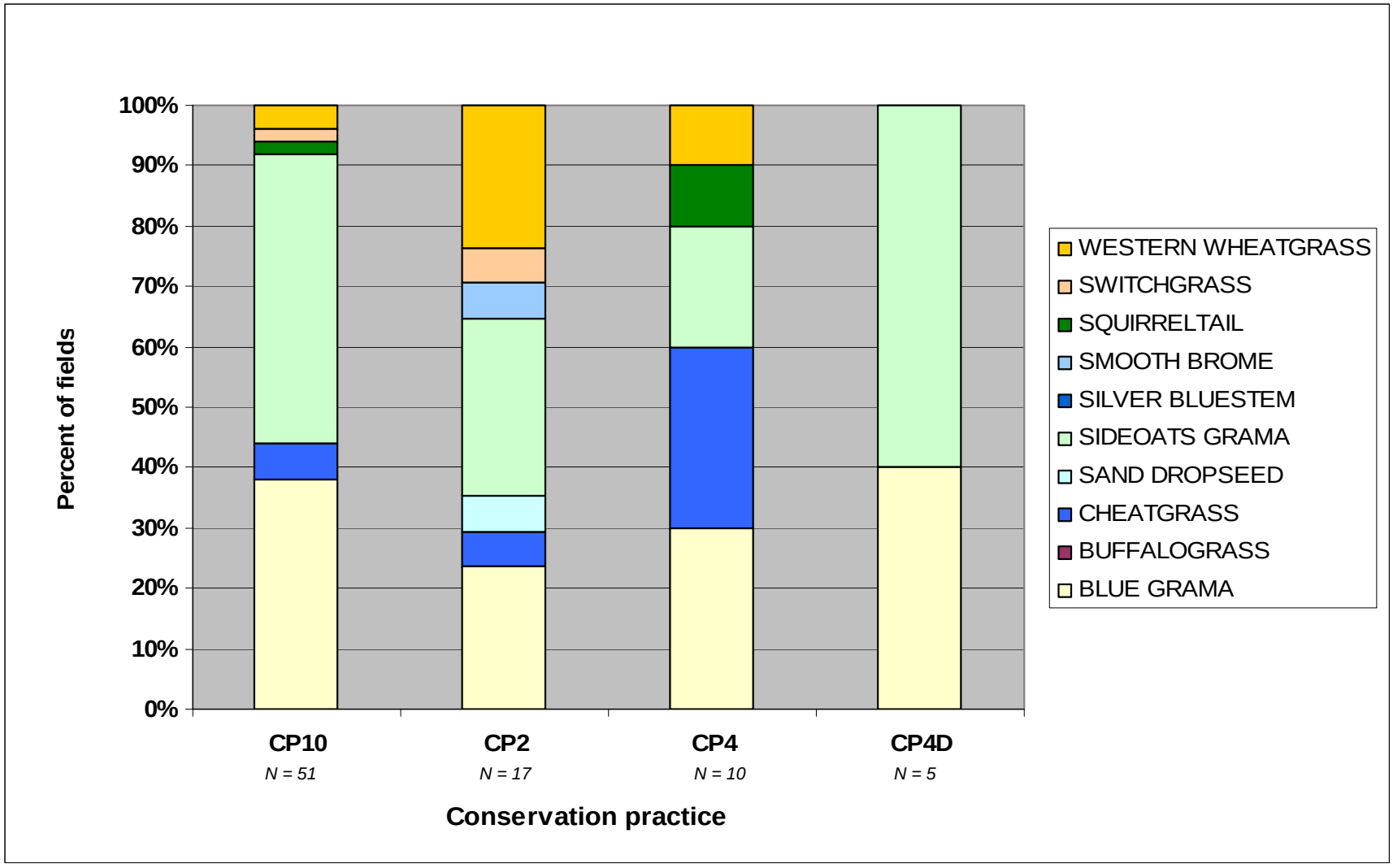


Figure 12. Percentage of CRP fields within grass height categories in Colorado.

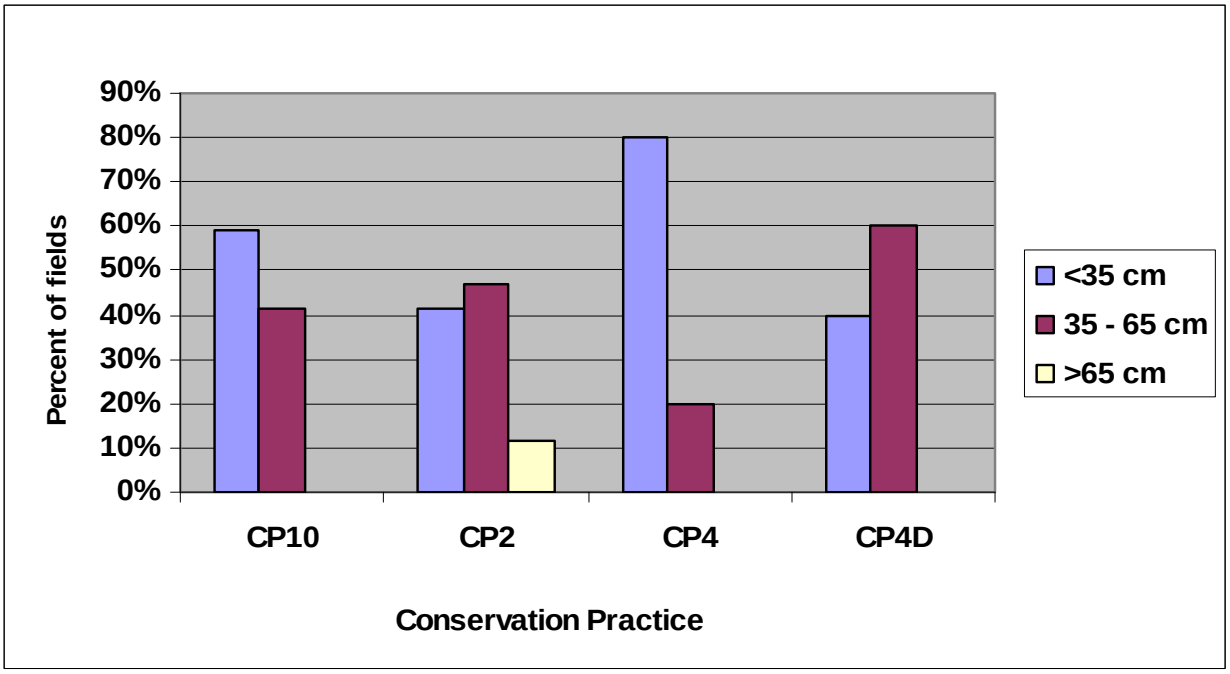


Figure 13. Comparison of grass and forb cover in CRP fields in Colorado.

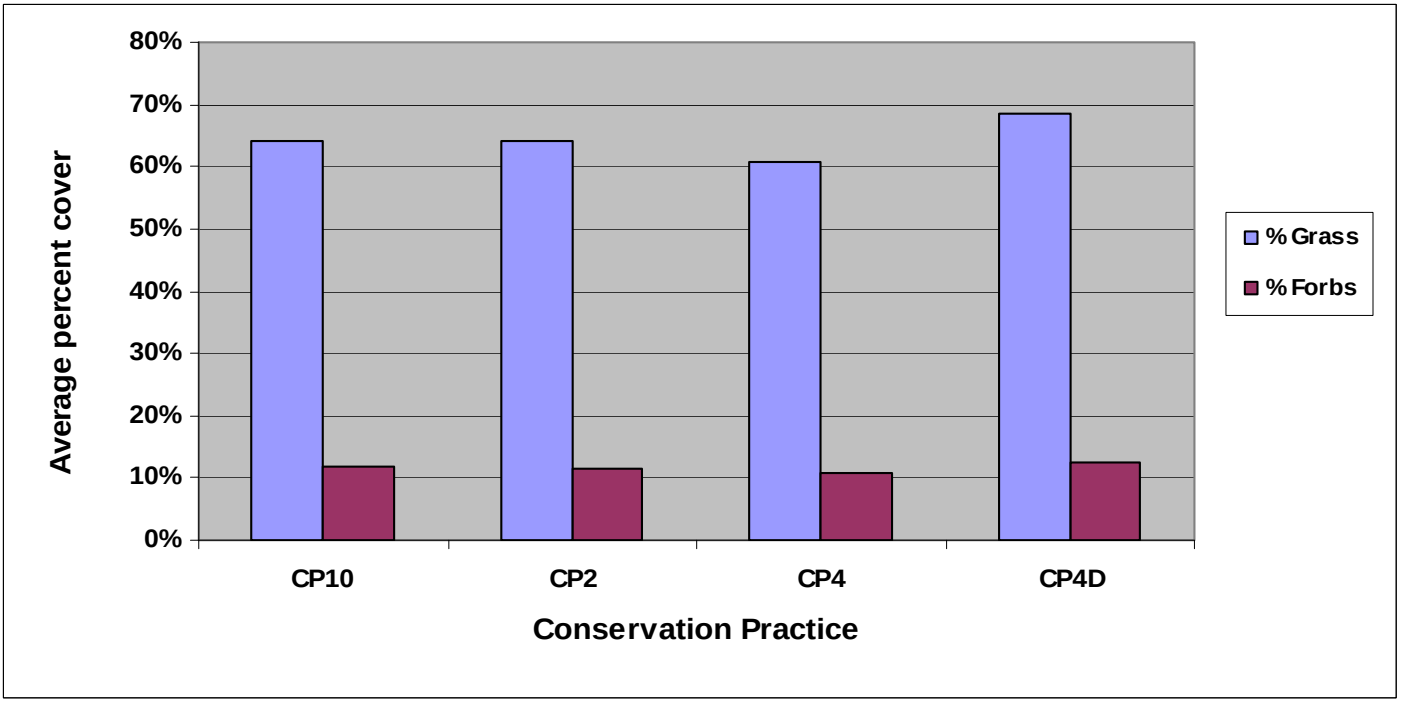


Figure 14. Comparison of dominant grass species in CRP fields in Kansas.

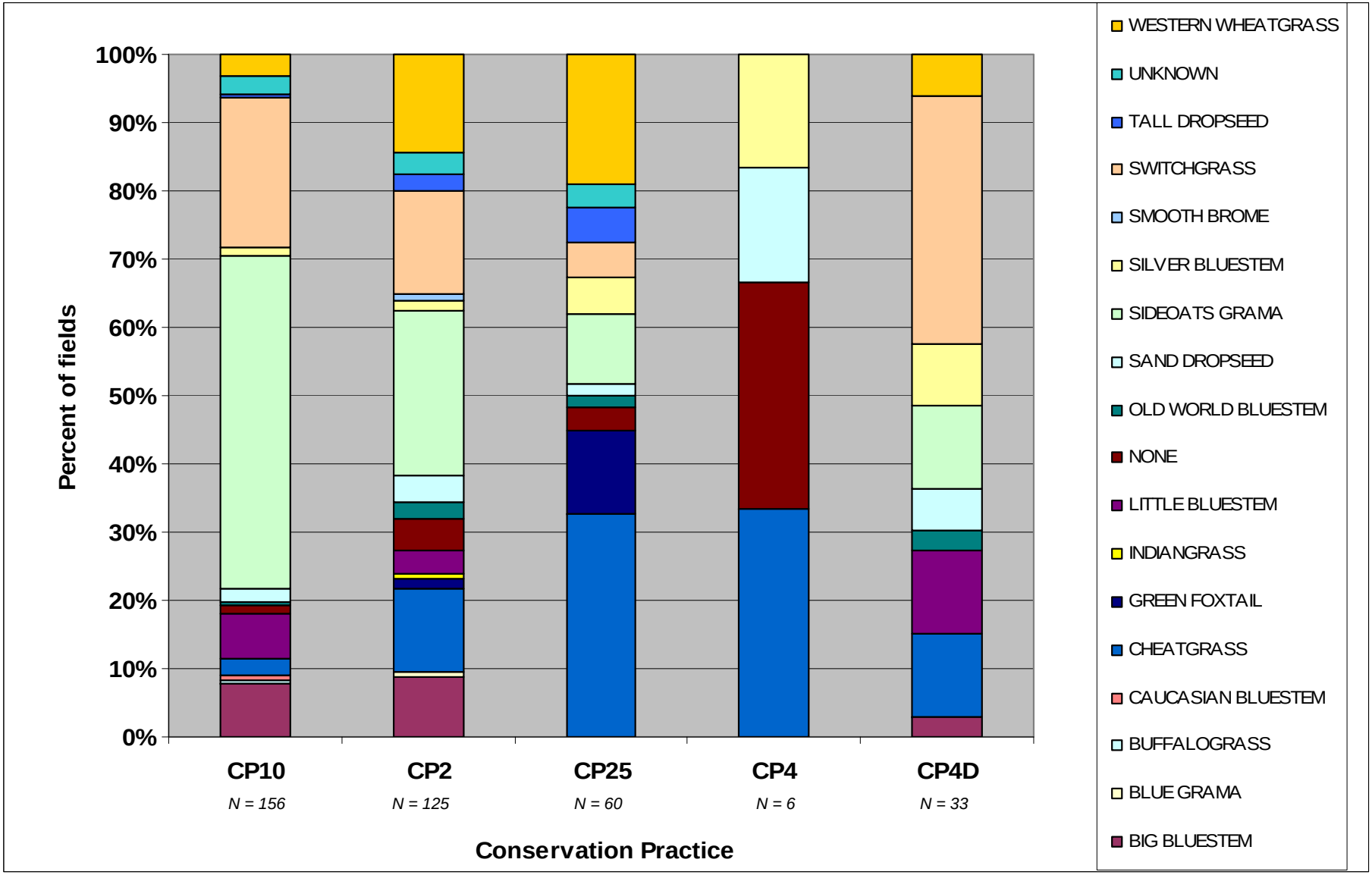


Figure 15. Percentage of CRP fields within grass height categories in Kansas.

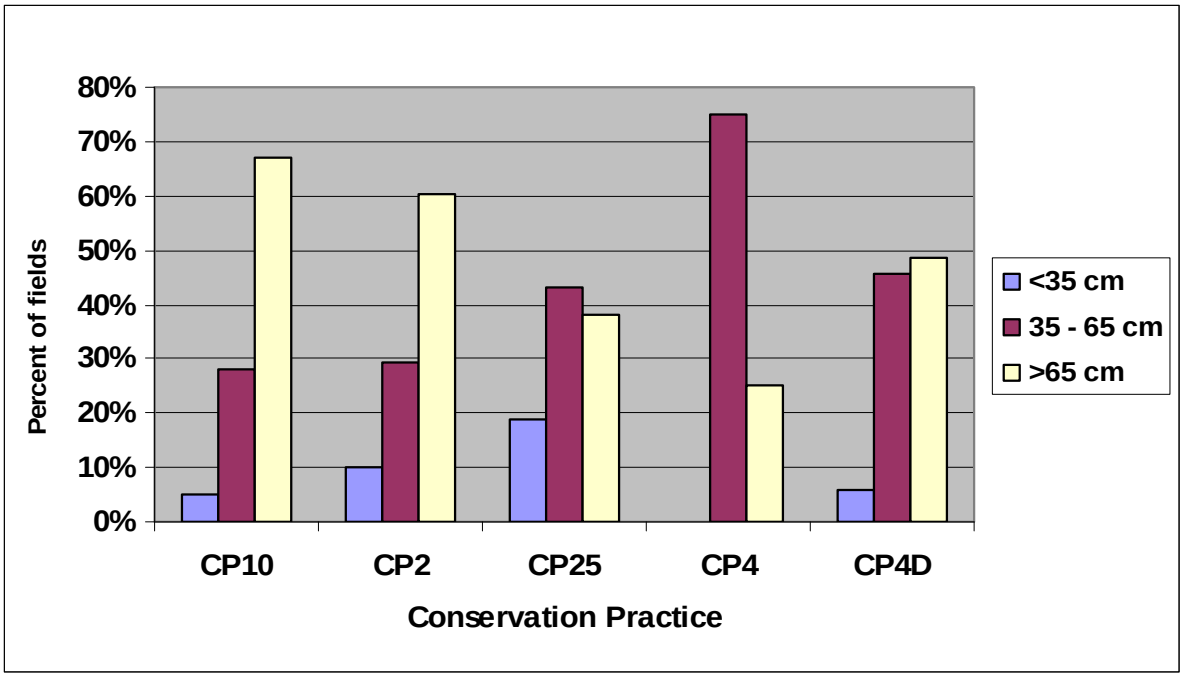
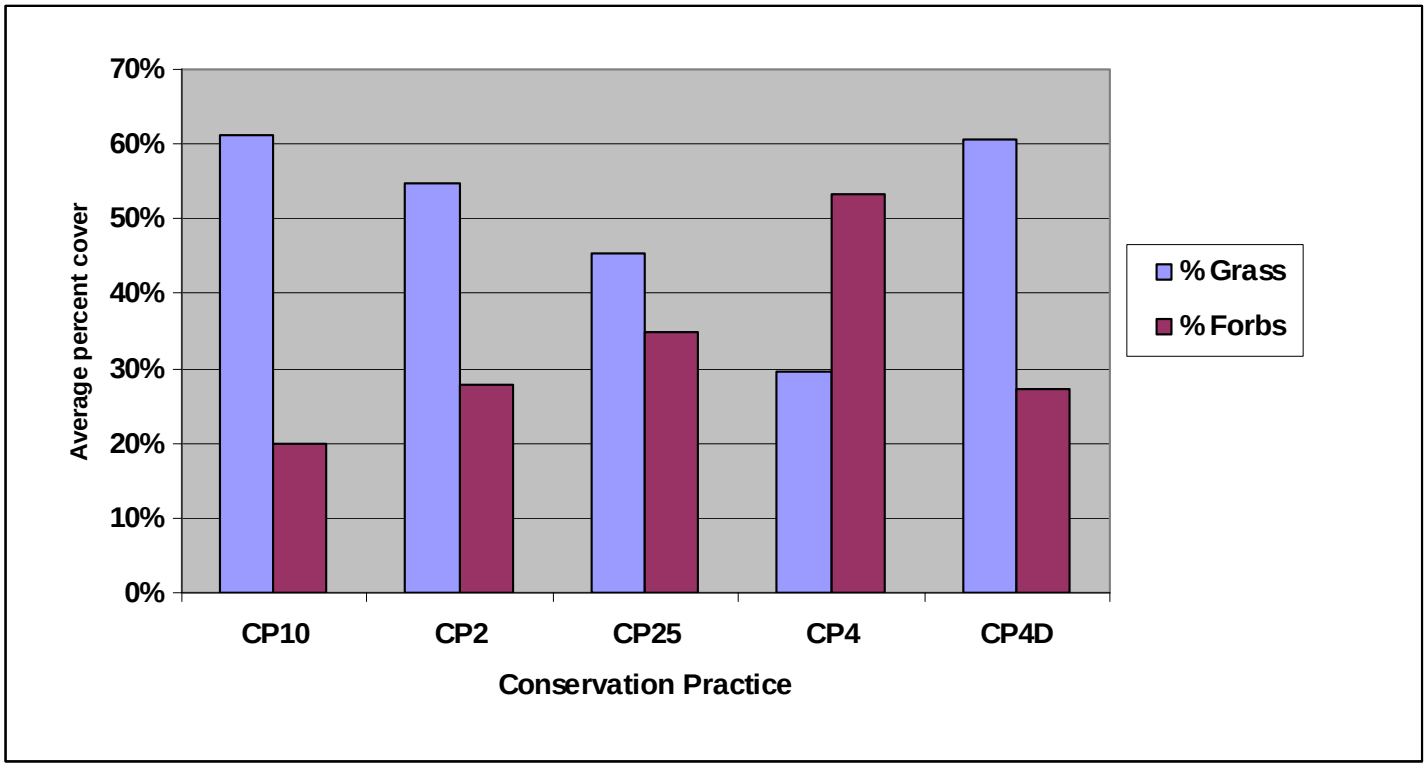


Figure 16. Comparison of grass and forb cover in CRP fields in Kansas.



. Figure 17. Comparison of dominant grass species in CRP fields in New Mexico.

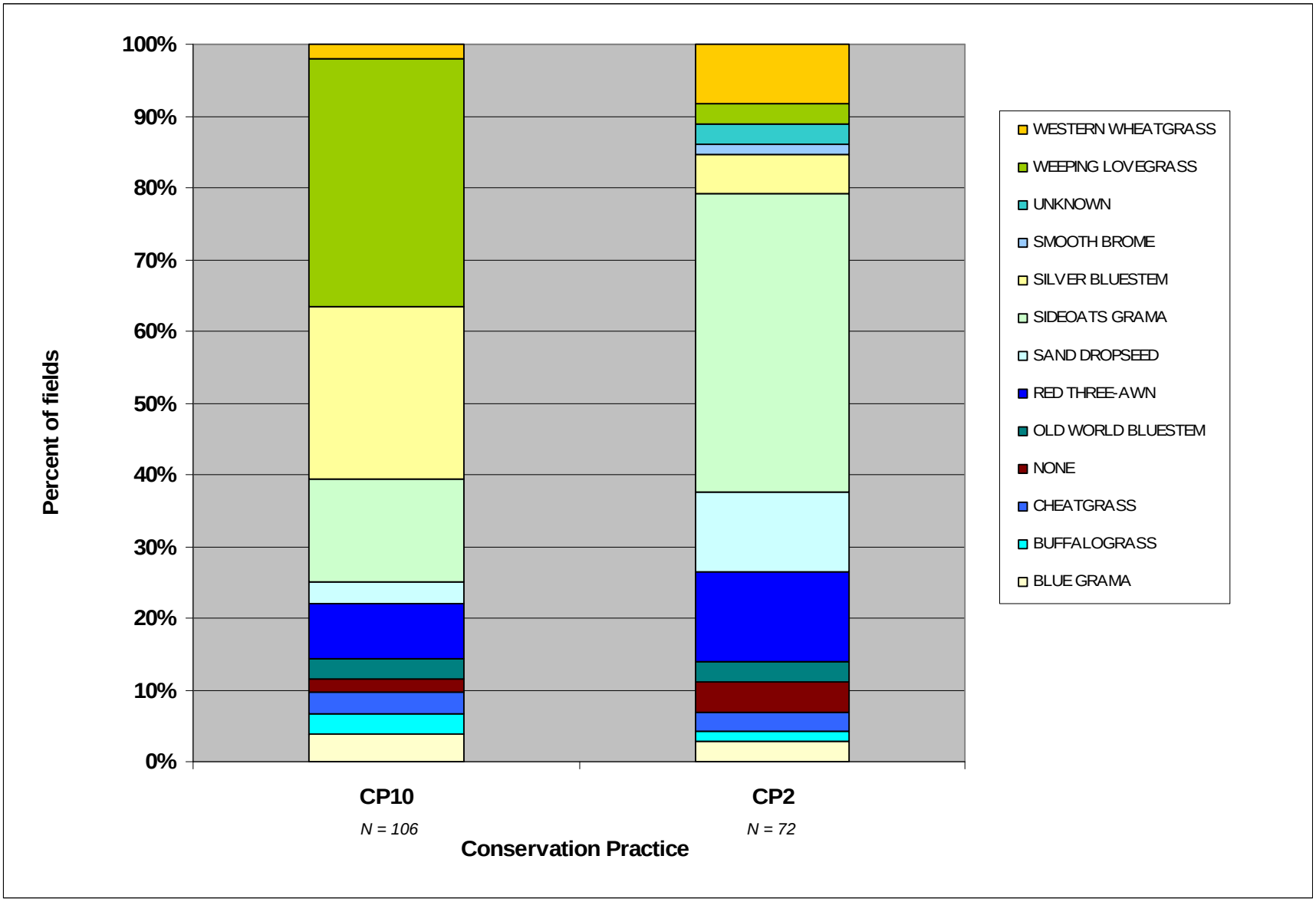


Figure 18. Percentage of CRP fields within grass height categories in New Mexico.

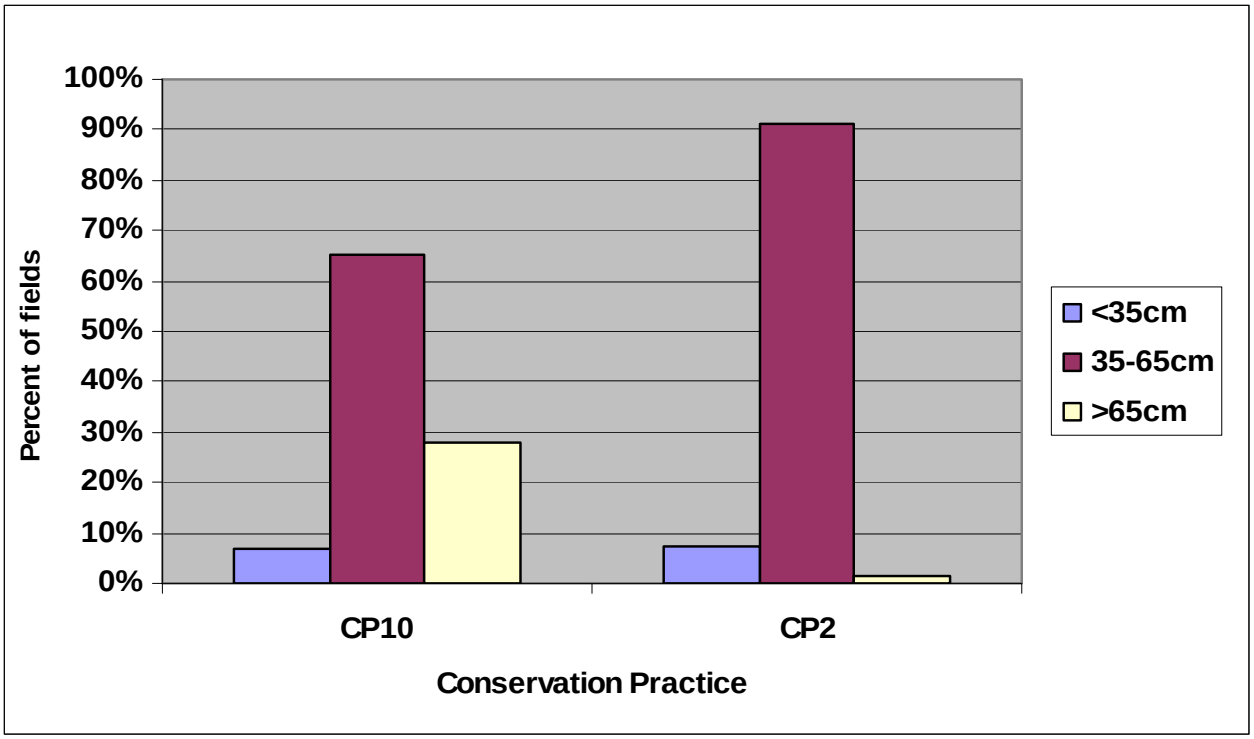


Figure 19. Comparison of grass and forb cover in CRP fields in New Mexico.

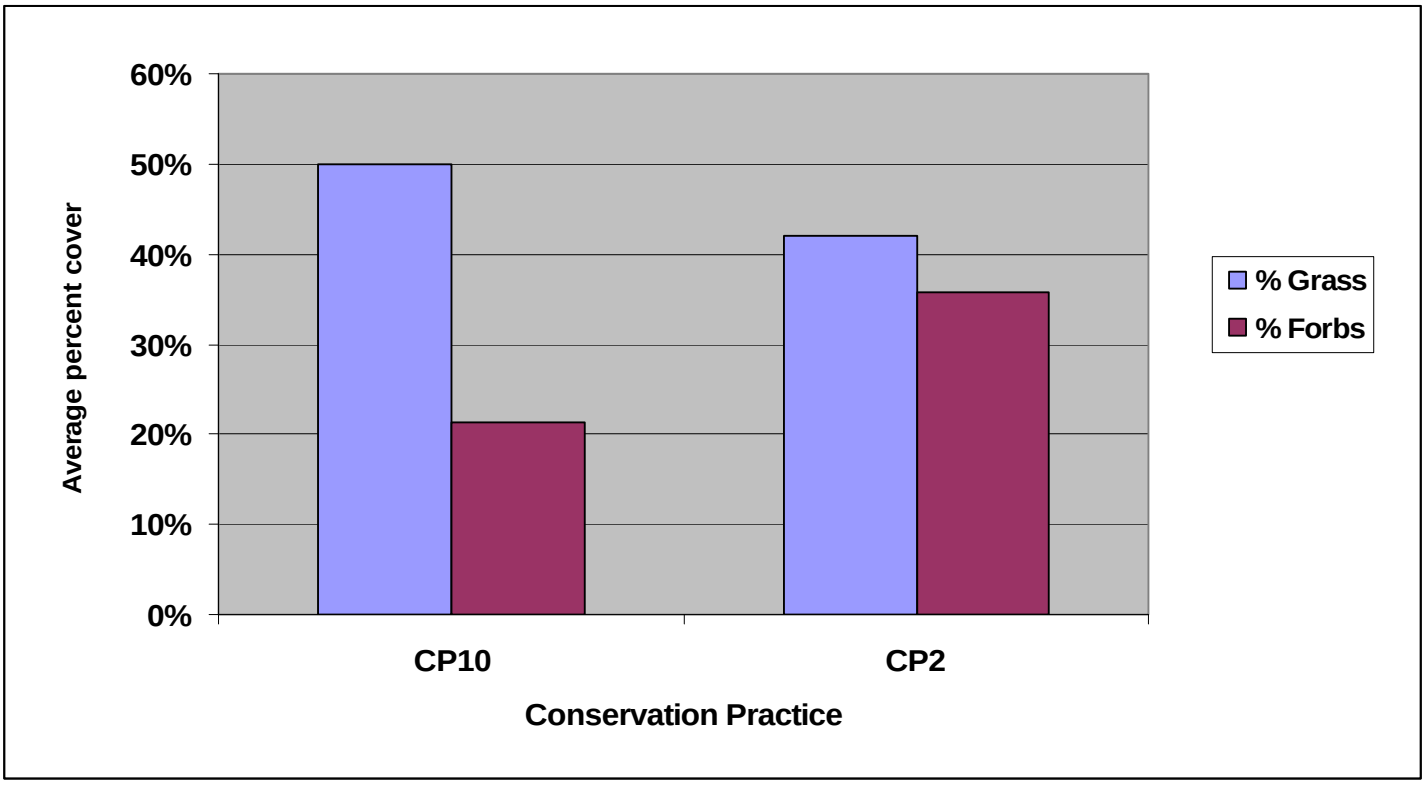


Figure 20. Comparison of dominant grass species in CRP fields in Oklahoma.

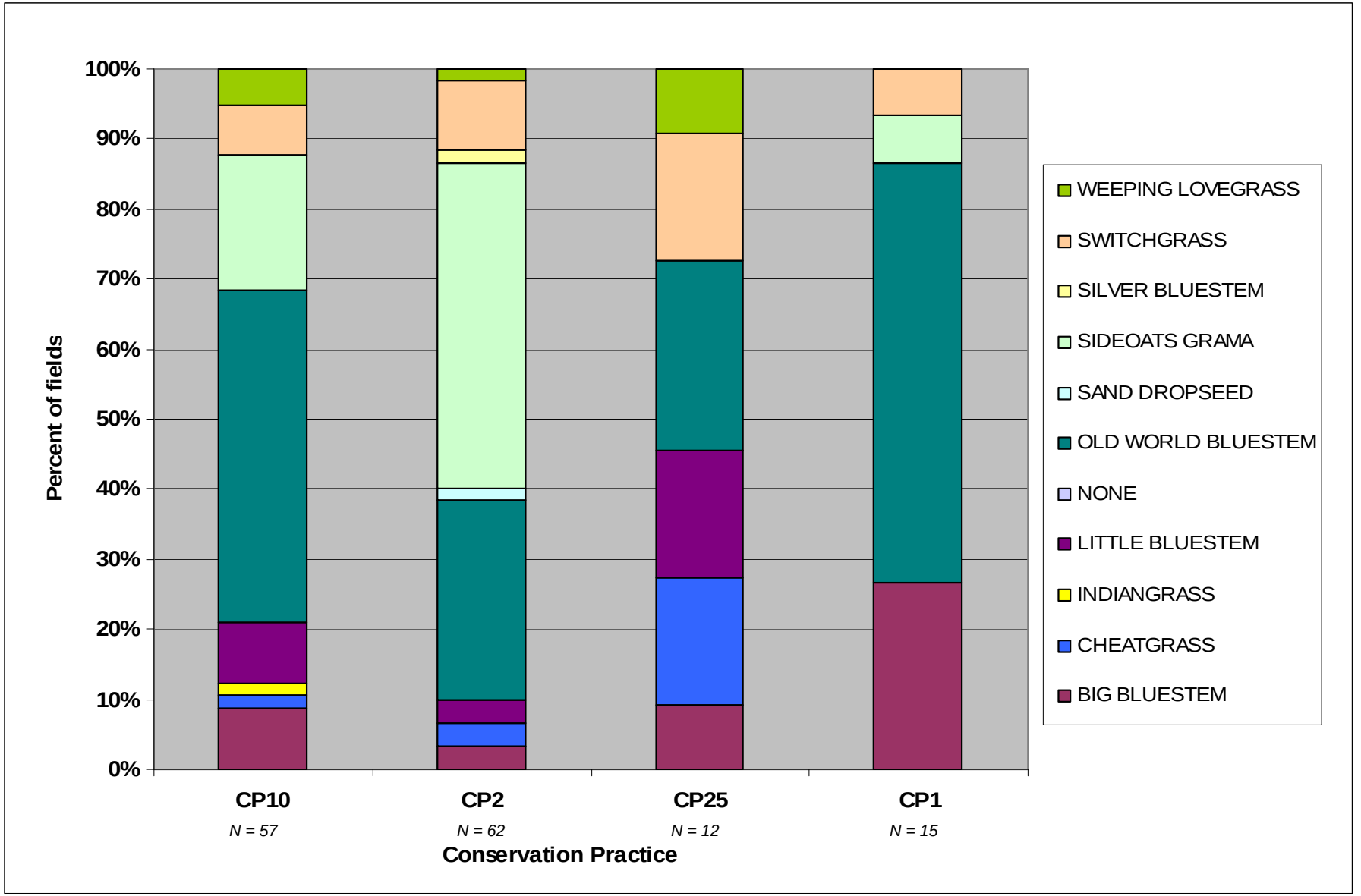


Figure 21. Percentage of CRP fields within grass height categories in Oklahoma.

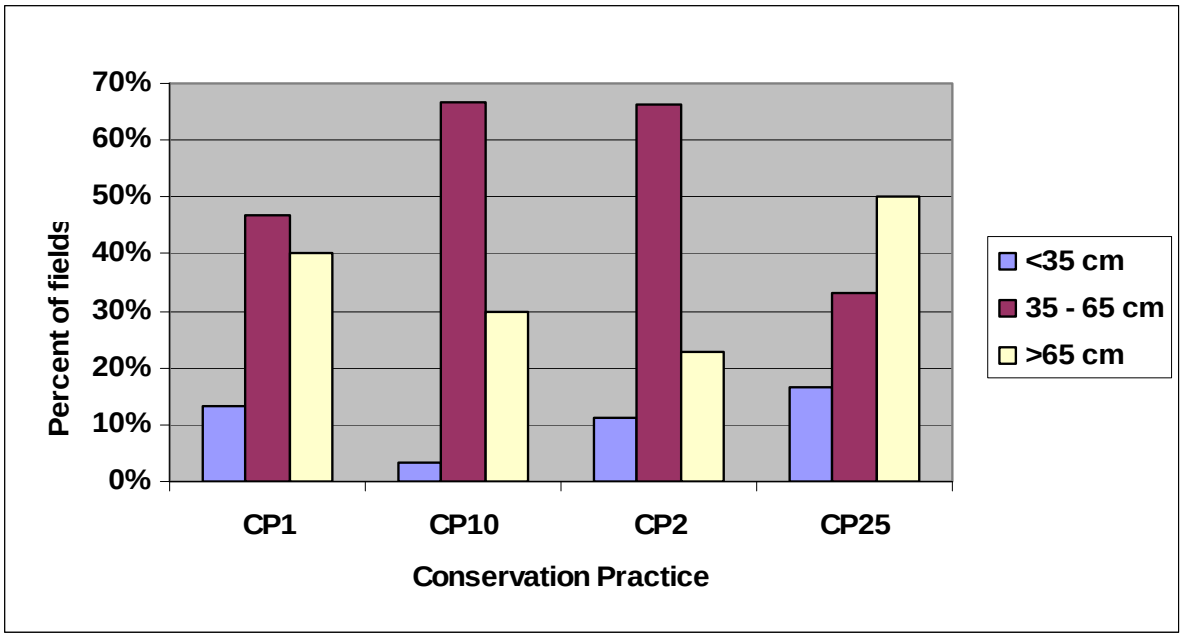


Figure 22. Comparison of grass and forb cover in CRP fields in Oklahoma.

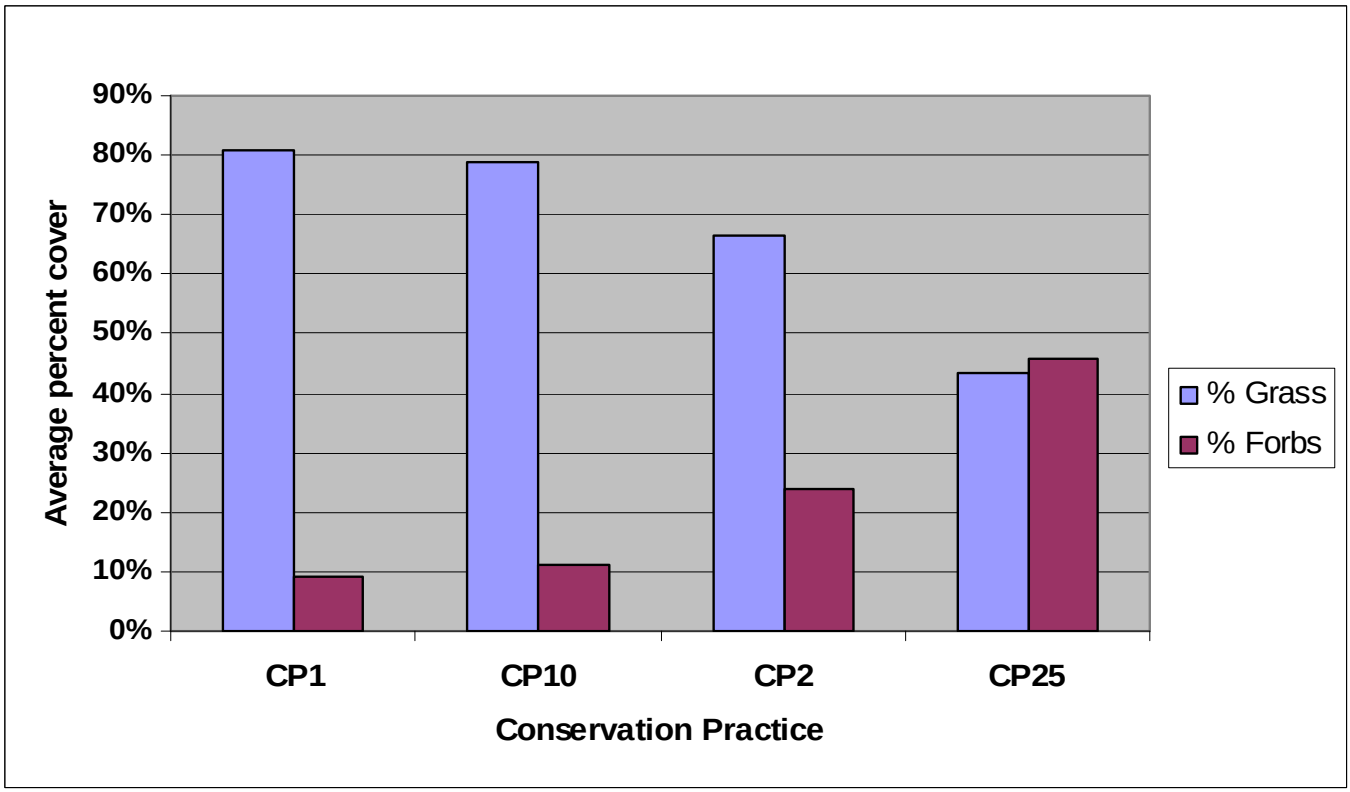


Figure 23. Comparison of dominant grass species in CRP fields in northeast Texas.

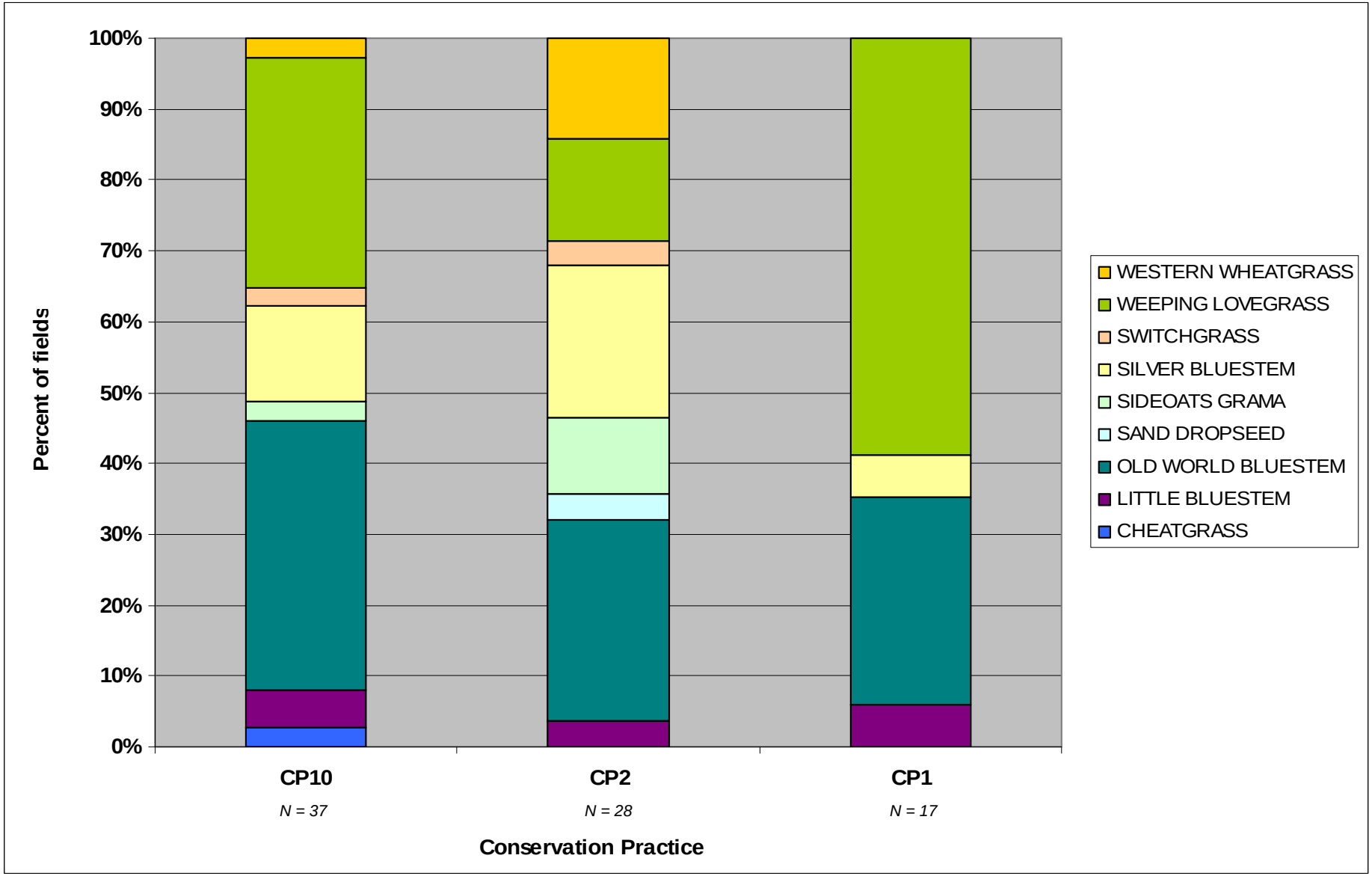


Figure 24. Comparison of dominant grass species in CRP fields in northwest Texas.

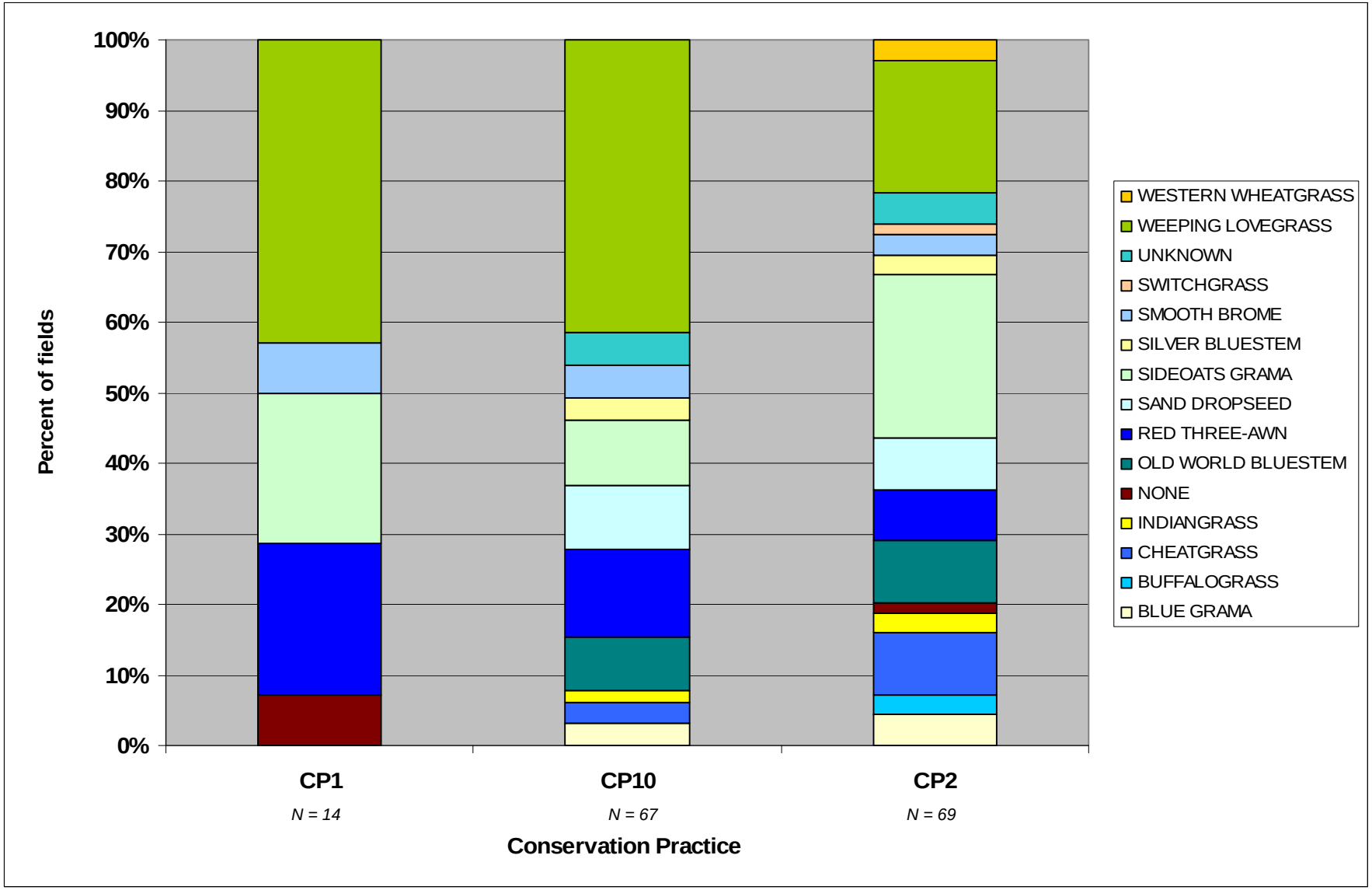


Figure 25. Percentage of CRP fields within grass height categories in northeast Texas.

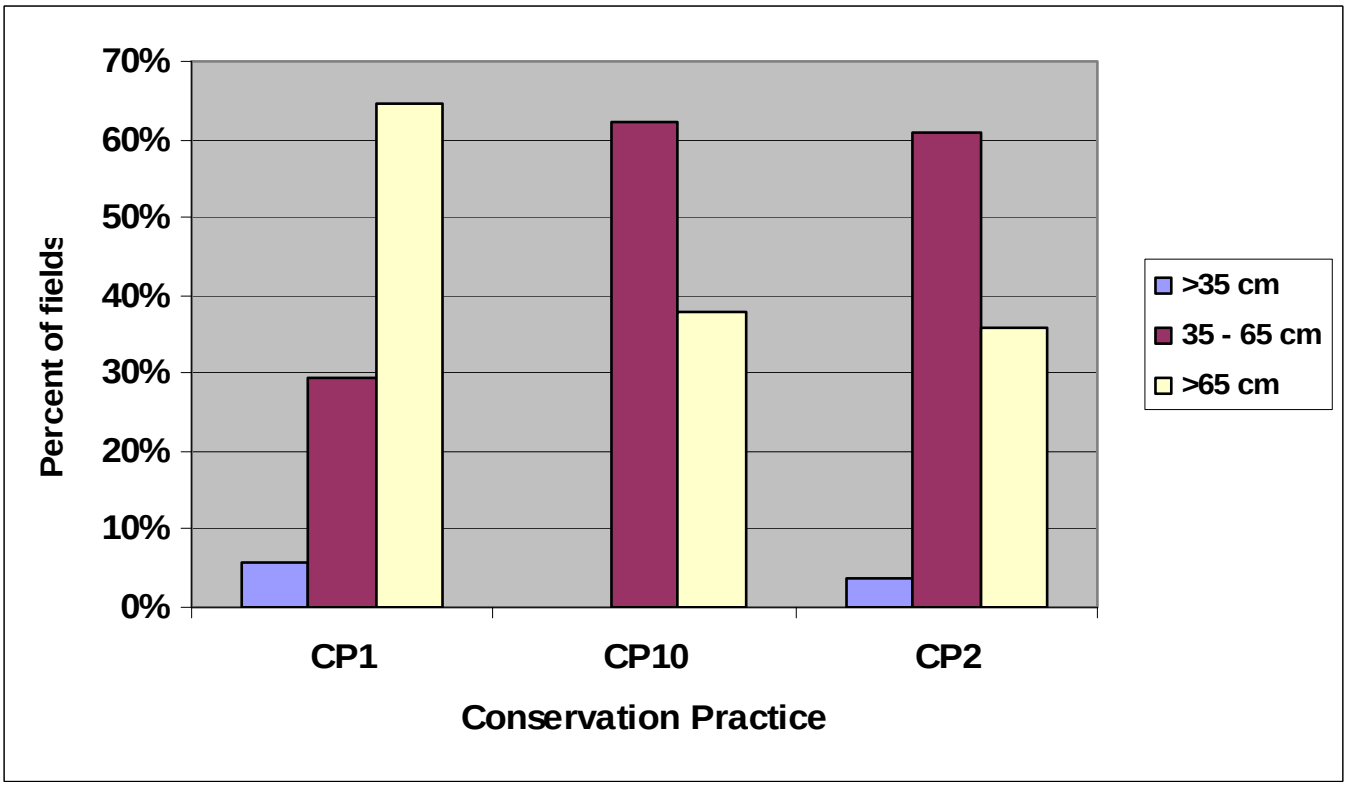


Figure 26. Percentage of CRP fields within grass height categories in northwest Texas.

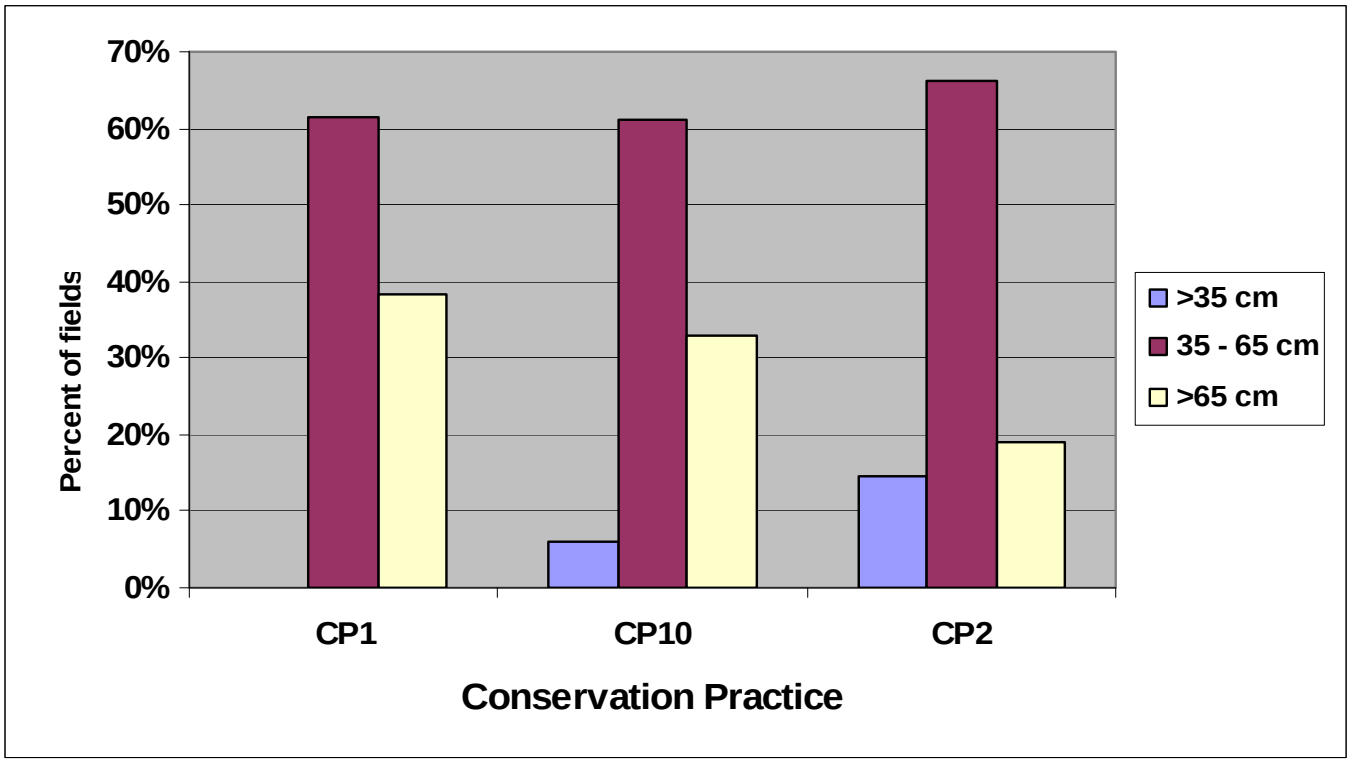
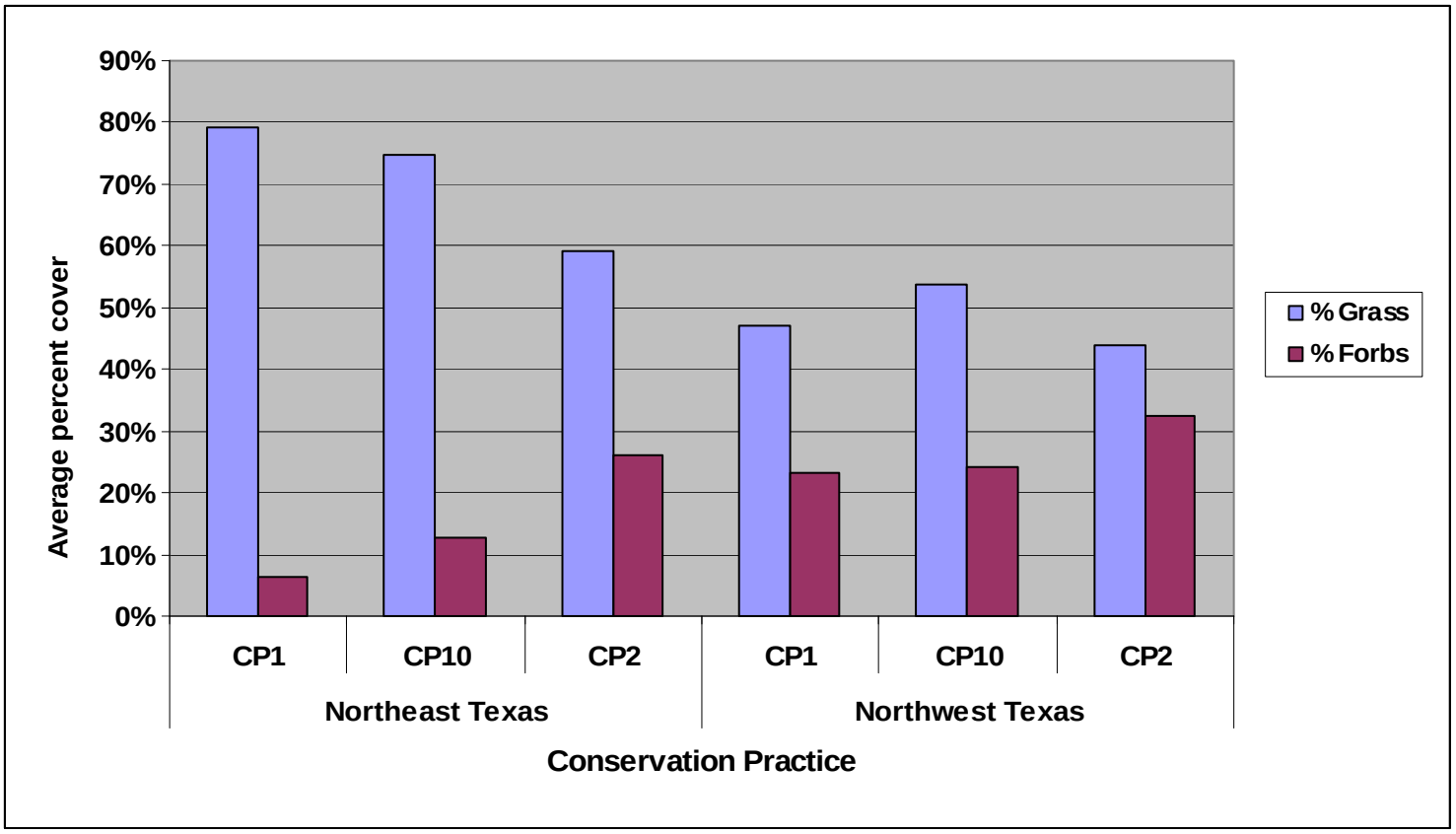


Figure 27. Comparison of grass and forb cover in CRP fields in Texas.



Appendix A. Field survey data sheet.

Field _____

Observer:		Date:	Time:
Field ID:		Acres:	CP: ☐☐
T	**R**	**S**	**¼ S**

Grass Cover		**_____% of Field**		
Dominant Species	% of total field	Height (circle one)		
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
Shrub Cover		**_____% of Field**		
Dominant Species	% of total field	Height (circle one)		
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
		<35 cm	35 – 65 cm	>65 cm
Forb Cover		**_____% of Field**		
	% of total field	Height (circle one)		
Alfalfa		<35 cm	35 – 65 cm	>65 cm
Other		<35 cm	35 – 65 cm	>65 cm

Other Cover _____% of total field	**Bare Ground**	**Trees In field**	**Water Sources**	**Fragmentation/Structures**
Describe:	_____% of total field	☐ 0 ☐ 1 ☐ 2 – 5 ☐ >5	☐ None ☐ Stream ☐ Playa ☐ Pond ☐ Stock Tank ☐ Guzzler ☐ Wet meadow ☐ Other	☐ Oil/gas wells ☐ High-tension wires ☐ Roads ☐ Fence Type - _____ ☐ Shelterbelt/shrubrow ☐ Turbines ☐ Other
LEPC Suitability of Surrounding Fields				
0 1 2 3				

NOTES: