DRAFT Range-wide Conservation Plan for the Lesser Prairie-Chicken

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DRAFT REPORT

This is a draft report of a range-wide conservation plan for the lesser prairie-chicken. Additional edits and changes are anticipated. Comments on this draft are encouraged. Please submit to Jan Caulfield janc@gci.net by March 1, 2013. A final version of the plan will be released in March.

Picture Credit: Larry Lamsa

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Introduction

The lesser prairie-chicken (*Tympanuchus pallidicinctus*; hereafter LEPC) is a North American grouse species that occupies sand sagebrush (*Artemisia filifolia*), sand shinnery oak (*Quercus havardii*) and mixed grass vegetation communities of the southern Great Plains. Historically, LEPC occupied an estimated range of approximately 182,843 sq. mi., however estimates of this range included many areas of unsuitable habitat in shortgrass prairies. Since the 19th century, LEPC and the habitat upon which they depend have diminished across their historical range (Crawford and Bolen 1976a, Taylor and Guthery 1980a), with recent estimates of current occupied range totaling approximately 30,900 sq. mi., or about 17% of the estimated area of their historical range, as shown in Figure 1. Causes for this reduction in the occupied range are primarily attributed to habitat loss and fragmentation (USFWS 2012a). Habitat losses have been caused by conversion of native prairie to cropland (Bent 1932, Copelin 1963, Jackson and DeArment 1963, Crawford and Bolen 1976a, Taylor and Guthery 1980b), long term fire suppression (Woodward et al. 2001), grazing management practices that reduce LEPC habitat quality (Jackson and DeArment 1963, Taylor and Guthery 1980a, Riley et al. 1992), tree invasion (Fuhlendorf et al. 2002), herbicide spraying that reduces LEPC habitat quality (Jackson and DeArment 1963, Peterson and Boyd 1998, Thacker et al. 2012), habitat fragmentation from both oil and gas (Hunt 2004) and wind energy (Pruett et al. 2009) developments. In addition, LEPC populations have been influenced by fences and utility lines (Wolfe et al. 2007, Hagen 2010), prolonged drought (Merchant 1982, Dixon 2011, Lyons et al. 2011, Grisham 2012), and climate change (Grisham 2012, USFWS 2012a, USDA NRCS 2012).

Because of these declines, the U.S. Fish and Wildlife Service (USFWS) was petitioned to list the LEPC as threatened in 1995. After review, the USFWS issued its findings in 1998 that the species was warranted for listing but precluded from listing because of actions needed by other higher priority species (USFWS 2012a). The USFWS assigned LEPC a listing priority number of 8 (1 indicating the highest need for action and 12 lowest), which it then revised in 2008, increasing it to a 2 (USFWS 2012a) primarily because of the perceived increased threat of wind development and associated development of transmission lines within the occupied range. On December 11, 2012, the USFWS released a Proposed Rule to list the LEPC as a threatened species (Federal Register 50 CFR Part 17 Docket No. FWS-R2-ES-2012-0071:4500030113)
("http://www.gpo.gov/fdsys/pkg/FR-2012-12-11/pdf/2012-29331.pdf" \t "_blank"
http://www.gpo.gov/fdsys/pkg/FR-2012-12-11/pdf/2012-29331.pdf). A final rule determination is scheduled to be made by September 30, 2013.

Numerous efforts to reverse the decline of the LEPC have been initiated since the initial determination of its status as a warranted but precluded species. The USFWS (2012a) described many of these initiatives in its proposed rule, but expressed concerns that a number of existing and expanding threats are currently outside of the regulatory authority of the states to control, thus the determination to propose listing LEPC as threatened. In June 2012, the 5 states supporting LEPC specifically Kansas (KS),

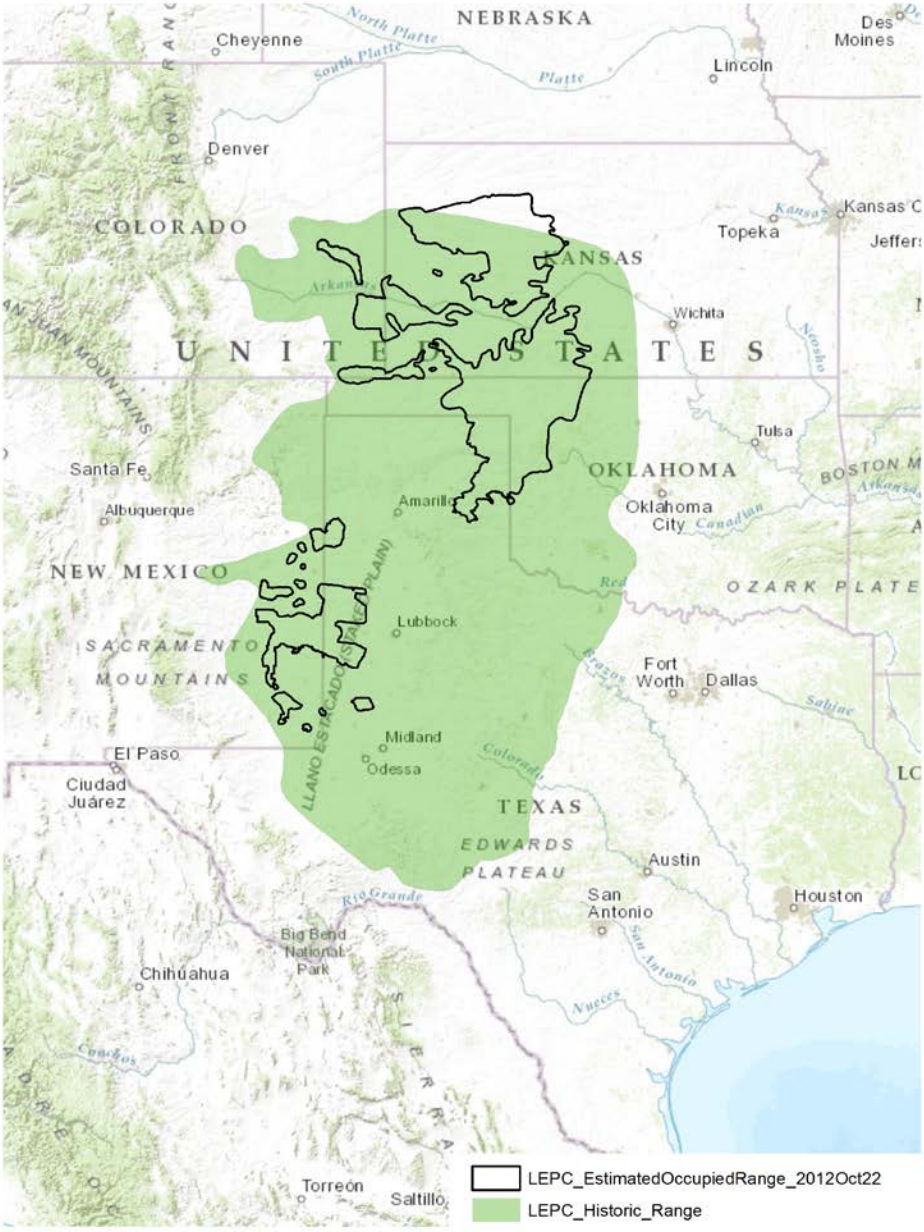

Figure 1. Estimated historical range and current occupied range of lesser prairie-chickens.

Colorado (CO), Oklahoma (OK), New Mexico (NM), and Texas (TX) agreed to develop a range-wide conservation plan for LEPC. The 5 states worked through the Western Association of Fish and Wildlife Agencies (WAFWA) and its LEPC Interstate Working Group (IWG) to develop the range-wide plan, and engaged the Ecosystem Management Research Institute (EMRI) (www.emri.org) to coordinate development of the plan. A number of initiatives are underway, and the IWG anticipates that the solutions collected and explained in this document and implemented by engaged conservation partners will substantially reduce the threats and issues affecting LEPC sustainability and these form the foundation for this LEPC Range-wide Conservation Plan.

Range-wide LEPC Conservation Plan Goal

The overall goal of the range-wide conservation plan for LEPC is to develop a conservation strategy for the species that identifies and coordinates conservation actions that can be implemented to ensure the continued sustainability of the species throughout its current or expanded range. More specifically, this plan will:

- Identify a range-wide population goal for LEPC,
- Identify desired habitat conditions to achieve the population goal,
- Develop a map of focal areas where LEPC conservation actions will be emphasized to produce the habitat conditions required to sustain the species,
- Identify connectivity zones to allow movement of LEPC among focal areas,
- Identify programs and cooperative efforts to produce the desired habitat conditions,
- Develop a framework for coordinated mitigation of potential development impacts on LEPC,
- Promote agreements designed to minimize impacts to LEPC from various development activities,
- Identify monitoring and research needs, and
- Obtain input from agencies, organizations, landowners, industries, other stakeholders, and the general public on concerns and suggestions for conservation planning for LEPC.

LEPC Background Information

LEPC Life History and Habitat Requirements

During the breeding season (primarily mid-March through May), male LEPC congregate on lek sites and perform courtship displays to attract females for mating. Nests are initiated mid-April through late May, typically within two weeks of lek attendance and copulation (e.g., Bent 1932, Copelin 1963, Snyder 1967, Merchant 1982, Haukos 1988, Behney et al. 2010). Hatching peaks in late May through mid-June throughout the range (e.g., Copelin 1963, Merchant 1982). Re-nests (following nest depredation or abandonment of the initial clutch) are initiated mid-May through early June, with hatching mid-June through early July (e.g., Merchant 1982, Pitman et al. 2006). In the autumn and winter, birds assemble into mixed flocks of both sexes, feeding primarily in sand sage, sand shinnery oak, or mixed-grass prairies, but also often in waste grain fields (Hagen and Giesen 2005). Habitat components necessary to fulfill LEPC life history needs include nesting habitat, brood-rearing and summer habitat, and autumn/winter habitat.

Leks

LEPC have high fidelity to lek sites (Campbell 1972) and males often use traditional leks sites year after year. Females tend to select traditional leks rather than newer or temporary leks (Haukos and Smith 1989), however new leks will form especially with an expanding population as reported for greater

prairie-chickens (*Tympanuchus cupido pinnatus)* (Hamerstrom and Hamerstrom 1973). Lek sites are characterized by sparse, low vegetation (less than 4" (10 cm)) and are often located on a knoll or ridge, or grama-grass (*Boutela* spp.) flat (Jones 1963, Copelin 1963, Cannon and Knopf 1979, Taylor and Guthery 1980a, Giesen 1991). Disturbed areas such as roads, abandoned oil and gas well pads, areas around livestock watering facilities, herbicide treatments, and prairie dog towns (Crawford and Bolen 1976a, Davis et al. 1979, Sell 1979, Taylor 1979, Ahlborn 1980, Locke 1992, Bidwell et al. 2003) may also be used as lek sites. Jones (2009) reported on a lek being established in a sand sagebrush site one year after a burn. A study conducted by Jarnevich and Laubhan (2011) indicated that areas with slight topographic relief are favored as lek sites.

Generally, there are sufficient areas with appropriate conditions for use as leks to meet this LEPC habitat requirement. Lek sites are therefore not considered limiting to LEPC populations, and habitat management to specifically provide for lek sites is not considered to be necessary. However, leks are very important in management for LEPC as they help wildlife managers understand the distribution and trends of LEPC in an area, and indicate where birds are finding nesting habitat. Monitoring of leks is an important component of an LEPC conservation plan. Lek data provide a valuable index of the population status of LEPC in an area over time. Further, lek locations provide valuable information on where maintenance and improvement of nesting and brood rearing habitat will be most effective. The presence of birds on leks reveals that at least minimum quality habitat exists in the area and that birds are present to respond to habitat improvements. Leks are therefore considered an important consideration in developing management plans for specific sites.

Nesting Habitat

Nesting success and brood survival are two of the most critical population parameters for LEPC sustainability (Hagen 2003, Pitman et al. 2006, Hagen et al. 2009). Therefore, nesting and brood rearing habitat are considered two of the most critical habitat components for this species.

The importance of shrub and herbaceous cover as a key component influencing nest fate of LEPC is well documented (e.g., see Davis et al. 2008). In sand sagebrush-grasslands, nests are most often in sand sagebrush or in tall native bunchgrasses (Giesen 1994b, Pitman et al. 2005, 2006). Further, successful nests are typically associated with greater heights and cover of shrubs and/or tall perennial grasses (e.g., native bluestems) (Davis et al. 1979, 1981; Riley et al. 1992, Patten et al. 2005, Davis 2009, Lyons et al. 2011, Hagen et al. in review). Typically the height and density of shrubs, forbs, or residual grasses are greater at the nest site than in the surrounding rangeland, and are greater at successful nests than at unsuccessful nests (Riley 1978, Davis et al. 1979, Wisdom 1980, Haukos and Smith 1989, Riley et al. 1992, Pitman et al. 2005, Patten et al. 2005, Davis 2009, Lyons et al. 2011, Hagen et al. in review). In southwestern Kansas, LEPC that nested in areas with denser cover were more successful in hatching nests than females with less cover (Hagen et al. 2007b). A maximum height selection for grasses and shrubs appears to be around 18-20 in. (Lyons et al. 2011), with areas supporting taller grasses than this not showing significant selection for these greater heights. Grasses were found to be taller at successful nests (average height = 26 in., n = 10), than unsuccessful nests (average height = 14 in., n =

26; Riley et al. 1992). Optimum nesting habitat in sand sagebrush communities would have >60% absolute cover of shrubs, grasses, and forbs, and where feasible should support grasses >20 in. in height (Hagen et al. in review). Residual litter should be maintained and bare ground minimized (Davis 2009, Grisham 2012, Hagen et al. in review). In sand shinnery oak, nesting habitat will have a lower total vegetation cover (>35% absolute cover desired), but should strive to support grasses >20 in. in height and maintain a high level (>30%) residual cover of litter (Haukos and Smith 1989, Riley et al. 1992, Davis 2009, Grisham 2012, Hagen et al. in review).

In Conservation Reserve Program (CRP) grasslands planted to mixed, native warm-season grasses, nests are predominately found in mid- and tall grasses such as western wheatgrass (*Pascopyrum smithii*), little bluestem (*Schizachyrium scoparium*), big bluestem (*A. gerardi*), and switchgrass (*Panicum virgatum*), where clumps of tall residual vegetation from the previous growing season are common (Fields 2004). Nests have been found in CRP planted to Old World bluestems (*Bothriochloa* spp.) (Wolfe et al. 2003) but such stands are generally thought to offer poorer quality nesting habitat than native warm season grass stands.

Leks are generally located around good nesting habitat, and female LEPC typically nest within 2 miles of leks (Suminski 1977, Riley 1978, Giesen 1994b). Pitman et al. (2006) reported that the majority of hens they monitored nested within 1 mile of a lek, but not necessarily the lek where they were captured. Thus locations of leks can serve as an indicator of where existing nesting habitat is located, and indicate prime areas for potential improvements to nesting habitat.

Brood Habitat

Areas used for brood-rearing are usually close to nesting areas (juxtaposition and interspersion (King 1938) of nesting and brood habitat is important), and so are generally found within 1.8 miles of lek sites. As broods have limited mobility, especially at early ages, quality brood needs to be close to nesting habitat. Giesen (1998) suggested approximately 1000 ft. (300 m.) as a desirable maximum distance for brood movement. A mosaic of nesting and brood habitat provides the optimal combination of conditions for LEPC. Hagen et al. (in review) suggested that approximately 1/3 of an area should be in brood habitat and 2/3 in nesting habitat for optimum LEPC habitat quality. Thus, interspersion of nesting and brood habitat is important in providing optimum habitat conditions.

Brood habitat typically has a higher amount of forb cover and less grass cover than nesting sites (Ahlborn 1980, Applegate and Riley 1998. Hagen et al. in review). Brood-rearing locations are usually associated with higher levels of insect abundance (Jamison et al. 2002b, Hagen et al. 2005) and where chicks can move easily on the ground (Bidwell et al. 2003). Grisham (2012) reported that brood survival from 0-14 days post-hatch was the primary limiting factor to LEPC in the Southern Great Plains, and that lack of forbs that could support greater numbers of insects was a primary factor. Active sand dunes with shrubs, especially within sand shinnery oak or sand sagebrush vegetation types are common in brood-rearing habitat. Jones (2009) reported male LEPC and females with broods using sand sagebrush areas one and two years following a burn. Greater forb density was found in these areas.

Burning of LEPC habitat (both sand sagebrush and sand shinnery oak communities) tends to temporally reduce shrub and grass cover while increasing forb cover for one to two years post-fire and has been found to increase grasshopper densities (Boyd and Bidwell 2001). Following this, the shrub and grass component recovers and the forb cover is reduced (Davis et al. 2008). Thus, brood habitat is improved for a few years following a burn while nesting habitat is lowered in quality, but this is a temporary change as grasses and shrubs respond following the burn and typically return to their higher cover and density within several years. Grisham (2012) compared brood habitat selection in areas in New Mexico that had either been grazed or not, or treated with herbicide (tebuthiuron) to reduce sand shinnery oak, and found that broods used areas that were either grazed or had received herbicide treatment further supporting the selection of broods for more disturbed areas.

Shrubs and hybrid shinnery – post oak mottes have been reported to be used for shade in summer (Copelin 1963, Donaldson 1969, Bell 2005 Larsson et al. 2012) for thermoregulation during high temperatures (Bell et al. 2010, Larsson et al. 2012) not only for broods but for adults as well. At higher temperatures, LEPC broods in New Mexico selected locations with more over-head cover and taller plant heights (Bell et al. 2010). There was also evidence that sand shinnery oak was preferred habitat irrespective of temperature (Bell et al. 2010).

Autumn/Winter Habitat

LEPC typically range across larger areas during the autumn and winter months, occupying the same general vegetation types as are used for nesting and brood-rearing (Giesen 1998). LEPC were found to use mixed-grass, sand sagebrush, or sand shinnery oak for resting and roosting (Taylor and Guthery 1980a). The birds fed in these vegetation communities, or congregated in agricultural fields with waste grains as long as they are located in close enough proximity of rangelands that provide adequate cover for resting and concealment (Jones 1964, Crawford and Bolen 1976b, Ahlborn 1980, Taylor and Guthery 1980b, Jamison 2000). Sand shinnery oak provides leaves, catkins, acorns, and insect galls as seasonal food resources. Pirius (2011) and Boal and Pirius (2012) described overwinter habitat use in sand shinnery oak ecosystems in Texas, while Kukal (2010) described overwinter habitat use in the panhandle of Texas.

Food

The USFWS (2012a) provided a good review of foods of LEPC. They noted that most food habits studies have been conducted in sand sagebrush and sand shinnery oak areas, with food habitats from mixed grass communities less well documented. Insects are a key component of the diet when available, and are especially important for broods. Martin et al. (1951:97) reported oaks as a primary food in fall, winter and spring, with grain crops, especially wheat and sorghum used in fall and winter, with sumac in winter, and gromwell in spring and summer. They reported insects as a key summer food with grasshoppers the largest component followed by “beetles, bugs, and caterpillars”. As summarized by the USFWS (2012a), vegetation provides the bulk of the diet of adults through fall, winter and early spring. Green vegetation becomes important in spring, with seeds, mast, and leafy vegetation being selected throughout this time. In sand shinnery oak, acorns are an important food item when available, but their availability varies considerably from year to year (Smith 1979). Thus,

vegetation eaten by LEPC is diverse with many different species selected.

Water

Water is not considered a direct requirement of LEPC (Davison 1935, Elmore et al. 2009, USFWS 2012a), although they will use surface water when it is available. Supplemental water sources were noted as being more available today than historically because of water developments for livestock. Supplemental water was suggested as a benefit during periods of drought (Crawford 1974), but no data to support its importance are available. Generally, water developments in most parts of the range are not considered to be a habitat improvement practice for LEPC. However, Haukos (USGS, personal communication) noted that in the sand hills of the Southern Great Plains that with the drawdown of the Ogallala aquifer that many springs and seeps appear to have dried up. Loss of these water sources could reduce LEPC habitat in these dry landscapes so that water improvements may be desired in these areas.

Home Ranges

Home ranges of individual LEPC have been reported in various studies, and have been summarized by the USFWS (2012a). Home ranges vary by sex, age, and season, and weather patterns. LEPC are not territorial, so home ranges of individuals will overlap. Taylor and Guthery (1980c) reported home ranges of 19 telemetered birds in western Texas as ranging from 86 acres for 1 immature female in February to 4804 acres for 3 immature males in December. The overall average monthly home range for the 19 birds was 988 acres. Riley et al. 1994 conducted telemetry studies in New Mexico and found that 51 females averaged 571 acre home ranges during pre-nesting and 227 acres while nesting. Females with broods had home ranges that averaged 294 acres while females without broods averaged 180 acres in the post-nesting timeframe. Toole (2005) studied LEPC in Texas and found that home ranges for 24 birds distributed across 2 study areas for 2 years ranged from 286 acres to 729 acres during the breeding season while home ranges for 7 birds across the 2 study areas in one fall ranged from 422 to 647 acres. Toole (2005) found no significant differences between sexes or ages of the birds he monitored. Giesen (1998) reported that home ranges for males in Colorado were 512 acres while females were 1,473 acres. Jamison (2000) reported home ranges of males in Kansas to be 30-346 acres in the spring, 190-356 acres in the summer, and 566-1010 acres in the fall. Taylor and Guthery (1980a) reported winter home ranges in Texas to range from 86 to 1223 acres. Home ranges have been noted to increase in size during droughts (Copelin 1963, Ahlborn 1980, Merchant 1982). Merchant (1982) found the average home range size of 7 female lesser prairie-chickens was 430 acres during a year of normal precipitation, but was 1,146 acres for 8 females in a drought year. Thus, in general, most home ranges of LEPC have been found to be less than 2 sq. mi. in size.

Minimum Sizes of Habitat Blocks

To ensure a viable population, Applegate and Riley (1998) recommended clusters of 6-10 or more leks, each with a minimum of six males, separated from one another by a distance of 1.2 miles or less. A number of studies have reported distances between leks of a mile or less (Crawford 1974, Crawford and Bolen 1976a, Taylor 1979, Locke 1992, Jamison et al. 2002a). If each lek in the cluster was surrounded by a 2 mile radius area (i.e., the minimum breeding season patch size around a lek), the entire cluster of

leks and core habitat complex might occupy up to 32 square miles (~21,000 acres), with a wider perimeter of habitat for autumn and winter foraging and escape cover. This is more or less consistent with the 25,000-acre estimate of Bidwell et al. (2003) for a lek complex.

Taylor and Guthery (1980c) recommended that LEPC be managed in units of at least 16,000 acres in size. Bidwell et al. (2003) suggested that the collective home range of all birds that attend a particular lek site averages approximately 19 square miles (>12,000 acres), indicating that large areas are needed to ensure the long-term persistence of LEPC populations (Elmore et al. 2009). Although the minimum habitat patch size to support LEPC is not clear, several studies have speculated that habitat mosaics containing patches ranging from 1,200 to 25,000 acres of contiguous native rangelands may be necessary to sustain LEPC populations (Davison 1940, Copelin 1963, Crawford and Bolen 1976a, Taylor and Guthery 1980b, Wildlife Management Institute 1999, Woodward et al. 2001, Bidwell et al. 2003).

The USFWS (2012b) discussed the need for "strongholds" to support viable populations of LEPC. They defined strongholds as areas that are managed or set aside for long-term LEPC conservation and of sufficient size to support a viable population of LEPC. They recommended that for viable populations, strongholds should contain at least 6-10 leks, with at least 6 males/lek. This recommendation is based on the work reported above. They suggest a minimum size of 25,000 acres but that would only apply if all of the area was high quality habitat, with the need for up to 50,000 acres or more if lower quality areas such as ecological sites that don't support high quality habitat are interspersed in the area. They noted that patches with <65% high quality habitat may not be able to support a viable population. Strongholds should have long-term protection. Where split estates occur a stronghold must have agreements that BMP's that protect high quality habitat need to be in place for developments. CCA's and CCAA's can provide certainty that the needs of LEPC are being addressed.

Crawford and Bolen (1976a) reported that areas should be greater than 63% high quality habitat to provide good habitat conditions. Haufler et al. (2012) recommended maintaining core conservation areas averaging around 50,000 acres in size with at least 70% of the area in good to high quality habitat.

Density Information

Density estimates for LEPC are difficult to determine, as unlike species that defend territories, the communal lek activities and associated nesting and brood rearing behaviors spread the population out in non-regular patterns. In addition, densities are strongly influenced by habitat quality as well as changes to habitat quality that can occur annually with different weather patterns. As noted above, home range sizes have been found to expand in years with unfavorable weather conditions, indicating that densities may also fluctuate under similar conditions. Various estimates of densities have been made. Texas estimated a mean density of 5.63 LEPC/sq. mi. (range 2.18-8.64) (Davis et al. 2008). New Mexico used an estimate of 4.85 birds/sq. mi. (Davis et al. 2008). Kansas estimated densities of LEPC in much of its range at 10 breeding birds/sq. mi. (Davis et al. 2008). Olawsky and Smith (1991) using transect sampling reported summer densities of 52-67 birds/sq. mi., and 88-137 birds /sq. mi. in winter in their study areas in Texas and New Mexico. Davison (1935) estimated a spring population of

850 birds on a 10,000 acre ranch in sand shinnery oak in northwestern Oklahoma in 1935, a density of approximately 55 birds/sq. mi., and reported an average density of males of 24/sq. mi. for 7 years of monitoring in the 1930's, a decade with reported reduced numbers of LEPC due to drought conditions (Davison 1940). This ranch used a regulated burning program. In development of the conservation plan for LEPC in Oklahoma, an estimate of 5 birds/ sq. mi. was used in setting habitat goals (Haufler et al. 2012).

Movement Information

Movements of LEPC may be expressed as normal daily movements or occasionally as dispersal movements. Campbell (1972) observed that males moved several miles from their leks to feed in grain fields in the winter. Taylor and Guthery (1980c) recorded a daily movement of over 2.4 mi. in one day, with one juvenile male moving 7.7 mi. in 4 days, a move that they attributed to dispersal. Jamison (2000) in a study conducted in southwestern Kansas reported movements that averaged 806 ft. per day (n = 14, range 634 – 1,411 ft.) for broods less than 14 days of age and 1040 ft. per day (n = 8, range 605 – 2,139 ft.) for broods 14 to 60 days of age (Jamison 2000). Banded juvenile male LEPC moved an average of 5.3 mi. (range 0.2- 12.6 mi.) from the lek they were captured on to where they were collected by hunters (Campbell 1972). Riley et al. (1994) reported that 3 females with broods moved an average of 910 ft. per day.

LEPC Habitat Dynamics

Davis et al. (2008) provided a good description of the relationship of fire to LEPC: "Fire was a naturally occurring form of disturbance on the pre-Columbian Great Plains and was ignited not only by lightning but, for at least 12,000 years, also by aboriginal Americans. The impact of fire was a major force in shaping the structure of the vegetation community (e.g., Knopf and Samson 1997). The long history of large ungulate herbivores on the Great Plains is also well accepted (Milchunas et al. 1988). Large ungulates are attracted to recently-burned areas by the new growth that is typically more palatable and of greater nutritional quality than vegetation in unburned areas. In turn, recently burned and, consequently, heavily-grazed areas supported more forbs and were less likely to burn in subsequent years due to a reduction in grass litter. The effect of this historical pattern, known as the fire-grazing interaction, created a mosaic of patches (burned/unburned, heavily grazed/lightly grazed, dominated by forbs/dominated by grasses) that shifted spatially over time (Vinton et al. 1993, Hartnett et al. 1996, Fuhlendorf and Engle 2001)." Since LEPC tend to nest in areas with greater heights and density of grasses and shrubs (e.g. Riley et al. 1992, Pitman et al. 2005, Lyons et al. 2011) but then move their just-hatched chicks to areas with less grass, more forbs, and greater insect availability (e.g. Bidwell et al. 2003, Jamison et al. 2002b, Hagen et al. 2005, Bell et al. 2010), this historical shifting mosaic satisfied their critical reproductive needs. Average intervals of fire return to any given area varied and were generally more frequent in eastern sections of the Great Plains where litter accumulation rates were greater. Within the range of the LEPC, fire return intervals varied from an average of 5 years in eastern sections of the range to 10-20 years in the more-arid, westernmost parts of the species' range (Hahn 2003, Masters 2004).

Thus, a mix of nesting and brood rearing habitat are considered the most critical components of LEPC habitat. These should be in relatively close proximity and fairly well interspersed to maximize habitat quality. As mentioned, Hagen et al. (in review) suggest a 2/3 to 1/3 mix of nesting to brood habitat to optimize LEPC habitat. Brood habitat can be created by fire, or by other disturbances including grazing, herbicide application, or mechanical treatments. However, for a site to maintain its dynamics where it will return rapidly from a brood condition to an optimum nesting condition, as occurred with historical fire regimes, it needs to support appropriate shrub/grass/forb communities. Disturbances that create brood habitat but do not sustain the compositions to allow the transition of brood habitat to nesting habitat make development of the mix of good nesting and brood habitat difficult.

LEPC Population Status

The LEPC is endemic to sand shinnery oak, sand sagebrush, and associated mixed-grass prairie communities in eastern New Mexico (Ligon 1961, Hubbard 1978), portions of southeastern Colorado (Hoffman 1963, Giesen 1994a), southwestern Kansas (Schwilling 1955, Horak 1985, Thompson and Ely 1989, Jensen et al. 2000), western Oklahoma (Duck and Fletcher 1944, Copelin 1963, Horton 2000), and the Texas panhandle (Henika 1940, Oberholser 1974, Sullivan et al. 2000). The USFWS (2012a) provided a good overview of the population status of LEPC in each of these 5 states.

In 2012, a range-wide aerial population monitoring program was initiated. This survey used helicopters flying standard routes within 15km by 15km blocks distributed within 4 LEPC ecoregions (McDonald et al. 2012) consisting of the sand shinnery oak ecoregion in eastern New Mexico-southwest Texas, the sand sagebrush ecoegion located in southeastern Colorado-southwestern Kansas and the western Oklahoma Panhandle, the mixed grass ecoregion located in the northeast Texas panhandle-northwest Oklahoma-south central Kansas area, and the short grass/CRP mosaic ecoregion located in northwestern Kansas and eastern Colorado (Figure 2). McDonald et al. 2012 reported observing 36 lesser prairie-chicken leks, 26 greater prairie-chicken leks, 5 lesser and greater prairie-chicken mixed leks and 85 prairie-chicken groups not confirmed to be lekking for a total of 152 prairie-chicken groups. Additional flights flown by Texas Tech University and the Oklahoma Department of Wildlife Conservation detected 10 lesser prairie-chicken leks and 7 groups not confirmed to be lekking. An estimated total of 3,174 lesser prairie-chicken leks (90% CI: 1,672 – 4,705) and 441 lesser and greater prairie-chicken mixed leks (90% CI: 92 - 967) were reported to occur in the study area, equating to an estimated total of 37,170 individual lesser prairie-chickens (90% CI: 23,632 – 50,704) and 309 hybrid lesser-greater prairie-chickens (90% CI: 191 - 456).

Garton (2012) conducted a reconstruction analysis of LEPC populations for the overall population of LEPC as well as for each of the 4 ecoregions for LEPC (Figure 2). Garton (2012) developed the population analysis from past lek counts including the most recent aerial survey reported above and used these to estimate quasi-extinction probabilities. He discussed many of the limitations of the available population data including the limited number of leks surveyed as one goes farther back in

time, the inconsistencies in the survey methods used, the assumptions of observed males on leks to numbers of females, and the minimum population sizes assumed to be needed to maintain populations. Garton (2012:16) showed "future projections of carrying capacity without substantial changes in key determinants of LEPC population dynamics are slightly above 10,000 in 30 years and less than 1,000 in 100 years." Of significant value in the analysis were the comparisons of the various ecoregions. Data for the shortgrass ecoregion could not be analyzed prior to 1997 due to a lack of sufficient leks, but the data for 1997- present showed this population to have a high probability for persistence and projected increasing numbers. The population analysis for the sand shinnery oak ecoregion showed good probabilities of short and long term persistence, although not as high as for the shortgrass ecoregion.

However, the projected populations in the mixed grass ecoregion and especially for the sand sagebrush ecoregion showed higher levels of short term risk and significant long term likelihood of dropping below the population extinction thresholds of 50 and 500 individuals based on the above assumption of no changes to key determinants of LEPC population dynamics.

Of interest is the expansion of LEPC into the shortgrass ecoregion. Early descriptions of LEPC range described LEPC as a shrub associated species. Copelin (1963) reported LEPC used low to high density shrub savannahs with shrubs less than 1m tall. Donaldson (1969) reported LEPC occurring in sand shinnery oak and sand sagebrush ecosystems using sand sagebrush and sand shinnery oak areas intermixed with areas of grassland. They were not reported to occur in grasslands (Copelin 1963, Donaldson 1969). Jones (1964) reported that LEPC occurred in sand sagebrush areas intermixed with patches of shortgrass prairie, while greater prairie-chickens occurred in tall grass prairies intermixed with shortgrass prairies. However, with the establishment of CRP in northwestern Kansas, LEPC have expanded their range into new areas with established blocks of CRP (Rodgers and Hoffman 2005). The grasses planted in these areas were a standard mixture used across Kansas (Pitman, KDWPT personal communication) and expanded various tall warm season grasses into ecological sites that were not noted to support dense stands of these species historically. It is possible historical grazing combined with the lower precipitation in these sites precluded the occurrence of stands of tall warm season grasses that occurred further east in higher precipitation areas. The shorter grasses occurring on less sandy ecological sites in this area may have provided a habitat barrier between populations of greater prairie chickens to the east and LEPC that utilized sand sagebrush and sand shinnery oak vegetation in the west. Schwilling (1955) reported that LEPC did not occur in the flatlands in this area but were confined to the rougher sand country to the west. However, with the protection from grazing in CRP, the taller grass species could occur further west allowing LEPC to move into these areas. LEPC populations are doing well in these planted fields with a generally expanding population (Garton 2012). Garton (2012) did note the extensive intermixing of LEPC and greater prairie-chickens in these areas with a number of mixed flocks and hybrids.

Survival rates of LEPC and factors affecting these rates have been studied at various locations. Haukas et al. (1988) reported a hen survival rate of 58% for the three month breeding season. Hagen et al. (2007) determined survival rates of females on 2 study sites in southwest Kansas and found that birds

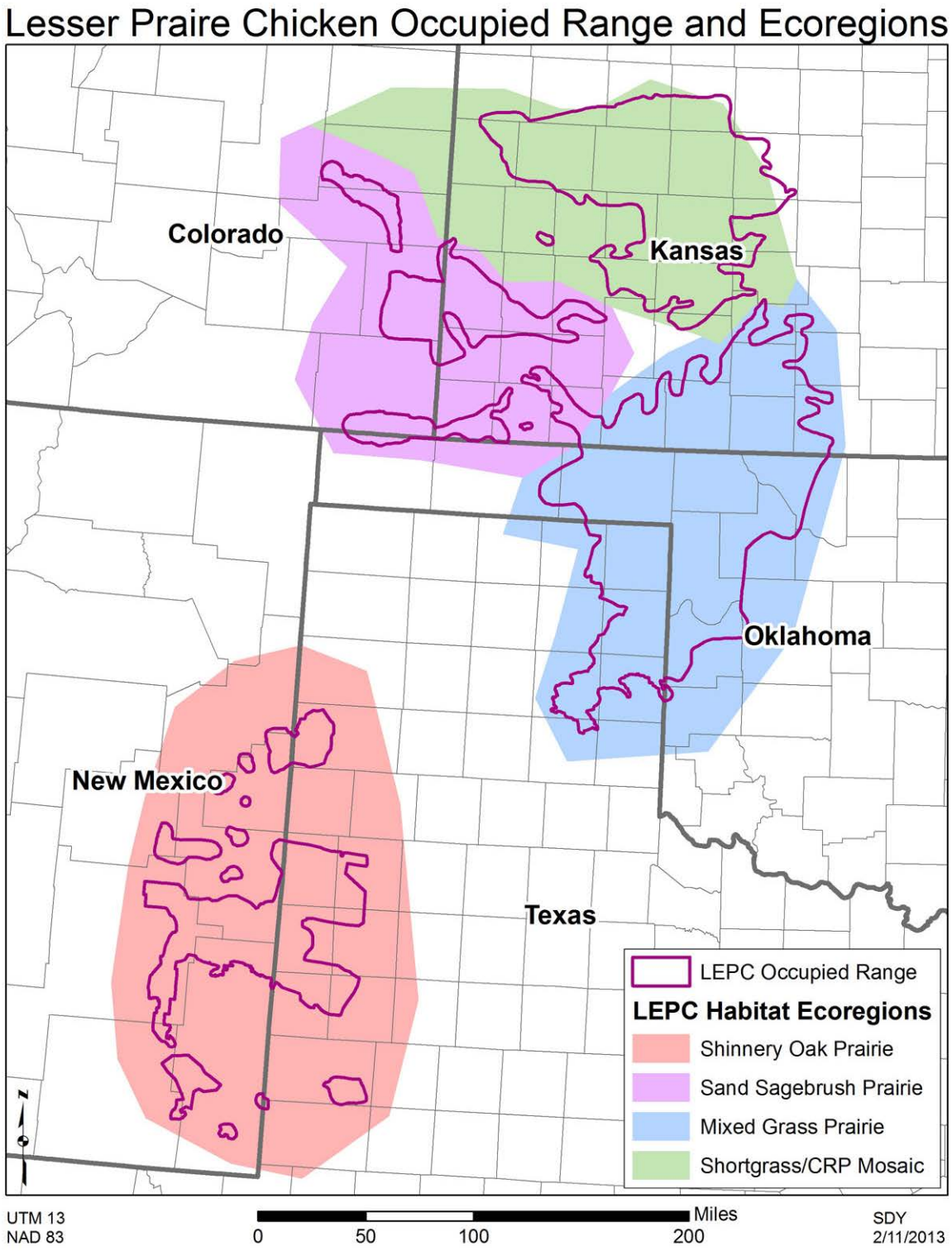

Figure 2. Ecoregions delineated for LEPC for their range including the currently estimated occupied range (EOR) of the species.

that were nesting or raising broods had higher mortality rates than at other times of the year or for females not involved in these activities. They suggested that nesting and brood habitat were key components to survival rates of LEPC. Jones (2009) reported lower survival rates for LEPC during the breeding season than other times of the year. Pitman et al. (2006) reported on survival of birds in southwest Kansas during early and late brood rearing as well as over-winter, and recommended that improving food resources for early brood rearing was important for increasing LEPC survival rates. Grisham (2012) studied both male and female LEPC survival rates in Texas and reported that males had a 57% survival rate during the breeding season while females had an 89% survival rate during 2010 and a 71% survival rate in 2011. He reported that these survival rates for females were higher than reported in other studies. Lyons et al. (2009) reported annual survival rates of 31% in sand shinnery oak ecosystems and 52% in sand sagebrush ecosystems in Texas with higher mortality occurring during the breeding season.

Threats to LEPC Populations

Various threats to the future sustainability of LEPC have been identified. The USFWS (2012a) provided a summary of threats they considered in their listing proposal. Potential threats identified by the USFWS (2012a) included habitat conversion from agriculture, livestock grazing, collision mortality, shrub control and eradication, altered fire regimes and invasion by woody plants, insecticides, wind power and energy transmission development and operations, petroleum production, roads and other linear features, predation, disease, hunting loss and other recreational disturbances, hybridization, and competition from ring-necked pheasants (*Phasianus colchicus)*. A number of these potential threats can cumulatively result in habitat loss and fragmentation, the primary concern of the USFWS in proposing LEPC as a threatened species.

Habitat Conversion from Agriculture

Conversion of native prairies and shrublands to agricultural crops has resulted in a substantial reduction in LEPC habitat (Crawford and Bolen 1976a, Fuhlendorf et al. 2002, USFWS 2012a). Woodward et al. 2002 found that areas with the greatest decreases in amounts of native shrubland had the greatest declines over time in LEPC numbers, but did not relate this directly to agricultural conversions. Most of the agricultural conversion occurred well in the past with settlement of the prairies. However, some conversion continues, as commodity demands and prices continue to influence the economics of agriculture production in new areas. Crawford and Bolen (1976a) reported that areas containing 5-37% sorghum fields had the highest populations of LEPC but when greater amounts of agricultural lands than this were present, that the population was unsustainable.

Livestock Grazing

Livestock grazing is a widespread practice on most remaining native grass and shrublands within LEPC range. Maintaining these native shrub and grasslands is desirable, as indicated above, and grazing (ranching) is a land use that encourages maintaining lands in this condition. Grazing is a practice that can have both beneficial and detrimental effects of LEPC habitat. Grazing practices that result in

reductions in vegetation structures and residual vegetation that are less than optimal for LEPC are detrimental to LEPC habitat quality (Hoffman 1963, Jackson and DeArment 1963, Sell 1979, Hunt and Best 2010). In particular, reductions in grass heights in nesting habitat can significantly reduce habitat quality. Grazing that reduces grass densities where they are too dense to allow for the movements of chicks, and that encourages the increase in forb cover or diversity will improve brood habitat quality. Thus, grazing can reduce the quality of LEPC nesting habitat, but is also an appropriate practice for improving brood habitat in some locations. Crawford (1981) reported that grazing can reduce the needed density of grasses as well as increase the density of shrubs. LEPC prefer sand sagebrush and sand shinnery oak with high densities of grasses. Grazing can reduce the density of grasses resulting in an increase in shrub densities (Crawford 1981), particularly in sand shinnery oak (Haukos 2011). Good cover of grasses will utilize available water and keep sand shinnery oak at lower densities. With higher levels of grazing, shinnery oak is able to obtain greater amounts of moisture and expand their densities and keep grasses from reestablishing, which at high levels reduces the quality of LEPC habitat (Haukos 2011). A lack of lightly grazed habitat will result in insufficient nesting habitat (Crawford 1980, Jackson and DeArment 1963, Davis et al. 1979, Taylor and Guthery 1980a, Davies 1992). Uniform or widespread livestock grazing of rangeland at an intensity that leaves less than adequate residual cover remaining in the spring is considered detrimental to LEPC populations (Bent 1932, Davis et al. 1979, Crawford 1980, Bidwell and Peoples 1991, Riley et al. 1992, Giesen 1994b), due to reductions in nesting cover and desirable food plants. Residual cover at and around nests is thought to increase nest success because the nest is better concealed from predators (Davis et al. 1979, Wisdom 1980, Riley et al. 1992, Giesen 1994b). Leonard (2008) found LEPC to use ungrazed areas for nesting significantly more than grazed areas.

Shrub Control and Eradication

Widespread control of sand shinnery oak or sand sagebrush can be detrimental to LEPC habitat quality (Haukos and Smith 1989, Johnson et al. 2004, Patten et al. 2005, Bell et al. 2010, Gunter et al. 2012, Thacker et al. 2012). A few studies have suggested that reduction of sand shinnery oak in some locations may provide some benefits to LEPC (Doer and Guthery 1983, Leonard 2008) by increasing seed production or other benefits. Olawsky et al. (1988) did not find a statistical difference in LEPC densities between treated and untreated areas. Patten et al. (2005) found higher survival rates of LEPC in sand shinnery oak with greater than 20% shrub cover compared to birds using 10-20% or <10% shrub cover. Patten et al. (2005) noted the more favorable microclimate provided by these higher cover of shrubs. Because most land management goals in sand shinnery oak communities are directly related to improving cattle forage, high application rates of tebuthiuron have been common, with little attention to possible wildlife related effects (Peterson and Boyd 1998, Haukos 2011). No studies have suggested that widespread chemical control of sand shinnery oak or sand sagebrush designed to eliminate these shrub species to increase grass production for livestock were beneficial for LEPC. In Texas, Haukos and Smith (1989) found that nesting LEPCs preferred nesting in untreated areas compared to treated areas. Likewise, Johnson et al. (2004) found more LEPC nests in untreated areas compared to treated areas in New Mexico. However, both of these studies were conducted in the presence of unmanaged grazing. Studies on treatments that applied tebuthiuron at lower levels to thin sand shinnery oak rather than

eliminate it have reported different results. Zavaleta (2012) tested restoration techniques using a combination of herbicide (0.60 kg/ha tebuthiuron) and managed short-duration grazing (50% utilization of annual production in two grazing events) treatments over a 10-year period. Use of tebuthiuron had the greatest effect on the community by increased grass and forb cover by 149% and 257%, respectively in treated areas. Across the study, plots with the herbicide and grazing treatment combination were the most comparable to NRCS ecological site reference communities with 20.2% sand shinnery oak, 69.7% grass, and 10.2% forb cover. Plots not treated with herbicide had three time greater coverage of sand shinnery oak and less than 50% cover of grass and forbs. Grazing treatment was found to have the greatest influence on LEPC response (Grisham 2012, Boal and Pirius 2012). Of the 66 encounter histories for females only 12% occurred in treatment combinations that included no grazing. No evidence of differences in breeding season survival among treatment combinations were found, and the studies concluded that herbicides and managed grazing can be used to restore monocultures of sand shinnery oak to near reference community compositions of shrubs, grasses, and forbs. Managed grazing will maintain the community so that future herbicide treatments should not be necessary (Haukos 2011). Haukos (2011) provided a good summary of LEPC use of sand shinnery oak communities and the effects of herbicide application to these communities, and also cited studies that showed the role of fire as a dynamic influence that helped maintain the diversity of conditions desired in sand shinnery oak communities.

Limited research has been conducted on effects of herbicide application to LEPC habitat quality in sand sagebrush ecosystems, although Thacker et al. (2012) and Gunter et. al. (2012) found changes in plant communities that were expected to be detrimental to LEPC habitat quality, and numerous studies have shown LEPC preference for nesting in sand sagebrush communities. No studies have reported a positive response by LEPC to chemical control of sand sagebrush.

Altered Fire Regimes and Invasion of Woody Plants

Expansion of woody plants including eastern redcedar (*Juniperus virginiana*) into LEPC range has caused reductions in LEPC habitat (Elmore et al. 2009, Fuhlendorf et al. 2002). In the southwest, mesquite has invaded some areas (USFWS 2012a). The expansion of these species has reduced or eliminated LEPC habitat. Further, alterations of fire regimes have changed the dynamic processes in sand shinnery oak, sand sagebrush, and mixed grass communities that historically produced the mix of habitats preferred by LEPC as previously discussed. Fear of use of prescribed burning as well as social perceptions of this practice have limited its use in many areas. LEPC habitat quality has declined as a result of these changes (USFWS 2012a).

Wind Power and Energy Transmission

As indicated previously, one of the primary reasons why the USFWS (2012a) increased the priority for a listing decision on LEPC was the increased perception of risk from wind energy developments and associated increases in development of transmission lines. Substantial areas of LEPC current occupied range do have high suitability for wind energy development (Pruett et al. 2009), particularly some of the sandy ridgelines that comprise high quality LEPC habitat. While empirical data on the effects of wind energy development on LEPC are lacking, and the avoidance behavior of LEPC towards transmission lines

has limited empirical data, concerns exist about the impacts of these developments on habitat use by the species (Pruett 2009a, 2009b, Hagen et al. 2010, 2011, USFWS 2012a).

Petroleum Production

As with wind energy and transmission developments, oil and gas developments have the potential to cause impacts to LEPC (Hunt 2004, Hunt and Best 2010, Hagen et al. 2005, Pitman et al. 2006, Beck 2009, Hagen et al. 2010, 2011). While additional information on avoidance behaviors of LEPC around oil and gas development and production activities is still needed, concerns exist that with each increase in density of wells, LEPC avoidance will occur with resulting reduced populations. In addition, the activities associated with oil development and production including roads, power lines, pipelines, compressor stations, and other structures all add to the cumulative footprint and associated displacement of LEPC populations. An added concern in addressing oil and gas developments is that of split estates, where landowners that own and control the surface of the land and the uses of that land often don't own the subsurface or mineral rights. Mineral rights are often owned by multiple parties and may have complex leases of the rights. As surface rights owners cannot deny mineral rights owners from exercising those rights, the complexity of addressing oil and gas development increases. In particular, gaining assurances or certainty that key areas of LEPC habitat can be maintained into the future is greatly complicated by the presence of split estates. Addressing potential oil and gas threats to LEPC populations is an important component of a conservation plan.

Climate Change

Climate change may have detrimental effects on LEPC (Grisham 2012, USFWS 2012a). Climate projections clearly show warming trends throughout LEPC range along with projected reductions in precipitation and more extreme weather events including intense storms and prolonged drought (http://www.climatewizard.org/). All of these are threats to LEPC populations. Plant communities in the southwest parts of LEPC range may shift in compositions or structures to be less favorable as LEPC habitat. Temperatures may stress LEPC populations in these warmer parts of the range. Prolonged drought conditions could cause population fluctuations that could threaten persistence of populations that are fragmented. Intense storms such as during the nesting season my cause significant local reductions in reproductive success or survival. Grisham (2012) modeled LEPC responses to predicted climate change and projected negative effects on the population by 2050.

Collision Mortality

LEPC have been shown to collide with fences, power lines, and cars (Hagen 2003, Wolfe et al. 2007, USFWS 2012a). Generally, these mortality rates have been relative minor, with the one exception of Wolfe et al. (2007) who reported a substantial level of mortality from fences in Oklahoma. Grisham (2012) did not find collision mortality to be a significant factor in his Texas and New Mexico study areas.

Habitat Loss and Fragmentation

As mentioned previously, the USFWS (2012a) reported that the threat of habitat loss and fragmentation is a primary concern for proposing LEPC as a threatened species. Habitat loss and fragmentation is a result of the cumulative effects of all habitat altering activities. It can affect LEPC populations at multiple scales. At large scales, fragmented populations of LEPC may become genetically isolated and

loose genetic diversity. This has not been shown to occur with LEPC, other than the finding that the population in New Mexico and west Texas does have some genetic differences from the rest of the population (Van Den Bussche et al. 2003, Hagen et al. 2010b, Pruett et al. 2011), but this population is of adequate size and with a low enough quasi-extinction risk to not be of a concern (Garton 2012) for maintaining a population above N_e. Fragmented populations may require demographic support to help build numbers back up following a local population crash from such factors as severe weather events. If no other population sources are close enough or if the intervening habitat conditions are too adverse to allow movements of individuals, local populations could be extirpated. Finally, reductions in habitat quality within habitat patches can reduce population sizes, reproductive success, and survival rates. While these will fluctuate annually with weather patterns and other factors, areas with low habitat quality may be population sinks and not able to maintain their population sizes without demographic support from other areas.

Other Factors

Other factors have not been shown to present serious threats to LEPC including diseases, predation, hunting, use of insecticides, or competition from ring-necked pheasant. Diseases, as reviewed by the USFWS (2012a) have not been shown to cause any substantial population concerns. While the presence of parasites such as eye worm (*Oxyspirura petrowi*) were noted, and their effects on LEPC health not well understood, no evidence exists that this is a significant threat to LEPC populations. The USFWS (2012a) concluded that "at this time, we have no basis for concluding that disease or parasite loads are a threat to any lesser prairie-chicken populations."

Predators have been shown to be causes of mortality of LEPC (e.g., Hagen et al. 2007, Wolfe et al. 2007, Grisham 2012) as LEPC are a prey species. However, Behney et al. (2011) and Behney et al. (2012) did not observe predation on leks and LEPC chicks in TX to be a significant concern based on over 700 hours of observations. Davison (1935) noted that predator control might cause changes to other populations (such as rats) that might do more harm to nesting LEPC than the predators being controlled. Robb and Schroeder (2005) discussed the importance of habitat quality as an influence on predation, and suggested that more fragmented habitat may lead to greater risks of predation.

Hunting could be a concern for a declining species when it is distributed in small, isolated LEPC habitat patches where hunting mortality may be additive rather than compensatory (Hagen et al. 2009). Hagen et al. (2009) reported that hunting mortality in their study contributed only 3% to overall mortality. Hunting of LEPC currently does not occur in 4 of the 5 states, but does occur in KS where there is little concern that hunting mortality is additive rather than compensatory for normal annual population cycles. The harvest of LEPC in Kansas for the past 5 reported years was 500 in 2007, 750 in 2008, 910 in 2009, 633 in 2010 and 378 in 2011, reflecting the general population fluctuations that have occurred with weather patterns. The USFWS (2012a) stated: Given the low number of lesser prairie-chickens harvested per year in Kansas relative to the population size, the statewide harvest is probably insignificant at the population level. Campbell (1972) reported no detrimental effects from hunting on an LEPC population he studied.

Effects of insecticide applications on LEPC have not been studied, but are not believed to present a threat to the species (USFWS 2012a).

Hybridization between LEPC and greater prairie chickens is known to be occurring, especially as noted by McDonald (2012) in the area where LEPC are expanding to the north and east in Kansas. While the presence of hybrid birds is known, how they compete in breeding and whether they produce viable offspring has not been researched.

Mote et al. (1998) reported that ring-necked pheasants can harass make LEPC on leks. Hagen et al. 2002 reported on 3 incidences of egg parasitism from ring-necked pheasants into LEPC nests out of 75 nests examined. While these present some evidence for competition between these two species, it is thought to only be a concern at a local level if remaining native rangeland becomes fragmented (Hagen et. al. 2002), but is not currently considered to represent a serious threat.

PLANNING APPROACH AND METHODS

The range-wide conservation plan for LEPC was led by the IWG consisting of a representative from each of the 5 states supporting LEPC (CO, KS, OK, TX, and NM) with coordination from WAFWA and EMRI. The plan was developed by engaging agencies, organizations, industries, universities, and other stakeholders through a series of targeted meetings and through broader public input opportunities. Several working teams or committees were established to help provide input to the IWG for various components of the plan. Specifically, a science team was established, as were a mitigation/voluntary offset committee and a habitat credit trading/conservation banking committee. Each state established its own implementation team to coordinate local delivery of LEPC landowner assistance programs. Various industry initiatives (candidate conservation agreement with assurances or habitat conservation plan initiatives) were included in planning discussions. Two broader meetings, one targeted as a general stakeholder meeting and a second more focused on industry interests in formal conservation agreements were also held. Finally the individual states held meetings to solicit input from industry and agricultural associations as well as landowners and other stakeholders. Drafts of the plan were made available for public review and input.

A critical component of plan development was coordination among the various agencies, organizations, industries, landowners, and other stakeholders interested in LEPC and its conservation strategy. Coordination was needed at multiple levels including interagency coordination for Federal agencies, interagency coordination within and among states, interagency coordination between states and Federal agencies, coordination with regional organizations and industries, intrastate agency and organization coordination, and general outreach and engagement of landowners and the public. Sequencing of planning components involved establishment of various committees to accomplish specific tasks, then engaging broader involvement as various components of the plan were available for

review and input.

The IWG established a science team to assist the planning effort with setting of plan goals as well as providing recommendations for science-based decisions included in the plan. The goals that the science team set were the desired population size and the conversion of the population goal into habitat goals for LEPC. The science team was also tasked with review of the science components of a mitigation metrics system to be used to quantify impact debits and mitigation credits, to recommend Impact buffer distances to be used in impact assessments, and to recommend range-wide delineation of sub-population areas. The science team was also asked to review other science components of the conservation plan. The science team included the members of the IWG as well as Dwayne Elmore with Oklahoma State University, Dan Mulhern, Chris O'Melia, Allison Arnold, Aron Flanders, and Heather Whitlaw with the U.S. Fish and Wildlife Service, Dave Haukos, with the U.S. Geological Survey, Blake Grisham with Texas Tech University, Don Wolfe with Sutton Research Center, Christian Hagen with Oregon State University representing the Natural Resource Conservation Service, and Alex Daniels and Anne Bartuszevige with Playa Lakes Joint Venture. This team met for 2 days in August 2012 and had several webinars/conference calls following the initial meeting to review and recommend inputs to the plan.

A significant focus of the conservation plan is the improvement of habitat for LEPC on private lands as well as integration of the limited amounts of public land that can contribute to LEPC habitat needs. A major component of this implementation of conservation initiatives available through agencies or organizations that specifically target delivery of programs for LEPC or that can include the needs of LEPC as a priority. Most of these initiatives are administered at state levels, either through staffing of Federal programs at state levels, state agency programs, or organizations that either operate within a state or align with state level initiatives. For this reason, coordination of LEPC programs within each state is a critical part of conservation planning. Therefore, each state convened an implementation team consisting of agencies and organizations involved in delivery of LEPC programs to coordinate initiatives within each state for maximum effectiveness and efficiency in conservation delivery. These teams reviewed their current coordination, identified additional opportunities for increased coordination, and discussed how to ensure that landowners are being provided with "one-stop-shopping" through contacts with any of the partnering agencies or organizations. Each state also held public meetings to discuss the on-going LEPC planning process and coordination. Landowners were encouraged to attend these meetings and provide input to the planning process.

The conservation strategy for LEPC must address the identified threats discussed above if it is to be successful in providing for a high probability of long-term viability of the species. Inclusion in the plan of mitigation opportunities and tools for voluntary reductions in threats is essential for this success. A framework for the consistent development and application of such conservation tools was needed. The science team, as mentioned, was tasked with reviewing the science involved in metrics that could be used to evaluate potential impact debits and mitigation credits. However, various decisions concerning the application of these metrics were also needed that involve policy components beyond

what science can provide as guidance. To address these policy components while providing a consistent foundation for impact and mitigation tools, a voluntary offset/mitigation committee was convened. This committee consisted of the following individuals: Chris O'Meilia, Bridget Fahey, and Allison Arnold with the US Fish and Wildlife Service, Sean Kyle and Kathy Boydston with Texas Parks and Wildlife Department, David Bender and Eric Johnson with Kansas Department of Wildlife, Parks, and Tourism, Doug Schoeling with Oklahoma Department of Wildlife Conservation, David Klute with Colorado Parks and Wildlife, Bill Van Pelt with WAFWA, Mark Watson with New Mexico Department of Game and Fish, Ed Arnett with the Theodore Roosevelt Conservation Partnership, and Christian Hagen with Oregon State University representing the Natural Resource Conservation Service. This committee met to make recommendations on a number of policy questions related to the mitigation metrics proposed by the science team as well as additional questions on an operational foundation for impact and mitigation tools. Additional input to the committee was provided by David Wolfe with Environmental Defense Fund, Wayne Walker with Common Ground Capital, Brian Woodard with Oklahoma Independent Petroleum Association, Brad Loveless with Westar Energy, Ben Shepperd with Permian Basin Petroleum Association, and Wayne White with Wildlands, Inc.

An additional committee was formed to consider the various tools or options that could be developed for credit trading/conservation banking. This committee was tasked with reviewing the mitigation metrics and policy framework developed by the science team and mitigation/voluntary offset committee and providing recommendations on how the foundation could be consistently applied to the various potential trading/banking tools. This committee consisted of Chris O'Meilia, Bridget Fahey, and Allison Arnold with the US Fish and Wildlife Service, Sean Kyle and Kathy Boydston with Texas Parks and Wildlife Department, Jim Pitman and Eric Johnson with Kansas Department of Wildlife, Parks, and Tourism, Doug Schoeling with Oklahoma Department of Wildlife Conservation, David Klute with Colorado Parks and Wildlife, Bill Van Pelt with WAFWA, Grant Beauprez with New Mexico Department of Game and Fish, Ed Arnett with the Theodore Roosevelt Conservation Partnership, Christian Hagen with Oregon State University representing the Natural Resource Conservation Service, David Wolfe with Environmental Defense Fund, Wayne Walker with Common Ground Capital, and Wayne White with Wildlands Inc. This committee met to make recommendations on a number of policy questions related to the mitigation metrics proposed by the science team as well as additional questions on a consistent operational foundation for impact and mitigation tools.

The IWG has coordinated with on-going CCAA/HCP efforts. The Great Plains Wind Energy Habitat Conservation Plan has held meetings and IWG has sent representatives to these meetings to help coordinate efforts. An oil and gas initiative is developing a draft CCAA for KS, OK, TX, and CO and has involved the 5 states and the USFWS in review of drafts of this effort. A meeting occurred in January 2013 where all interests in CCAA/HCP's or related conservation tools that might be applied to LEPC were invited to review the draft foundations developed for such tools and to provide input to the process.

Information on the planning process was provided on WAFWA's website (http://www.wafwa.org/html/prairie_chicken.shtml). A first draft of the Range-wide Conservation

Plan for Lesser Prairie-Chicken was provided for public input in January 2013. Input was received at a public meeting held in Edmond, OK on January 23, 2013 and was also received through both email and written inputs. A second draft of the plan was provided in February with the final draft provided in March 2013.

CONSERVATION STRATEGY FOR LEPC

This plan describes a conservation strategy for LEPC that when implemented will provide the population and habitat needed to sustain this species. Components of the strategy include the desired population goal deemed adequate to sustain LEPC populations range-wide and within 4 identified ecoregions, recommendations for required amounts, sizes, and distributions of habitat recommended to support the population goals, coordination and enhancement of programs to improve habitat on private lands through landowner incentive programs, programs that will avoid, minimize, and mitigate potential threats from developments, recommendations for monitoring the population, and adaptive management considerations.

A key component of the conservation strategy is applying the concept of focal (core) areas (e.g., http://gf.state.wy.us/web2011/Departments/Wildlife/pdfs/SAGEGROUSE_EO_COREPROTECTION0000651.pdf). This concept is based on identifying the areas of greatest importance to the species, and focusing habitat enhancement, maintenance, and protection in these areas. This accomplishes two things. First, it concentrates limited resources for species conservation in the most important areas, allowing for the establishment and maintenance of large blocks of habitat needed by many species including LEPC. Second, it identifies areas where development should be avoided or minimized, which also helps identify where development is less likely to be a concern. This provides developers with the guidance they typically seek for their development planning purposes, and helps avoid conflicts over impacts to the species.

The conservation strategy employs various tools to achieve its management objectives with a focus on focal areas. First, because LEPC occur primarily on private lands through most of its range, the strategy emphasizes delivery of habitat improvement in focal areas by maximizing landowner incentives within these areas to make landowner engagement in LEPC habitat improvements either economically neutral or advantageous. The strategy identifies programs available to help provide these improvements and the steps being taken by agencies and organizations to help coordinate and maximize the delivery of these programs. Second, the strategy identifies approaches and tools to avoid, minimize, and mitigate potential threats to LEPC, with a primary focus on energy developments because of their interest in engaging in voluntary agreements that can provide their future operations with assurances. Application of these approaches and tools using focal areas can be applied through voluntary programs. A mitigation framework was developed including a metric system to quantify impact debits and mitigation credits. This system forms a foundation for tools such as Candidate Conservation Agreements with Assurances (CCAA's), Habitat Conservation Plans (HCP's) and voluntary offset programs (VOP's). As a subset of focal areas, efforts to establish LEPC strongholds as defined by the

USFWS (2012b) were initiated. Finally, the strategy recognizes that many aspects of LEPC ecology and management remain unknown. Monitoring is proposed that will allow for the generation of new information as well as documentation of the population response to management activities. The strategy needs to include an adaptive management component that provides certainty for landowners, industry and others who implement voluntary programs, yet allows for adjustments as substantial new information is generated.

Population Goals

The IWG science team discussed LEPC population goals during its August 2012 meeting. The science team recognized the limitations of historical population data and the limitations of any population viability analyses conducted on a range-wide or regional basis to set population goals. With these data limitations, the team agreed to utilize a long term spring population average, trend information, and variability analyses as a basis for setting initial population goals on an LEPC regional basis. Initial population goals were set based on available population and habitat information for each ecoregion, and these were then revisited after reviewing the report by Garton (2012). Based on these acknowledged limitations and review of the available population information and analyses, the science team recommended a range-wide population goal of 67,000 birds as an annual spring average over a 10 year time frame.

The science team discussed distributions of the range-wide goal. The team agreed with a previous determination used in developing a monitoring protocol that 4 “ecoregions” should be designated within the overall range (figure 2), and population goals assigned to these ecoregions. The 4 ecoregions and their goals were:

- Sand shinnery oak ecoregion—long-term average goal of 8,000 birds (~4,000-12,000 range)
- Sand sagebrush ecoregion—long-term average goal of 10,000 birds (5,000-15,000)
- Mixed grass prairie ecoregion—long-term average of 24,000 birds (12,000-36,000)
- Short grass prairie ecoregion—long-term average of 25,000 birds (12,500K-37,500).

Continued coordinated monitoring efforts (discussed below) would assess annual population sizes within each of these ecoregions.

Habitat Goals

Based on LEPC planning work conducted in Oklahoma (Haufler et al. 2012) as well as similar conservation planning efforts for other grouse species (e.g., sage-grouse: http://wgfd.wyo.gov/web2011/Departments/Wildlife/pdfs/SAGEGROUSE_EO_COREPROTECTION0000651.pdf) the science team recommended use of the focal area strategy. Focal areas are defined as areas that have the greatest potential for supporting and sustaining long-term populations of LEPC through maintenance or restoration of large blocks of good to high quality habitat with minimal anthropogenic disturbances. Focal areas serve several purposes including those previously discussed. First, they

help conservation efforts to be coordinated and focused within these areas, creating the needed large blocks of habitat and minimizing what can become widespread application of habitat improvements that may produce only small local patches of habitat that will not support desired populations. Spreading conservation efforts across the range of the species (either within historical or estimated current occupied range) dilutes efforts and can result in "random acts of conservation" that while applying good practices at numerous locations don't provide for concentrated efforts that produce large blocks of habitat needed to counter habitat fragmentation threats. Second, delineation of this smaller set of focal areas will assist developers such as wind and oil and gas industries by prioritizing areas where avoidance of impacts is most needed and encouraging development in areas with minimal or reduced potential impacts to the species. In this way, focal areas realistically define what is needed to sustain the species rather than assuming that all occupied range is needed and that all potential impacts to the species are equal.

To set habitat goals, the science team considered what densities of LEPC might be expected. While good empirical data on population densities of LEPC is limited, past work has generally supported density estimates of 5-10 birds/sq. mi. in the spring to be reasonable. In Texas, a mean density of 5.63 breeding birds/sq. mi. ranging from 2.18-8.64 was reported (Davis et al. 2008). New Mexico estimated densities of 4.85 breeding birds/sq. mi. (Neville et al. 2005), while Kansas used an estimate of 10 breeding birds/sq. mi. (Davis et al. 2008). Additional analyses by state biologists have estimated population densities in the TX mixed grass ecoregion to be <4/ sq. mi. while in NM an estimate of 4/sq. mi. in sand shinnery oak was deemed appropriate. The science team recommended using a density of 9/ sq. mi. for the shortgrass ecoregion, 5 breeding birds/sq. mi. for the sand sagebrush ecoregion and the OK and TX areas of the mixed grass ecoregion, 9/ sq. mi. for the KS portion of the mixed grass ecoregion, and 4/ sq. mi. for the sand shinnery oak ecoregion. The science team set a goal of having sufficient habitat in focal areas to sustain 75% of the desired population goal of 67,000 birds. This equates to approximately 7,085,714 million acres of habitat in focal areas, and was set by the science team as the initial habitat goal for the conservation strategy.

The science team further defined what was desired for focal areas. They identified the following:

- Average size of focal areas should be at least 50,000 acres,
- A minimum of 25,000 acres of high quality habitat in one block should be a goal,
- Goal of at least 70% good to high quality habitat within each focal area,
- Focal areas should strive to be <20 miles apart to provide connectivity for genetic and population support, and
- Connectivity zones connecting focal areas should provide suitable habitat to support movements by LEPC.

Good to high quality habitat is considered to have vegetation conditions that support greater than 35% canopy cover of grasses, shrubs, and forbs, consist of greater than 50% composition of preferred species of shrubs and grasses, and have the appropriate structure to provide nesting and brood habitat

intermixed within the focal area.

The science team made recommendations for connectivity zones to allow linkage among focal areas. An exception is linkage between the sand shinnery oak ecoregion with the other three ecoregions, as the intervening area in TX is considered unsuitable for restoring or maintaining a connectivity zone. The LEPC population in the sand shinnery ecoregion is relatively stable based on the last 10-15 years of available population data. Should population interchange with the other ecoregions be deemed desirable (e.g., if genetic exchange was determined to be beneficial) translocations of birds could be considered.

Connectivity zones should strive to maintain 40% of the area as LEPC habitat. Habitat patches should be no further than 2 mi. apart. Connectivity zones can be variable in width, but optimally would be at least 5 miles in width. Connectivity zones should avoid or minimize the number of barriers they contain, including anthropogenic structures crossing connectivity zones that may serve as barriers. Where these must occur, they should be placed to minimize their effects on movements of LEPC.

Each state was tasked with delineating focal areas and connectivity zones for the state. Based on the population goals allocated to each ecoregion, each state implementation team developed a draft map of focal areas (Figure 3). Details of the focal areas are presented in Tables 1 and 2.

Table 1. Focal area total acreage delineations for each state compared to acreage of estimated historical range and estimated current occupied range.

State	Historical Range (ac)	Current Occupied Range (ac)	% Current of Historical	Focal Area Goal (ac)	Focal Area Delineation (ac)	Connectivity Zones Delineated	% Focal Delineated of Current
Colorado	5,414,400	1,101,545	20.3%	411,429	367,360	903,680	33.3%
Kansas	18,967,040	8,997,133	47.4%	3,931,429	3,929,600	500,480	43.7%
Oklahoma	16,915,200	4,018,883	23.8%	685,714	812,160	511,360	20.2%
Texas	58,414,720	3,573,468	6.1%	942,857	955,520	488,320	26.75
New Mexico	12,990,720	2,084,979	16.0%	1,114,286	784,000	704,000	37.6%
Total	**117,020,800**	**19,776,008**	**16.9%**	**7,085,715**	**6,848,640**	**3,107,840**	**34.6%**

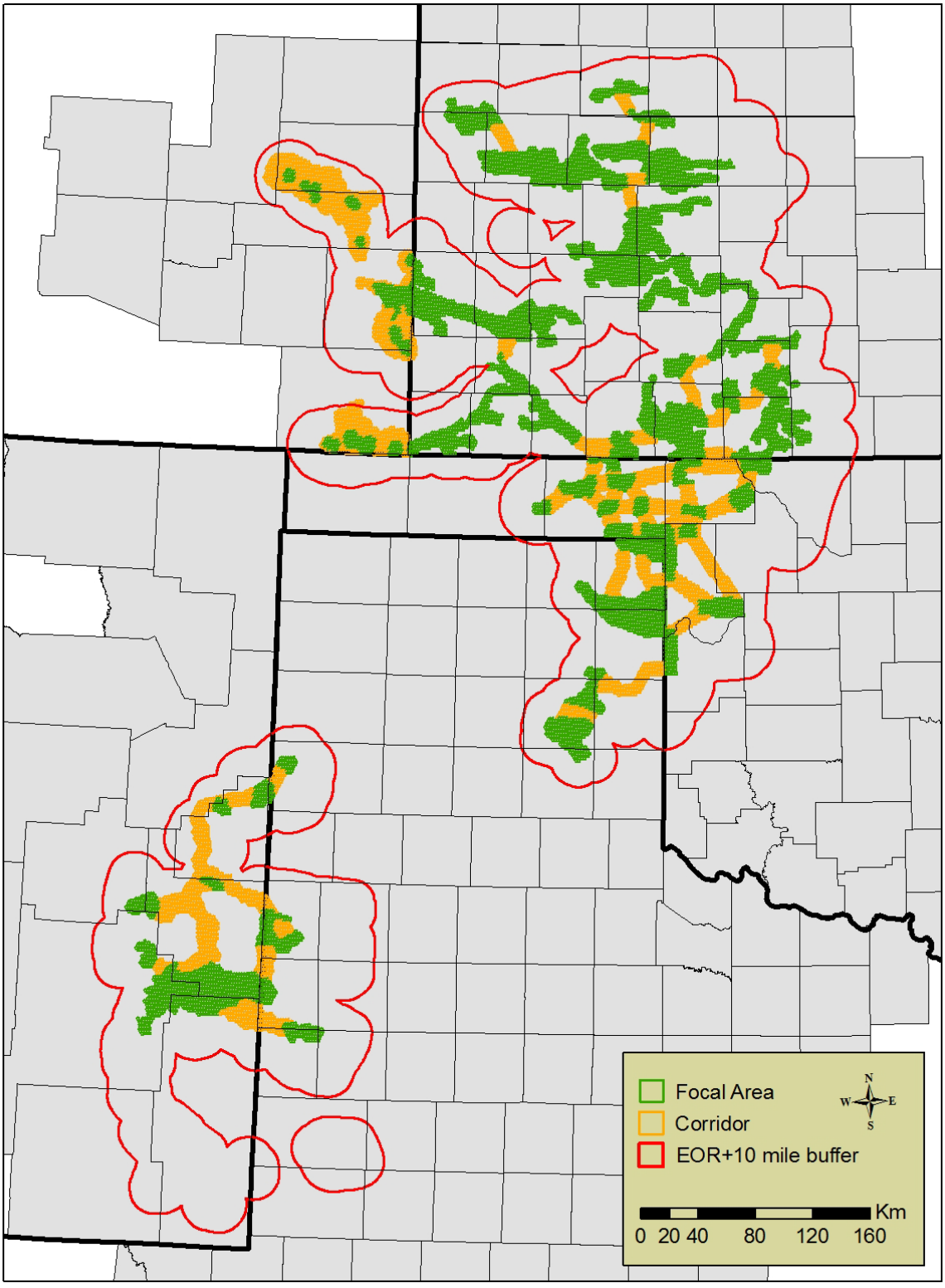

Figure 3. Map of focal areas where LEPC habitat improvements actions will be concentrated and development activities minimized.

Table 2. Population and focal area delineations by ecoregion. Population data were from the 2012 range-wide aerial monitoring survey.

Ecoregion	Population Goal (% of total goal)	Focal Area acreage goal	Estimated # of leks (from survey)	Estimated Population (from survey)	Focal Area Delineation (acres)	% of Focal Area Delineated	% of surveyed leks in ecoregion	% of surveyed pop. in ecoregion
Sand shinnery oak	8,000 (11.9%)	1,371,429	428	3,699	1,046,400	15.2%	13.5%	10.0%
Sand sagebrush	10,000 (14.9%)	1,371,429	105	1,299	1,306,880	19.1%	3.3%	3.5%
Mixed-grass	24,000 (35.8%)	2,438,095	877	8,444	2,600,960	38.0%	27.6%	22.7%
Short-grass	25,000 (37.3%)	1,904,762	1,764	23,728	1,894,400	27.7%	55.6%	63.8%
Totals	**67,000**	**7,085,714**	**3,174**	**37,170**	**6,848,640**	**100%**	**100%**	**100%**

In addition to the habitat provided in focal areas and connectivity zones, additional LEPC habitat will occur outside of these areas. Focal areas should provide the needed habitat to support at least 75% of the population goals, while connectivity zones will provide habitat for an additional component of the population goal. Other LEPC habitat will still be present, and will support additional birds. Populations are likely to experience greater fluctuations in areas outside of the focal areas (Roloff and Haufler 2002), as habitat quality is unlikely to be as good and occur in smaller blocks, but birds are expected to remain throughout most of the current occupied range of the species.

Focal Area Strategy

Focal area delineations include approximately 37% of the currently estimated occupied range. Focal areas will only be effective if conservation efforts can be concentrated in these areas, and if development can be minimized in them as well. Focal areas should ensure a sustainable and well distributed population into the future. The conservation strategy depends on the ability of incentive programs to engage landowners in implementing voluntary LEPC habitat improvements, especially within focal areas where large blocks of good to high quality habitat can be restored and maintained. It also depends on the avoidance and minimization of impacts to LEPC from energy and other developments especially within focal areas. As a component of mitigation, the strategy should encourage generation of mitigation credits (habitat protections and improvement) supported by the mitigation framework to be concentrated in focal areas and connectivity zones.

The conservation strategy for LEPC can be divided into these two management components; programs to maximize delivery of voluntary habitat improvements by landowners; and programs to avoid, minimize, and mitigate impacts from development to LEPC. Both of these components are designed to work in a voluntary framework. In addition, a subset of lands within focal areas will be identified as "strongholds". These are areas defined as such by the USFWS, and are a much smaller component of focal areas but have the ability to provide permanent conservation areas for LEPC.

LEPC Habitat Improvement Programs

Various habitat improvement programs and initiatives are available for LEPC at Federal, state, and local levels. The USFWS (2012a) provided a summary of many on-going programs and initiatives.

An important part of an effective LEPC conservation plan is coordination among the various programs and initiatives. Coordination is needed at all levels of plan implementation, but is especially important for various range-wide initiatives as well as within each of the 5 states.

It is important that programs designed to improve conditions for LEPC in focal areas consistently provide good to high quality habitat through their actions. Focal areas will only serve their function as source areas for the population if they provide this good to high quality habitat. Habitat conditions for LEPC are often labeled as "suitable" habitat, implying that an area can support LEPC. However, supporting LEPC and providing good to high quality habitat can be substantially different. Therefore, programs designed to maintain or improve habitat for LEPC should have clear objectives for the desired conditions for the site. Boxes 1-3 provide descriptions of desired habitat conditions in sand shinnery oak, sand sagebrush, and mixed grass prairie communities. In all areas, desired conditions should provide a mix with the majority of the area in nesting habitat intermixed with 25-35% in brood habitat (Hagen et al. in review). Management of the sites to produce optimum conditions should include prescribed grazing regimes. For nesting habitat, grazing plans that should recommend utilization rates that provide for the recommended cover and heights of grasses and that leave substantial residual herbaceous vegetation for the next spring. Brood habitat should be interspersed among nesting habitat and be created by the use of prescribed burning or prescribed grazing to keep grass and shrublands with enough diversity of conditions to support nesting and brood habitat. Detailed descriptions of prescribed grazing, prescribed burning, and herbicide use to improve LEPC habitat are included in the Appendix.

Box 1. Optimal LEPC habitat in the sand shinnery oak ecoregion (Figure 2)

Nesting habitat

1. *Absolute cover of sand shinnery oak: >20% but <50%*
2. *Absolute cover of preferred grasses (native bluestems, switchgrass, indiangrass, and sideoats grama): >20%*
3. *Absolute cover of a good mix of species of native forbs: >10%*
4. *Grass should average >15" in height*

Brood habitat

1. *Absolute cover of sand shinnery oak: 10-25%*
2. *Absolute cover of preferred native grasses: >15%*
3. *Absolute cover of a mix of native forbs: >20%*
4. *Grass should average >15" in height*
5. *Shrub, grass and forb understory open enough to allow movements of chicks.*

Box 2. Optimal LEPC habitat in the sand sagebrush ecoregion

Nesting habitat

1. *Absolute cover of sand sagebrush: 15-30%*
2. *Absolute cover of preferred native grasses: >30%*
3. *Absolute cover of a mix of native forbs: >10%*
4. *Grass should average >15" in height*

Brood Habitat

1. *Absolute cover of sand sagebrush: 10-25%*
2. *Absolute cover of preferred native grasses: >20%*
3. *Absolute cover of a mix of native forbs: >20%*
4. *Grass should average >15" in height.*
5. *Shrub and grass cover should be open enough near the ground to allow easy movement of chicks*

Federal Programs

Five Federal agencies have programs or initiatives that directly relate to delivery of LEPC habitat improvement. These 5 agencies are the Natural Resource Conservation Service (NRCS), Farm Service Agency (FSA), U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and the U.S. Forest Service (USFS).

Natural Resource Conservation Service and Farm Service Agency Programs

In 2010, NRCS launched the Lesser Prairie-Chicken Initiative (LPCI). This initiative has the objective "to increase the abundance and distribution of the Lesser prairie-chicken and its habitat while promoting the overall health of grazing lands and the long-term sustainability of ranching operations" (http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1047025.pdf). In addition to NRCS technical service providers, LPCI has partnered with various agencies and organizations to help to deliver the program to landowners through cooperative efforts. Partnering agencies and organizations include:

- Colorado Division of Wildlife
- Kansas Department of Wildlife, Parks and Tourism
- Kansas Forest Service
- New Mexico Department of Game and Fish
- Oklahoma Department of Wildlife Conservation
- Texas Parks and Wildlife Department
- USFWS Partners Program
- LPC Interstate Working Group
- National Fish and Wildlife Foundation
- National Wildlife Foundation
- Pheasants Forever

Box 3. Optimal LEPC habitat in mixed and short grass ecoregions lacking sand sagebrush

Nesting habitat

1. *Absolute cover of preferred native grasses: >50%*
2. *Absolute cover of a mix of native forbs: >10%*
3. *Grass averages >15" in height*

Brood habitat

1. *Absolute cover of preferred native grasses: 30-50%*
2. *Absolute cover of a mix of native forbs: >20%*
3. *Grass averages >15" in height.*
4. *Grass is not so dense to impede movement of chicks*

- Playa Lakes Joint Venture
- Rocky Mountain Bird Observatory
- The Woods Foundation
- Texas Wildlife Association, and
- The Nature Conservancy

LPCI is funded through the NRCS Conservation Technical Assistance Program, Environmental Quality Incentives Program (EQIP) and Wildlife Habitat Incentive Program (WHIP) in helping producers apply practices including, but not limited to, brush management, prescribed grazing, range planting, prescribed burning and restoration of rare and declining habitats. Table 3 lists the funding provided through LPCI from 2010-2012.

In 2012, NRCS working with the USFWS initiated the Working Lands for Wildlife (WLFW) program that incorporated the LEPC as one of its 7 focus species and the LPCI as its delivery program. "Working Lands for Wildlife is a new partnership between NRCS and the U.S. Fish and Wildlife Service (FWS) to use agency technical expertise combined with $33 million in financial assistance from the Wildlife Habitat Incentive Program to combat the decline of seven specific wildlife species whose decline can be reversed and will benefit other species with similar habitat needs" (http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/?&cid=stelprdb1046975).

Under this program landowners are provided with technical assistance, financial assistance to implement practices, and provided with regulatory assurances. "Under the WLFW partnership, federal, state and wildlife experts jointly identified at-risk or listed species that would benefit from targeted habitat restoration investments on private lands. Using the best available science, these wildlife experts prioritized restoration actions on a large regional scale to focus assistance most cost effectively. The federal government will grant farmers, ranchers and forest landowners regulatory predictability in return for voluntarily making wildlife habitat improvements on their private agricultural and forest lands. Participating producers must adhere to the requirements of each conservation practice during the term of their contract, which can last from one to 15 years. If landowners would like to receive regulatory predictability for up to 30 years, they must maintain the conservation practices as outlined in the NRCS and FWS agreement" (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/?cid=stelprdb1048842). This combination of Federal dollars for funding technical assistance and implementation of practices combined with partnering agency and organization funding of technical service providers and the regulatory assurances provided through the NRCS/USFWS agreement is a powerful voluntary, incentive-based initiative that is producing good results in terms of on-the-ground management of LEPC habitat.

Table 3. Contracts and funding through NRCS's LPCI program, listed by state for 2010-2012.

Contract Year	State	Contracts	Acres	Amount ($)
2010	KS	64	28,280	$1,525,789
2011	KS	43	19,464	$1,378,072
2012	KS	36	35,659	$1,377,897
2010	CO	6	33,815	$365,317
2011	CO	5	17,563	$423,356
2012	CO	3	33,883	$484,775
2010	OK	20	19,305	$645,532
2011	OK	26	28,500	$906,460
2012	OK	13	28,697	$1,439,684
2010	TX	231	165,352	$5,563,556
2011	TX	205	222,777	$6,868,732
2012	TX	21	48,780	$817,877
2010	NM	2	12,571	$234,459
2011	NM	17	164,594	$1,313,162
2012	NM	9	83,332	$1,186,590
Totals		**701**	**942,572**	**$24,531,258**

NRCS has worked with the USFWS to ensure the assistance provided through the LPCI and all NRCS technical and financial assistance will provide long term benefits to LEPC and LEPC habitat. A conference report was entered into with the Service on June 30, 2011 that ensures practices implemented will provide for the long term benefit of LEPC habitat. The NRCS is currently working with the Service to roll this Conference Report into a Conference Opinion which will continue to provide insurances for NRCS assistance should the LEPC be listed as threatened.

NRCS also has other Farm Bill conservation programs that can be applied to LEPC management, specifically the EQIP, WHIP, and the Grassland Reserve Program (GRP), while the Farm Service Agency administers the Conservation Reserve Program (CRP) including the State Acres for Wildlife Enhancement (SAFE) Program.

WHIP is a program offering technical and financial assistance to landowners to voluntarily develop and improve wildlife habitat on private lands. Participants work with NRCS and their local conservation district to develop a wildlife habitat development plan and contract. The plan describes the landowner's goals for improving wildlife habitat, includes a list of practices and a schedule for installing them, and specifies the steps necessary to maintain the new habitat for the life of the agreement. All privately owned rural lands are eligible for participation in WHIP. For more information see:

http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/national/programs/financial/whip/?&cid=STELPRDB104697.

EQIP is a voluntary conservation program that promotes agricultural production, forest management, and environmental quality as compatible goals. Through EQIP, farmers and ranchers may receive financial and technical assistance to install or implement structural and management conservation practices on eligible agricultural land. The NRCS administers EQIP with funding coming from the Commodity Credit Corporation. EQIP offers contracts with a minimum term that ends one year after the implementation of the last scheduled practice and a maximum term of 10 years. EQIP activities are carried out according to a conservation plan of operations developed with the program participants. For more information see:
http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/.

GRP is a voluntary program offering landowners the opportunity to protect, restore, and enhance grasslands on their property. The NRCS and Farm Service Agency (FSA) coordinate implementation of GRP, which helps landowners restore and protect grassland, rangeland, pastureland, shrubland and certain other lands and provides assistance for rehabilitating grasslands. The program will conserve vulnerable grasslands from conversion to cropland or other uses and conserve valuable grasslands by helping maintain viable ranching operations. For more information see:
http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/easements/grassland/?cid=nrcs143_008401. In addition, the Farm and Ranchlands Protection Program (FRPP) may provide additional opportunities for establishment of easements that can provide benefits to LEPC.

CRP is a voluntary program for agricultural landowners administered by the FSA. Through CRP, agricultural producers can receive annual rental payments and cost-share assistance to establish long-term, resource conserving covers on eligible farmland. The Commodity Credit Corporation (CCC) makes annual rental payments based on the agriculture rental value of the land, and it provides cost-share assistance for up to 50 percent of the participant's costs in establishing approved conservation practices. Participants enroll in CRP contracts for 10 to 15 years. For more information see: http://www.fsa.usda.gov/FSA/webapp?area=home&subject=copr&topic=crp.

SAFE is a new CRP continuous signup practice offered by the FSA. SAFE has been used in all 5 of the states supporting LEPC to target improvements for the species. Information on SAFE is available at: http://www.fsa.usda.gov/Internet/FSA_File/safe08.pdf. Areas allocated and under contract for SAFE acres for LEPC as of December 2012 were: Colorado 21,500 allocated, 13,488 approved; Kansas 52,100 acres allocated, 30,111 acres under contract; New Mexico 2,600 acres allocated, 2,600 acres under contract; Oklahoma 15,100 ac allocated, 6,668 under contract; and Texas 122,700 allocated and 77,634 under contract.

U.S. Fish and Wildlife Service

USFWS Partners for Fish and Wildlife Program

The USFWS Partners for Fish and Wildlife Program. restores, improves and protects fish and wildlife habitat on private lands through partnerships between the USFWS, landowners and others. The objectives of this national program are to:

- Restore, enhance and manage private lands for fish and wildlife habitat
- Significantly improve fish and wildlife habitat while promoting compatibility between agricultural and other land uses
- Restore declining species and habitats
- Promote a widespread and lasting land use ethic.

Projects that benefit LEPC and other wildlife can fit well with most farming and ranching operations. Typical conservation practices directed to LEPC habitat conservation include invasive species removal (eastern redcedar, non-native grasses), fence marking or removal, native vegetation planting, prescribed fire, prescribed grazing, and brush control. Through the Partners Program, the USFWS provides technical assistance and financial incentives to landowners that improve the state of LEPC and important habitat on their property. Cooperating landowners agree to use funds for approved wildlife related projects, and manage and maintain the project area for at least 10 years. The program provides technical and financial assistance through a 10-year cost-share agreement. Landowners agree to maintain the conservation practices for the duration of the agreement. More information is available at: http://www.fws.gov/partners/.

Candidate Conservation Agreement with Assurances (CCAA)

A CCAA is a formal agreement between the USFWS and one or more parties to address the conservation needs of proposed or candidate species, or species likely to become candidates before they become listed as endangered or threatened under the Endangered Species Act (ESA). Property owners voluntarily commit to conservation actions that will help stabilize or restore the species with the goal that listing will become unnecessary. The goal of CCAA's is that conservation can preclude the need for federal listing as threatened or endangered or can occur before the species status has become so dire that listing is necessary.

CCAA's related to LEPC habitat improvements provide landowners with assurances that if they apply good conservation practices for LEPC, they will not incur additional restrictions because they have LEPC on their lands, should LEPC be listed by the USFWS at a later date. Currently, the USFWS has landowner CCAA's in place in NM and TX, with an additional CCAA being implemented in OK. A CCAA may benefit property owners in several ways. First, if the conservation actions preclude listing, no regulatory programs that could occur through ESA are implemented. Second, if the conservation actions are not sufficient and the species is listed, the CCAA automatically becomes a permit authorizing the property owner's incidental take of the species, covering any adverse effects of the landowners' normal activities on the species. Thus, the CCAA provides property owners with assurances that they

will not face future additional conservation measures or restrictions beyond those they agree to at the time they enter into the Agreement. Third, for property owners who want to conserve the species or want to manage habitat on their land, the Agreement provides an avenue to potential federal or state cost-share programs. To enter into a CCAA, a landowner would be required to agree to implement an approved conservation plan that would achieve a net conservation benefit to LEPC habitat. The Agreement is a powerful incentive for landowners to participate in conservation actions that benefit the species. For more information see: http://www.fws.gov/endangered/what-we-do/cca.html#ccaa. CCAA's are also a tool to address voluntary conservation actions by developers, as discussed below.

Landowner CCAA's for practices conducted to improve LEPC habitat currently exist for NM, TX, and OK.

Bureau of Land Management

The BLM manages lands within the occupied range of LEPC and in delineated focal areas, especially in New Mexico, as well as having regulatory responsibility for Federal oil and gas permitting. Where it has management control of lands, it can make substantial contributions towards LEPC habitat. In New Mexico, the BLM has implemented a Special Status Species Resource Management Plan for the LEPC, and as part of this plan, has established an LEPC Habitat Preservation Area of Critical Environmental Concern (http://www.blm.gov/pgdata/etc/medialib/blm/nm/field_offices/roswell/rfo_planning/special_status_species.Par.34868.File.dat/pdf_sss_rod_rmpa_May_2008.pdf). This plan specifies decisions regarding oil and gas leasing and development within the plan area, off-highway vehicle use, land ownership adjustments, and wildlife habitat management. It addresses the management of all resources and uses on approximately 850,000 surface acres of public lands and approximately 1,150,000 acres of Federal mineral estate in the Planning Area located in southeastern New Mexico. The plan established the 58,000 acre Lesser Prairie-Chicken Habitat Preservation Area of Critical Environmental Concern (ACEC). The purpose of this ACEC is to maintain and enhance habitat for the lesser prairie-chicken and sand dune lizard. The plan describes areas that should be avoided from future energy developments, describes the desired plant communities that should be the goal of vegetation treatments and grazing plans, and recommendations for other land uses such as off-highway vehicles. As part of the oil and gas specifies, it includes a description of best management practices.

U.S. Forest Service

The USFS manages national grasslands within the occupied range of LEPC, with some of these lands occurring within delineated focal areas. In particular, the Cimarron National Grassland in Kansas and the Comanche National Grasslands (NG) in Colorado can make substantial contributions towards LEPC habitat in these states. The Comanche NG encompass more than 444,000 acres in southeastern CO. An analysis conducted by Rondeau and Decker (2010) found vegetation conditions on a 9,300 acre high priority area for LEPC generally within the range suitable for LEPC habitat although lacking in preferred bluestem grass species. However, they noted low LEPC populations in the area possibly as a result of the severe winter of 2006-2007. While both the Comanche and Cimarron NG's are still operating under a forest plan developed in 1984, both recognize the importance of management of LEPC habitat. The Comanche NG has instituted some changes in grazing rotations in designated LEPC grazing

allotments to enhance LEPC habitat. The Cimarron NG in southwestern Kansas is 108,175 acres in size and is one of the largest areas of public land in Kansas and the only area managed by the U.S. Forest Service. The Cibola National Forest administers four National Grasslands: Black Kettle, McClellan Creek, Kiowa, and Rita Blanca, which cover 263,261 acres in northeastern New Mexico, western Oklahoma, and northern Texas. The Black Kettle NG include over 30,000 in western OK and while these acres are divided into smaller parcels of Federal ownership, provide opportunities for improvements to LEPC habitat.

Regional Organizational or Interagency Programs

Western Association of Fish and Wildlife Agencies Lesser Prairie Chicken Interstate Working Group

The Western Association of Fish and Wildlife Agencies (WAFWA) coordinates the LEPC IWG that integrates LEPC management among the 5 states within the range of this species. This group has been working since the 1990's on coordination of activities. It previously developed a detailed report on range-wide status of the LEPC (Davis et al. 2008), and has led the development of the Southern Great Plains Crucial Habitat Assessment Tool, discussed below. It is currently responsible for coordinating the development of this range-wide plan.

Southern Great Plains Crucial Habitat Assessment Tool

The Western Governors' Wildlife Council is creating the Western Wildlife Crucial Habitat Assessment Tool (CHAT). The purpose of the CHAT is to provide greater "certainty and predictability to planning efforts by establishing a common starting point for discussing the intersection of development and wildlife". As a subset of this effort the Southern Great Plains CHAT is being developed. The Southern Great Plains CHAT has been led by the Oklahoma Department of Wildlife Conservation and the Kansas Department of Wildlife, Parks and Tourism along with the LEPC IWG, Playa Lakes Joint Venture, and USGS. The project is modeling LEPC habitat and developing an online tool usable by conservation managers, industry, and the public that identifies priority areas (http://kars.ku.edu/geodata/maps/sgpchat/). The CHAT is an important tool for implementation of the range-wide LEPC conservation plan.

The LEPC CHAT has been developed to identify different levels of priority areas that can help guide locations to concentrate habitat improvements as well as helping locate appropriate locations for energy and other developments. The various categories of the CHAT are discussed below in the mitigation framework section.

The CHAT is envisioned to work is several ways. First, it will be used to help steer conservation programs to concentrate benefits in the most important areas. The strategy behind the focal areas is to build and maintain large blocks of high quality habitat to provide population source areas for LEPC. Habitat improvement programs will have ranking criteria for allocation of funds where locations in focal areas will receive extra selection "points" over other categories. Similarly, important habitat outside of focal areas and linkage zones will receive extra selection points, but not as many as focal areas, with each additional category similarly weighted. This will not exclude habitat improvement work from

occurring outside of focal areas, but will ensure that building large blocks of habitat is encouraged. The CHAT will also help function in indicating where development activities should be avoided and where these activities should be encouraged. A metric system that quantifies both impacts and mitigation benefits (see section below on mitigation metrics) will be linked to the various CHAT categories in assigning multipliers of impact debits or mitigation credits depending on the location of the impact of mitigation site. In this way, developments are encouraged to be placed in areas with lower CHAT ratings while mitigation actions are encouraged to occur in more highly weighted CHAT categories.

Playa Lakes Joint Venture

Playa Lakes Joint Venture (PLJV) is a regional partnership of federal and state wildlife agencies, conservation groups and private industry dedicated to conserving bird habitat throughout the western Great Plains- including portions of Colorado, Kansas, Nebraska, New Mexico, Oklahoma and Texas. PLJV has several ongoing programs that provide conservation benefits to LEPC including the development of spatially explicit decision support tools in collaboration with the NRCS and FSA; coordination, support and funding for private lands biologists that help deliver habitat in the LEPC region; promotion and funding of local and state prescribed burn associations in Kansas and Oklahoma; and coordination and hosting of a monthly conference call on LEPC to allow exchange of information about ongoing conservation efforts. PLJV was a facilitating partner in the development of the Southern Great Plains CHAT. In addition, PLJV is a member of collaborative groups in Colorado and New Mexico that developed siting guidance for wind energy developers and associated best management practices documents.

National Fish and Wildlife Foundation

The National Fish and Wildlife Foundation (NFWF) in partnership with NRCS initiated a new funding program in 2011 called the Private Land Technical Assistance Program. The purpose of this partnership is to provide grants on a competitive basis to support field biologists and other habitat professionals (botanists, ecologists, foresters, etc.) working with NRCS field offices in providing technical assistance to farmers, ranchers, foresters and other private landowners to optimize wildlife conservation on private lands. One of the funding priorities of this program was the short grass prairie with a specific focus on helping deliver programs to improve LEPC habitat.

Pheasants Forever

Pheasants Forever (PF) is dedicated to the conservation of pheasants, quail and other wildlife through habitat improvements, public awareness, education and land management policies and programs. In 2009, the North American Grouse Partnership joined with Pheasants Forever, Quail Forever, Theodore Roosevelt Conservation Partnership, Ecosystem Management Research Institute, American Bird Conservancy, and the Mule Deer Foundation to launch the Prairie Grouse Partners, a conservation partnership with an aggressive goal of restoring 20 percent of North America's native grasslands. This effort would result in 60 million acres of improved habitat for a wide range of wildlife, including three species of prairie grouse and pheasants. In support of this and its other habitat management efforts, PF has been an active partner in funding cooperative technical service provider positions with NRCS and state wildlife agencies. A number of these positions are within the range of LEPC and help deliver

NRCS LPCI and other LEPC habitat improvement programs. In this cooperative effort, Farm Bill Wildlife Biologists are employed by PF but work out of NRCS offices. In 2012, PF had 10 biologists in four of five states helping provide technical services within the range of LEPC. The biologists provide direct technical assistance to producers and offer full service in implementing all phases of local programs provided through NRCS, FSA, state fish and wildlife agencies and other partners. This is one of several ways that PF is fulfilling its commitment to the Prairie Grouse Partners effort.

Rocky Mountain Bird Observatory (RMBO)

RMBO is a nonprofit organization that conserves birds and their habitats through science, education and stewardship efforts across the western United States and Mexico. RMBO has been working on grassland bird conservation on private lands for more than a decade including LEPC outreach and management. RMBO works in partnership with the Colorado Parks and Wildlife and Colorado Natural Resources Conservation Service (NRCS) to host and support two biologists through the Strategic Watershed Action Team and Private Lands Wildlife Biologist program, respectively. These positions provide technical assistance to NRCS and landowners in Colorado to deliver NRCS (Lesser Prairie Chicken Initiative (LPCI) and other wildlife and habitat programs. Efforts include promoting grazing compatible with LEPC and landowner goals, conservation easements, creation and enhancement of LEPC habitat thru CRP, and leveraging of partner funding, among other benefits. In addition, RMBO partner positions play a key role in LPCI project monitoring, as well as assisting with annual lek surveys. Both positions are active in the Colorado LEPC working group and work hand-in-hand with NRCS state office staff on review of LPCI policy and implementation. RMBO has various landowner programs and tools that encourage grassland stewardship and promote enhancement of LEPC habitat. RMBO has partnered with several agencies and organizations to provide fence marking kits to help reduce the risk of LEPC collisions with fences, improve seed mixes, provide financial assistance with cost-share on LPCI project and provide wildlife escape ladders for stock water tanks.

The Nature Conservancy

The Nature Conservancy (TNC) has various on-going programs that provide benefits to LEPC. TNC owns a number of preserves within the range of LEPC, several of which have LEPC as a primary focal species. Key preserves will be discussed in the state descriptions below. TNC also offers conservation easements to interested landowners throughout LEPC range. It also has other programs that are coordinated with state efforts, so will discussed within each state.

Land Trusts

Various land trusts and other organizations have active programs to support conservation easements for private lands within LEPC range. Three land trusts collaborated in a focused effort to help LEPC through application of a NWFW grant. The Colorado Cattlemen's Agricultural Land Trust (CCALT), the Ranchland Trust of Kansas (RTK), and the Texas Agricultural Land Trust (TALT) are working to obtain conservation easements on ranchlands that can provide long term assurances for LEPC habitat. CCALT protects productive agricultural lands and the conservation values they provide by working with ranchers and farmers, thereby preserving Colorado's ranching heritage and rural communities. CCALT was started in 1995 by the Colorado Cattlemen's Association, who saw a need for a land trust to serve

the farming and ranching community. Since inception, it has partnered with over 265 landowners to protect over 394,000 acres throughout the state of Colorado (www.ccalt.org). RTK is a land trust affiliated with the Kansas Livestock Association (KLA). KLA, formed in 1894, is a trade association that represents the state's multi-billion dollar cattle industry at both the state and federal levels, with a focus on legislative and regulatory issues. In 2003, KLA leaders formed RTK as a separate charitable conservation organization, with a mission to preserve Kansas' ranching heritage and open spaces for future generations through the conservation of working landscapes (www.klaranchlandtrust.org). TALT was founded in 2007 by leaders from the Texas Farm Bureau, Texas & Southwestern Cattle Raisers and Texas Wildlife Association. Today it holds easements on approximately 128,000 acres throughout Texas (www.txaglandtrust.org). In Kansas, TNC is in partnership with RTK in a program seeking to conserve mixed grass communities.

State Programs

As mentioned, much of the habitat improvement work for LEPC occurs through management programs administered at the state level, both in terms of the actual delivery of Federal agency programs by the NRCS, FSA, and USFWS as well as state agency programs and additional programs of conservation districts, conservation organizations, and others. Therefore, coordination of programs at a state level is extremely important to maximize delivery of LEPC habitat improvements within each state.

Oklahoma

Oklahoma Department of Wildlife Conservation (ODWC) has programs directed towards LEPC management. In 2011, at the request of the state legislature, ODWC began development of the Oklahoma Lesser Prairie Chicken Conservation Plan (Haufler et al. 2012; www.wildlifedepartment.com/wildlifemgmt/lepc/Final_OK_LEPC_Mgmt_Plan_23Oct2012.pdf) and completed the plan in 2012. The plan followed a collaborative process involving agencies, organizations, universities, industry, interest groups and the public in its development. It established a state LEPC science team to provide recommendations on population and habitat needs. It also established an LEPC implementation team to coordinate delivery of LEPC programs to landowners. A number of meetings were held with groups of stakeholders as were two series of 3 public meetings to obtain input to the plan. The plan was available for public review on the ODWC website, and numerous comments were received and addressed.

ODWC has a number of programs that it administers to provide technical and financial assistance to landowners to undertake conservation projects that benefit grasslands and restore and enhance habitats important to the LEPC. It also has programs and tools that assist with addressing impact evaluations and mitigation.

The ODWC LEPC Habitat Conservation program was designed to help private landowners develop, preserve, restore, enhance and manage LEPC habitat on their land. This plan has been incorporated into this range-wide plan for LEPC, and will continue to provide the benefits it developed. Landowners receive technical and cost-share financial assistance to develop and maintain LEPC habitat. Eligible conservation practices include brush management, native grass planting, fence marking and removal, fire break construction and prescribed fire. Landowners work with ODWC to develop a habitat

management plan and enter into a contract that specifies the conservation projects that will be accomplished. For more information see: http://www.wildlifedepartment.com/wildlifemgmt/lepchcp.htm

Through the State Wildlife Habitat Improvement Program (SWHIP), ODWC provides cost share assistance for specific habitat improvement practices. Under the SWHIP, landowners enter into 10-year contracts with ODWC for approved projects to develop, preserve, restore and manage wildlife habitat on private lands. ODWC shares part of the cost of habitat improvement work, based on allowable costs determined by the NRCS. In exchange, the landowner agrees to maintain the habitat for a period of 10 years. For more information see: http://www.wildlifedepartment.com/wildlifemgmt/wildlifehabitat.htm

The ODWC Quail Enhancement Program focuses on improving quail habitat and increasing the public's knowledge of bobwhite biology, habitat requirements and management. Improvements to quail habitat will also provide many benefits to LEPC, although the habitat requirements of the two species do differ in a number of ways. Technical assistance to improve habitat is available to landowners free of charge by ODWC biologists, including on-site visits and management recommendations. Any landowner in the state of Oklahoma is eligible for technical assistance, regardless of property size. For more information see: http://www.wildlifedepartment.com/wildlifemgmt/quailenhancement.htm.

Through the Voluntary Offset Program (VOP), developers can enter into voluntary agreements with the ODWC and make financial contributions to a habitat conservation fund to help offset acknowledged impacts to wildlife habitat from development activities. The VOP is a voluntary mechanism to accomplish offsite mitigation and has been used to offset or partially offset acknowledged impacts to LEPC habitat. Examples include two agreements and payments made by Oklahoma Gas and Electric Company in 2009 and 2010 using a ratepayer impact assessment to provide compensation for two adjacent wind facilities, and a March 2012 agreement with Chermac Energy Corporation to compensate for a planned 55 mile high voltage transmission line.

The Oklahoma LEPC Spatial Planning Tool (Horton et al. 2010) is a spatially explicit model designed to assist development planning by providing developers with information that will allow them to avoid, minimize and mitigate negative effects of development on LEPC in Oklahoma. The tool was developed through a cooperative multi-party effort to promote voluntary habitat conservation actions and to prioritize agency management actions. See www.wildlifedepartment.com/lepcdevelopmentplanning.htm

The Oklahoma Association of Conservation Districts (OACD) has established a wildlife credit program to provide landowners with stewardship payments for work done to protect and expand the habitat of LEPC. This pilot program is funded through a NRCS Conservation Innovation Grant (CIG). See: www.okconservation.org.

In addition to these programs, ODWC is working with other agencies and organizations to coordinate delivery of conservation benefits, particularly within its delineated focal areas. ODWC, NRCS, and

USFWS Partners personnel have coordinated their efforts to identify ways that various programs may be able to complement each other and provide higher levels of match to landowners than individual programs might be able to individually. They have also worked to provide "one-stop-shopping" for landowners so that whichever agency may get approached for technical assistance, the person responding can provide information on all of the available programs that the landowner might use. Coordinated management plans that include all of the programs are being standardized and applied.

ODWC has been working with the USFWS to provide a CCAA for landowners who engage in LEPC habitat improvements. The landowner CCAA is currently being implemented by ODWC and will offer management assurances to landowners who voluntarily agree to implement a LEPC management plan for their property.

Other agencies and organizations in Oklahoma are helping provide LEPC habitat. The Oklahoma Prescribed Burning Association has been working to help landowners better utilize this tool through training programs, coordination of local prescribed burning associations, and identification of liability insurance options. The Nature Conservancy offers conservation easements for interested landowners as well as managing some of its own lands for LEPC. ODWC has a number of wildlife management areas within LEPC range, and is developing management plans for these areas that emphasize the enhancement of LEPC habitat. The USFS manages the Black Kettle National Grasslands which also help provide habitat for LEPC.

Kansas

Kansas has been targeting coordinated management towards LEPC for some time. Kansas Department of Wildlife, Parks, and Tourism (KDWPT) staff has coordinated with NRCS and USFWS Partners in coordinating delivery of LEPC habitat improvements for a number of years. In September 2012 a more formal Kansas LEPC implementation team was convened. This team included numerous representatives from KDWPT and NRCS as well as representatives from USFWS Partners program, USDA FSA, Kansas State University (KSU) Extension, TNC, and the U.S. Forest Service. At this meeting, all parties agreed that coordination of programs with a concentration in focal areas was a priority. The concept of one-stop-shopping would be enhanced through development of a 1-2 page handout for landowners that all technical service providers would have that describes all of the available LEPC programs. Information on the plan and landowner opportunities would be provided on a LEPC webpage maintained by KSU Extension. The implementation team developed a map of focal areas following the guidelines from the IWG. An annual meeting of all technical service providers for LEPC will be coordinated to review available programs and to make sure that all providers are up to date on the available programs.

Three public meetings were held within the LEPC range in Kansas in late September 2012 to provide the public and especially landowners with information about development of the plan and opportunities for involvement in LEPC conservation. Input from the meetings will assist the KS Implementation Team in improving LEPC habitat.

Kansas has a number of programs available for helping improve LEPC habitat. The Federal programs (CRP, SAFE, LPCI, and USFWS Partners) are all very important for LEPC in Kansas. The U.S. Forest Service has 108,000 acres in the Cimarron National Grasslands in Kansas. The 5 year plan for these grasslands includes LEPC as one of its indicator species. These lands will be considered in focal area delineations.

KDWPT has several programs that can deliver habitat improvements to LEPC. KDWPT's Upland Game Bird – Habitat Improvement Program allows for KDWPT biologists and private landowners to work together in the development of habitat management plans. This program provides a 75% match for practices that can improve LEPC habitat. Currently the annual budget is $120,000. The program is focused on CRP enhancements, including cost sharing on prescribed burning, light disking, food plot establishment, forb/legume interseeding, brush removal, and providing additional Sign-Up Incentive Payment or Practice Incentive Payment incentives to help increase the enrollment in several Continuous CRP practices. Additional focus has been to provide cost share for the conversion of cropland to native grass, converting cool season grasses to native warm season grass, hedgerow renovation, wetland development, and deferred grazing on native rangeland.

KDWPT secured a State Wildlife Grant (SWG) to provide cost-share assistance to private landowners interested in enhancing habitat for species of greatest conservation need, including LEPC. Those landowners approved for funding will be required to match a minimum of 25% of the total project cost. This match can be cash from non-federal source, contributions of in-kind labor (labor, equipment and supplies) or a combination of both. This program last year had $212,000 in funding, with 65% of the funds USFWS SWG dollars and 35% state dollars.

In partnership with FSA, NRCS, Playa Lakes Joint Venture, and others, KDWPT developed a targeted Conservation Priority Area to encourage enrollment of CRP within the LEPC current range. KDWPT provides technical assistance in planning seeding mixes and targets KDWPT WHIP cost-share towards enhancing CRP within the identified priority areas. SAFE enrollment is targeted towards LEPC through these priority areas.

The Nature Conservancy in Kansas has a Strategic Watershed Assistance Team grant from NRCS to promote EQIP and WHIP programs. They are also providing assistance to Prescribed Burning Associations such as through workshops. TNC has identified LEPC as a target species in their ecoregional plans for the Red Hills. Conservation easements are an important focus of TNC, and can help maintain LEPC habitat for the long-term. The Smokey Valley Ranch is a TNC property managed as a showcase for how a prescribed grazing program can produce habitat and grazing benefits. TNC provides outreach on EQIP and LPCI to landowners they work with.

KSU Extension has been providing public education through programs and through maintenance of a LEPC website (http://www.ksre.k-state.edu/p.aspx?tabid=275). KSU Extension has also been working to assist prescribed burning associations. Several Burn Coops are working within LEPC range- especially in the Red Hills, Comanche Co, and Park County. The Prescribed Fire Council of the Kansas Grazing Lands Coalition provides help with educational programs and other support for prescribed burning.

The Comanche Pool Prairie Resource Foundation is a collaborative initiative of the USFWS Partners program is an effective habitat improvement program within LEPC range that was awarded a NFWF grant to fund two prescribed fire specialists.

Colorado

CPW partners with Federal agencies in delivery of their LEPC related programs. The NRCS LPCI program has enrolled an average of 21,600 acres annually in Colorado over the last three years. The LEPC SAFE program for Colorado is available within the Action Area identified for the LPCI. Landowners may sign-up for the FSA program on a continuous basis and both 10-year and 15-year contracts are available. Approximately 7,000 acres are available for enrollment and additional allocations of acres are anticipated once available acres are used. USFWS Partners program has identified the LEPC and associated sand sagebrush as priorities in its strategic plan. Though specific dollars have not been allocated to this effort, LEPC projects have received high priority in focal areas. Annual project allocations range from $50,000-75,000, with additional funds being resourced via grants as opportunity and need are demonstrated.

CPW is charged with increasing delivery of federal farm bill programs. This task is coordinated with partner agencies and organizations including Pheasants Forever, RMBO, and NRCS. Private Lands Wildlife Biologists are supported through cooperative funding from these agencies and organizations. Cooperative initiatives including the Private Lands Wildlife Biologist program are designed to provide landowners with technical assistance and “one-stop shopping” for a host of federal, CPW, and non-government conservation group programs.

All known and historical leks are monitored annually. Additional reconnaissance is conducted in potentially suitable habitat to detect leks which may be currently unknown or newly established. Aerial helicopter surveys were conducted in 2011 to survey large blocks of potentially suitable habitat north of currently occupied areas in Colorado; however, no new leks were discovered.

CPW convened an implementation team meeting for LEPC that included representatives from CPW, USFWS Partners, RMBO, NRCS, U.S. Forest Service Comanche National Grasslands, Kiowa County Energy Development, and Audubon Colorado. This team has met annually in the past to discuss and coordinate LEPC management in Colorado. The team delineated LEPC focal areas for the state and reviewed proposed population goals. Public meetings on LEPC planning were held on Feb. 4, 2013 to review the listing proposal and the draft range-wide conservation plan.

CPW’s LEPC habitat improvement program (LPCHIP) was initiated in 2009. This program was specifically designed to improve and develop habitat on private lands for LEPC and other mid-grass and sand sagebrush dependent wildlife found in occupied LEPC range in southeast Colorado. Program delivery to date has been achieved through the collective and collaborative work of biologists, district wildlife managers, and the partnership farm bill biologists. Specific project identification and implementation is contracted through Pheasants Forever using their program that has been demonstrated to be efficient and effective in delivering on-the-ground conservation. Currently the

LPCHIP is funded by the severance tax species conservation trust fund. Program funds are often used to provide incentives in conjunction with Federal programs to target projects that address habitat limiting factors for LEPC, almost exclusively on private lands. A small portion of funding was used for a project on the Comanche National Grasslands, administered by the U.S. Forest Service. As of June 2012, the LPCHIP implemented projects directly impacting 11,212 acres. There were an additional 7,413 acres of projects in progress and areas where there was strong landowner interest. The completed acres include 3,590 acres of CRP projects, 3,280 acres of CRP mid-contract management, 4,380 acres of grazing deferment designed to improve nesting habitat adjacent to leks, and 2,422 acres of non-CRP grass establishment.

The Nature Conservancy is currently focusing on conservation easements as one of the important tools used to protect LEPC habitat in eastern Colorado. The Conservancy is working closely with partners, including CPW and NRCS to conserve properties containing LEPC habitat. Land trusts, such as the Conservancy can apply to CPW and NRCS for funds to help with the costs associated with acquiring a conservation easement.

One of Colorado's core LEPC populations was found on the Comanche National Grasslands. CPW works closely with USFS personnel on LEPC habitat management by offering recommendations on grazing management, assisting with population monitoring on the Grasslands, and by providing equipment, materials, and manpower for LEPC habitat projects. In recent years the USFS has changed much of their grazing management in order to provide better nesting habitat for the birds. This has included annual deferment of grazing on some pastures, reduction of stocking rates in one of the primary LEPC allotments, and conducting some patch-burn-grazing trials to assess its effectiveness as a habitat management tool for SE Colorado sand sagebrush rangelands. In partnership with CPW, the USFS has also installed large grazing exclosures around or in close proximity to its active leks. Portions within these exclosures are disked annually in order to provide patches of quality brood habitat.

Texas

Texas Parks and Wildlife Department (TDPW) provides technical assistance to landowners including development of LEPC wildlife management plans (WMP) to those interested. Implementation of a plan will allow a landowner to be included in the Texas LEPC landowner CCAA with a certificate of inclusion (CI) provided by TPWD to the landowner that will "protect the landowner from future land use restrictions that would be imposed if and when the species is listed." Under this CCAA, "TPWD will meet with participating landowners at their request to provide continued technical assistance, including discussions of funding options, for projects that improve and maintain LPC habitat" (http://www.tpwd.state.tx.us/huntwild/lesserprairiechicken/media/lpc_ccaa.pdf). "Under this CCAA, TPWD will issue a CI to private landowners who enter into TPWD-approved WMPs for LEPC and are actively implementing conservation measures for the species. The conservation measures implemented by participating landowners would generally consist of prescribed grazing, prescribed burning, brush management, Conservation Reserve Program (CRP) and cropland management, range seeding, other upland wildlife habitat management practices, and population management techniques".

The Landowner Incentive Program (LIP) is a TPWD program intended to help meet the needs of private, non-federal landowners wishing to enact good conservation practices on their lands for the benefit of healthy terrestrial ecosystems. LIP focuses on projects aimed at creating, restoring, protecting and enhancing habitat for migratory birds and species of greatest conservation need including the LEPC. LIP is funded through various partnerships including the U.S. Fish and Wildlife, Partners for Fish and Wildlife Program, National Fish and Wildlife Foundation and other partners. For more information see: http://www.tpwd.state.tx.us/landwater/land/private/lip/.

TWPD also helps coordinate other LEPC management activities within the state through partnerships with other agencies and NGOs. As a member of the Texas State Technical Action Committee, TPWD works with NRCS, FSA and other agencies and NGOs to help effectively target Farm Bill Programs for wildlife habitat. In 2011, TPWD worked with NRCS and Pheasants Forever to develop a proposal funded by the NFWF to hire three State Watershed Action Team Biologists to assist with Farm Bill program delivery and monitoring under the NRCS LPCI. In addition, TPWD recently formed the TX LEPC implementation team with representatives from TPWD, NRCS, FSA, Texas AgriLife Extension, Texas General Land Office and USFWS. The intent of this team is to promote common targeting of LEPC habitat management programs across agencies within the state and to coordinate with similar teams in other states.

Within TX, the Dorothy Marcille Wood Foundation has developed a website to disseminate information on LEPC, and helps coordinate LEPC education and other programs.

New Mexico

New Mexico has private landowner programs administered by both state and Federal agencies as well as lands administered by the BLM that are contributing to LEPC habitat. Similar to other states, NRCS in New Mexico has partnered with the National Fish & Wildlife Federation, Pheasants Forever and Quail Forever to create a Strategic Watershed Action Team (SWAT) that provides specialists in the field to work with landowners and NRCS field offices. The Team assists in conducting range and habitat inventories, grazing plans, outreach, and in monitoring and evaluation of applied conservation practices. As a result of the team's efforts, ranchers and conservationists will have a better understanding of the impacts of conservation activities, and will be able to more effectively prescribe, target and implement future conservation efforts that will benefit the health and productivity of rangeland and lesser prairie-chickens.

New Mexico Department of Game and Fish (NMDGF) has recognized the importance of managing LEPC since the 1940's. A recent report (NMDGF 2011) stated: "In the 1940's the State Game Commission started to acquire properties for the purposes of conserving habitat for this species (LEPC). These acquired properties, named Prairie Chicken Areas (PCAs), were often farms and ranches that had failed during the Dust Bowl and Great Depression and were scattered throughout De Baca, Lea, and Roosevelt Counties. The basis for this purchase strategy was that wide distribution of protected areas would be more beneficial to lesser prairie-chicken conservation than conserving a large area in only one part of this species' range. Currently, there are 29 properties that encompass 27,182 acres. These

properties range in size from 28 to 7,189-acres and are managed primarily to provide habitat for lesser prairie-chickens, but also to provide benefits to other wildlife species. This also includes the Sandhills Prairie Conservation Area (CA), which was acquired in 2007 and encompasses 5,285-acres." NMDGF is in the process of enrolling all of these properties in a CCAA, discussed below.

NMDGF worked with the BLM, TNC, and other partners to identify a series of LEPC core conservation areas. These are areas that have many conservation components already in place, assuring long-term benefits for LEPC. The designated areas are discussed below under the Stronghold section of the plan.

Many of the livestock grazing allotments are enrolled in a Candidate Conservation Agreement program and the private and state lands associated with these allotments are enrolled in the Candidate Conservation Agreement with Assurances program. Approximately 60 percent of federal mineral estate is not under lease and will remain so. Mineral estate that might be acquired by the BLM under the proposed Permian Basin Land Exchange would be closed to future oil and gas leasing, per the resource allocations and decisions found in the BLM's 2008 Special Status Species Resource Management Plan Amendment. Completion of the proposed Permian Basin Land Exchange would strengthen the habitat protections in both the linkage zones and core conservation areas.

TNC also has land holdings devoted to LEPC in New Mexico. "In 2005, the Conservancy purchased the 18,500-acre Creamer Ranch in eastern New Mexico to become the Milnesand Prairie Preserve. In 2009, the Conservancy significantly expanded the preserve through its acquisition of the 9,200-acre Johnson Ranch. The preserve, now at 28,000 acres, provides superb condition—unfragmented grassland with oak shrubs providing protective cover for these ground-nesting birds." (http://www.nature.org/ourinitiatives/regions/northamerica/unitedstates/newmexico/placesweprotect/milnesand-prairie-preserve.xml). TNC has enrolled over 7,000 acres of its lands in the Milnesand Prairie Preserve in the NM CCAA, discussed below. This preserve is also the site of the Annual High Plains Lesser Prairie Chicken Festival that attracts visitors in April to observe mating displays of LEPC.

As reported by the USFWS (2012a:73833) "In January 2003, a working group composed of local, state, and Federal officials, along with private and commercial stakeholders, was formed to address conservation and management activities for the lesser prairie-chicken and dunes sagebrush lizard (*Sceloporus arenicolus*) in New Mexico. This working group, formally named the New Mexico Lesser Prairie-Chicken/Sand Dune Lizard Working Group, published the Collaborative Conservation Strategies for the Lesser Prairie-Chicken and Sand Dune Lizard in New Mexico in August 2005. This Strategy provided guidance in the development of BLM's Special Status Species Resource Management Plan Amendment (RMPA), approved in April 2008, which also addressed the concerns and future management of lesser prairie-chicken and dunes sagebrush lizard habitats on BLM lands, and established the Lesser Prairie-Chicken Habitat Preservation Area of Critical Environmental Concern. Both the Strategy and the RMPA prescribe active cooperation among all stakeholders to reduce or eliminate threats to these species in New Mexico. As an outcome, the land-use prescriptions contained in the RMPA now serve as baseline mitigation (for both species) to those operating on Federal lands or non-Federal lands with Federal minerals." "Since the CCA and CCAA were finalized in

December 2008, 29 oil and *gas companies have enrolled a total of* 330,180 ha (815,890 ac) of mineral holdings under the CCA. In addition, 39 private landowners in New Mexico have enrolled about 616,571 ha (1,523,573 ac). There currently are additional pending mineral and ranching enrollment applications being reviewed and processed for inclusion. Recently, BLM also has closed 149,910 ha (370,435 ac) to future oil and gas leasing and closed some 342,770 ha (847,000 ac) to wind and solar development. They have reclaimed 536 ha (1,325 ac) of abandoned well pads and associated roads and now require burial of power lines within 3.2 km (2 mi) of leks. Some 52 km (32.5 mi) of aboveground power lines have been removed to date. Additionally, BLM has implemented control efforts for mesquite (*Prosopis glandulosa*) on some 148,257 ha (366,350 ac) and has plans to do so on an additional 128,375 ha (317,220 ac)."

Threat Avoidance, Minimization, and Mitigation Programs

A second component of the LEPC conservation strategy is to provide initiatives that address various threats to the species. In particular, the threat of impacts from new developments has been identified as significant concerns (USFWS 2012a). While conversion of native rangelands has been a significant impact in the past, its rate of development has slowed and the landowner habitat incentive programs discussed previously are designed to offer economic alternatives to stem or reverse this conversion.

Focal areas serve not only to identify areas where habitat improvements are desired to be concentrated, but also are areas where impacts from development are to be avoided or minimized. Mapping of focal areas and use of the Southern Great Plains CHAT can assist by identifying to developers the areas of greatest concern, and encourage development into areas where impacts to LEPC will be minimal or completely avoided. Where developments do occur in LEPC habitat, measures to minimize these impacts are recommended and a program to provide for off-site mitigation established.

Existing Programs and Tools

Several programs or tools already exist to help reduce impacts to LEPC from development. These include the BLM LEPC Special Status Species Resource Management Plan that includes best management practices for oil and gas development, an existing CCAA in NM that addressed oil and gas development, a draft best management practice agreement between ODWC and the Oklahoma Independent Petroleum Association (OIPA), wind development guidelines developed by the USFWS, wind development guidelines for CO and NM developed by the Colorado Renewables and Conservation Collaborative and the New Mexico Wind and Wildlife Collaborative with assistance from PLJV, and on-going efforts for development of the Great Plains Wind Energy HCP. In addition, a new oil and gas CCAA is under discussion by a number of oil and gas companies and associations with WAFWA and the USFWS.

BLM LEPC Special Status Species Resource Management Plan

The BLM LEPC Special Status Species Resource Management Plan (BLM 2008) not only directs BLM's land management activities for this area but also specifies guidelines for oil and gas development and other development activities. For example, it established a program where applicants for electric

power lines right of ways could participate in a power line removal credit (PLRC) program. Under this program, applicants could remove 1.5 miles of idle power lines (wire and poles) within prairie-chicken habitat management units or LEPC habitat type before receiving authorization to construct 1.0 mile of new power line in similar or lower value LEPC habitat. As mentioned previously, the Plan specifies areas that are closed to new oil and gas development as well as specifying levels of allowable development in additional areas. It includes a set of Best Management Practices (BMP's) for oil and gas activities. These BMP's specify various actions including seasonal restrictions for time of day of allowable activities, reclamation and restoration requirements, fence marking, burying of power lines, and various other required practices.

CCA's, CCAA's and HCP's

Several energy-related Candidate Conservation Agreements (CCA's), Candidate Conservation Agreements with Assurances (CCAA's), and Habitat Conservation Plans (HCP's) are either existing, under development, or being considered. CCA's apply to federal programs or lands and specify actions being taken to promote conservation of candidate species that if followed by all landowners would preclude the need for listing the species. CCAA's similarly describe actions voluntarily agreed to by energy or other companies or landowners that if adopted by all companies or similar landowners would preclude the listing of the species, and in exchange for entering into this agreement, the USFWS agrees that if the species is subsequently listed despite the presence of the CCAA, that those entering into the agreement will not be subject to additional actions or regulations relating to the activities covered by the agreement. HCP's are a similar tool but are designed to operate after listing of a species and provide the ability for a company/landowner which/who voluntarily enters into the agreement to receive an incidental take permit that protects the permit holder from any harm that may occur to the protected species should such harm occur as an incidental occurrence from the otherwise permitted activities covered by the permit. Candidate species can be included in an HCP if another listed species is also addressed.

The New Mexico CCA/CCAA allows developers and landowners to become Participating Cooperators in the agreement. The CCA/CCAA operates under the guidelines of the BLM Special Status Species Resource Management Plan Amendment (RMPA). The RMPA established foundational requirements to be applied to all future activities for Federal surface and Federal minerals (including private surface used for Federal mineral development). Each Participating Cooperator must sign a Certificate of Participation for a particular parcel of land (enrolled property), and agree to the foundational requirements of the RMPA, implement conservation measures on the enrolled property and contribute funding, land, or provide in-kind services for conservation efforts that will benefit the LPC and/or sand dune lizard either on or off-site of the enrolled property. The CP requires the Participating Cooperator to implement conservation activities including the following as appropriate (http://www.fws.gov/southwest/es/Documents/R2ES/LPC-SDL_CCA-CCAA_2008.pdf):

- Establish Plans of Development for enrolled properties,
- Remove caliche pads and roads on legacy wells where there is no responsible party,

- Construct all infrastructures supporting the development of a well (including roads, power lines, and pipelines) within the same corridor,
- Construct new infrastructures in locations which avoid occupied and suitable LPC habitat,
- Bury new distribution power lines that are planned within 2 miles of occupied LPC habitat,
- Minimize total new surface disturbance by utilizing alternative techniques such as co-locating wells, directional drilling, and interim reclamation of drill pads to minimum area necessary to operate the well,
- Provide escape ramps in all open water sources,
- Install fence markers along fences that cross through occupied habitat within 2 miles of an active lek,
- Design grazing management plans to meet habitat specific goals for individual ranches that may include stocking rates, rotation patterns, grazing intensity and duration, and contingency plans for varying prolonged weather patterns including drought, and/or
- Remove mesquite vegetation that invades into the soils preferred by LPC.

The CCAA includes mitigation payments for oil and gas developments that are assessed on a per well basis. These payments go into an account managed by a board that can fund land acquisition, conservation easements, and habitat improvement programs designed to offset the impacts associated with the development activities.

The wind energy industry has been working on the Great Plains Wind Energy Habitat Conservation Plan that is proposed to include LEPC. This HCP is scheduled for completion after the timelines for this range-wide plan. However, the HCP should be designed to be compatible with the recommendations in this plan.

Best Management Practices (BMP's)

TPWD has developed voluntary mitigation siting guides and BMPs that can be accessed at: http://www.tpwd.state.tx.us/huntwild/wild/wildlife_diversity/habitat_assessment/tools.phtml. These guidelines include the following:

- Avoid
    - Coordinate and communicate with TPWD to avoid transmission-related development in estimated occupied annual range of LEPC habitat.
    - Avoid any grassland corridors between existing large tracts of LEPC habitat.
- Minimize or limit
    - Minimize impacts to lek sites: Development within 1 to 2 miles of active leks of LEPC is discouraged.
    - Minimize impacts to broods
- Schedule timing of activities to avoid LEPC breeding, nesting, and brood-rearing activities (March 01 thru July 31).
- Install raptor deterrents on poles as indicated by Avian Power Line Interaction Committee (APLIC).

- Restoration of degraded habitat
- Conversion or reseeding of cropland into native grasslands is encouraged.
- Compensation
    - If avoidance is not possible and all measures for minimization have been taken, and there is still a need to compensate for LEPC habitat, mitigation should be used.
- Consider alternative locations and development configurations to minimize fragmentation of habitat in consultation with TPWD and USFWS personnel.
- Protect high quality habitat parcels identified by TPWD and USFWS that may be included as part of a plan to limit future loss of habitat for the LEPC.
- Identify areas for restoration of LEPC habitat such as historic LEPC habitat adjacent to or could be connected to existing LEPC habitat through restoration practices.
- Fund/perform monitoring, habitat maintenance**,** aerial surveys with data sharing among partners, habitat mapping, and/or research.
- Replace or provide substitutes such as habitat acquisition, conservation easements, restoration of historic habitat, enrollment of suitable acres in Candidate Conservation Agreement with Assurances (CCAA), mitigation banking.
- Payment per acre to pre-determined non-profit entity based on agreed-upon LEPC to-be-determined habitat value(s).

In Colorado, oil and gas well permits are issued by the Colorado Oil and gas Conservation Commission (COGCC). As of April 2009, the 1200 series COGCC rules require producers to use online resources to identify sensitive wildlife habitat and areas of restricted surface occupancy. Currently, sensitive LEPC wildlife habitat is defined as production areas that include 80% of the nesting and brood rearing habitat that surrounds leks that have been active once in the last 10 years. Restricted surface occupancy areas for LEPC are defined as areas within 0.6 miles of leks that have been active once in the last 10 years. Under COGCC rule, potential oil and gas wells identified within these areas mandates a consultation with Colorado Parks and Wildlife, where best management practices (BMPs) are provided to industry to minimize impacts to LEPC. CO has developed a set of oil and gas BMP's. These include the following provisions for LEPC:

- Consult with CPW at the earliest stage of development to review detailed maps of LPC seasonal habitats and to help select development sites.
- Conduct comprehensive development planning that provides a clear point of reference in evaluating, avoiding, and mitigating large scale and cumulative impacts.
- No surface occupancy within 0.6 mile of any active or inactive (within past 5 years) LPC leks.
- Avoid oil and gas operations within 2.2 miles of active leks and within LPC nesting and early brood-rearing habitat outside the 2.2 mile buffer.
- Select sites for development that will not disturb suitable nest cover or brood-rearing habitats within 2.2 miles of an active lek, or within identified nesting and brood-rearing habitats outside the 2.2 mile perimeter.

- Where oil and gas activities must occur within 2.2 miles of active leks, conduct these activities outside the period between March 15 and June 15.
- Restrict well site visitations to portions of the day between 9:00 a.m. and 4:00 p.m. during the lekking season (March 15 to June 15).
- Establish company guidelines to minimize wildlife mortality from vehicle collisions on roads.
- Avoid surface facility density in excess of 10 well pads per 10-square mile area (one well pad per section) in lesser prairie chicken nesting and early brood-rearing habitat (within 2.2 miles of active leks).
- When surface density of oil and gas facilities exceeds 1 well pad/section, initiate a Comprehensive Development Plan (CDP) that includes recommendations for off-site and compensatory mitigation actions.
- Phase and concentrate all development activities, so that large areas of undisturbed habitat for wildlife remain and thorough reclamation occurs immediately after development and before moving to new sites. Development should progress at a pace commensurate with reclamation success.
- Implement the species appropriate Infrastructure Layout and Drilling and Production Operations Wildlife Protection Measures found in Section II B. and Section II D. of this document.
- Locate compressor stations at least 2.2 miles away from lesser prairie chicken active and historic (within last 5 years) lek sites. When compressor stations must be sited within 2.2 miles of lesser prairie chicken active and historic (within last 10 years) lek sites, locate compressor stations farther than 0.6 mile (3200 feet) fromLPC lek sites.
- Use topographical features to provide visual concealment of facilities from known lek locations and as a noise suppressant.
- Muffle or otherwise control exhaust noise from pump jacks and compressors so that operational noise will not exceed 49 dB measured at 30 feet from the source.
- Utilize a central generator to feed the entire field via underground electrical lines.
- Design tanks and other facilities with structures such that they do not provide perches or nest substrates for raptors, crows and ravens.
- Install raptor perch deterrents on equipment, fences, cross arms and pole tops in lesser prairie-chicken habitat.
- Bury new power lines and retrofit existing power lines by burying them or installing perch guards to prevent their use as raptor perches.
- Design wastewater pits to minimize retention of stagnant surface water.
- Treat waste water pits and any associated pit containing water that provides a medium for breeding mosquitos with Bti (*Bacillus thuringiensis v. israelensis*) or take other effective action to control mosquito larvae that may spread West Nile Virus to wildlife, especially grouse.
- Use early and effective reclamation techniques, including an aggressive interim reclamation program to return habitat to use by lesser prairie-chicken as quickly as possible.
- In consultation with CPW, replace any permanently impacted, disturbed, or altered sand sagebrush habitat within identified nesting and brood rearing range through enhancement of

existing or marginal sand sagebrush habitat or reclamation of altered or converted habitat within or immediately adjacent to mapped nesting or brood rearing habitat.

- Implement the species appropriate reclamation guidelines found in this document.
- When reclaiming breeding habitat, include a substantially higher percentage of forbs than used in other areas.
- Reclaim LPC habitats with native grasses including switchgrass, big bluestem, little bluestem, sand bluestem, yellow Indian grass, and prairie sandreed.
- Do not plant buffalo grass, blue grama and sideoats grama in lesser prairie chicken habitat as they will eventually dominate the resulting stand and will not provide lesser prairie chicken habitat.
- Restore appropriate native shrub species to disturbed sites.
- Do not use aggressive non-native grasses or shrubs in LPC habitat reclamation.
- Utilize native and select non-native forbs and legumes in seed mixes as they are a vital component of brood-rearing habitat. Dryland adapted varieties of alfalfa and yellow sweet clover should be the primary non-native forb species used.

In Oklahoma, OIPA worked with ODWC to develop a set of Voluntary Best Practices for oil and gas development (http://www.oipa.com/page_images/1336665235-regulatory.pdf). Preplanning is recommended to consider the location of possible developments in relation to areas of high value to LEPC as mapped by Oklahoma's LEPC Spatial Planning Tool. Avoidance of high value areas is recommended, but where development will occur in these areas, construction during the spring breeding season should be avoided, and ODWC biologists consulted to minimize impacts during pad siting. Where oil and gas development will occur in LEPC habitat, the following best practices are recommended to the extent possible:

- Maximize the use of existing corridors for new infrastructure supporting new well development (i.e. roads, power lines, pipelines, flowlines, etc.) and combine multiple operations at one site to minimize the disturbance / fragmentation of the LPCs habitat.
- Minimize surface disturbance in order to decrease fragmentation.
- Minimize the time needed to complete new construction and drilling operations, remove unnecessary equipment and infrastructure, and reclaim all portions of well sites not needed for production operations and all portions of roads not needed for vehicle travel.
- At new well sites near active leks, consider the use of low profile equipment and whenever economically feasible, consider burying distribution power lines.
- At well sites near active leks, to the extent possible, avoid conducting early morning activities between 3:00 am and 9:30 am during the mating season (March 1 to May 1).
- At well sites near active leks, to the extent possible, use noise control devices to muffle or control exhaust noise from facilities (pump jacks, compressors, etc.)

- New fencing installed that is not associated with tank batteries or other equipment on site should limit the height of the top strand to below 40 inches, limit fencing to three strands, and install fence markers or other visually detectable avoidance mechanisms.
- Remediation practices
    - When reseeding disturbed areas in high importance habitat use native grasses and forbs where possible to promote natural habitat.
    - Remove un-needed equipment, infrastructure, trash and debris from well sites.

The USFWS (2012c) developed its recommendations for wind energy guidelines. These suggested a tiered approach to wind development, where planning emphasized avoidance of sensitive areas. The guidelines contained some BMP's, though they are quite general and not specific to LEPC.

The Colorado Renewables and Conservation Collaborative and the New Mexico Wind and Wildlife Collaborative developed a set of BMP's for multiple species for each state http://www.pljv.org/windandwildlife/index.php. These are informal groups of representatives from the renewable energy industry and the conservation community whose common purpose was to constructively and proactively address conservation concerns related to renewable energy development in each state. Each collaborative developed a science-based site selection and mitigation framework that described avoidance, minimization and/or mitigation actions associated with wind energy development. The groups also developed BMPs for multiple species and landscape features including LEPC. The LEPC BMPs are similar for each state and include recommendations such as avoiding wind energy development in identified LEPC habitat whenever possible (similar to USFWS guidelines), avoiding large blocks of habitat if possible, bury power lines and minimize fencing and avoid construction during the breeding season. To offset impact that do occur, the BMPs offer mitigation recommendation.

LEPC Impact and Mitigation Metrics

As a foundation for threat avoidance, impact assessment, and quantification of mitigation credits for LEPC, a system to quantify both impacts and mitigation was developed. The metric system is designed to evaluate the ecological impacts of a proposed or implemented development considering its direct and indirect disturbances to a site, the effects of the conditions in the lands surrounding the site to its quality as LEPC habitat, and the location of the site in the larger context of LEPC populations and distributions. The metrics for quantifying mitigation benefits use the same variables as those quantifying impacts but also add a system for quantifying benefits from applying habitat management practices. These metrics provide the foundation for establishment of an off-site mitigation framework that can quantify and track impact debits and balance these with the creation of mitigation credits, with both debits and credits measured as changes to LEPC habitat quality. The system ensures that debits and credits are consistently evaluated from an ecological perspective and that they can provide a basis for determining that a conservation benefit is produced through mitigation actions. The metric system is designed to be rigorous and scientifically defensible, produce ecologically meaningful results for both impact and mitigation determinations, be flexible to support a number of potential mitigation

opportunities, yet be as simple to apply as possible. A User's Manual for the LEPC Metric System is attached as Appendix A. The manual describes how the metric system can be applied to a site, provides example calculations, and provides detailed descriptions of use of mitigation practices for generating credits.

Various mitigation opportunities are under development to help with conservation of LEPC, and the metric system should provide the foundation for these initiatives. Opportunities include direct mitigation actions by a developer to produce and document that it has generated mitigation credits that fully offset the impact debits produced by its development activities, voluntary offset programs that allow companies to compensate agencies and organizations to conduct mitigation and generate the needed credits that offset its impacts, metric credit trading systems that provide a more formal service to companies in tracking impact and mitigation exchanges, mitigation requirements as a component of demonstrating net conservation benefits of CCAA's, HCP's or other conservation agreements, and conservation banking that provides long-term mitigation opportunities.

Quantification of Baseline Conditions

The metric system operates by first determining the existing value (baseline score) of a site that may be the location for either development or mitigation actions. At each development or mitigation location, the existing vegetation conditions and ecological sites are mapped and delineated into homogeneous units (similar ecological site and existing vegetation conditions) termed evaluation sites. Each evaluation site is then assessed using general vegetation parameters to rate the conditions that are present and how these relate to habitat quality for LEPC. Each evaluation site is then assessed for its setting in terms of what is present in the surrounding area and how this may influence the ability of the evaluation site to provide functional habitat. This assessment is done for a 1 mile area out from the center of the evaluation site in what is termed the evaluation area. Based on the assessment of the vegetation conditions within the evaluation site and the assessment of the conditions in the surrounding evaluation area, a habitat score is determined for the evaluation site. The habitat score is then multiplied times the ecological site weighting. This weighting has been pre-determined and is based on the maximum habitat quality that each ecological site has the potential to produce (see description below). This adjusted score times the acres in the site produce the baseline habitat units contained in the site (quality of habitat times acres contained in the site). The effect of existing impacts on number of baseline habitat units is then determined. Existing anthropogenic structures are mapped, and impact buffers (discussed below) are applied to these structures. Area under the buffers is determined, and the number of habitat units is reduced appropriately by the impacted area. The location of the evaluation site relative to a CHAT category is then used to assign an impact or credit multiplier times the baseline score.

A component incorporated into the metric system is an assessment of the potential of an evaluation site to be LEPC habitat. Not all locations have the potential to support high quality LEPC habitat. Soils and other environmental features are significant determinants of the plant species that can occur at a specific location and thus the plant community that can be supported. Different plant communities

have different potentials for LEPC habitat quality. NRCS has developed a classification system of ecological sites (http://esis.sc.egov.usda.gov/Welcome/pgReportLocation.aspx?type=ESD) that relate to mapped soils and describe the various plant communities that can be supported on each ecological site. Each site can be evaluated for its potential quality as LEPC habitat. The LEPC habitat potential of each ecological site occurring within LEPC range is listed in Appendix C. The habitat score of a site is multiplied by this weighting for determination of impacts or generation of credits. In this way, sites that have higher potential for LEPC habitat will create more debits than sites that have lower habitat potential, encouraging development to occur on the lower potential sites. Similarly, mitigation practices applied to sites with higher potential will generate more credits than a site that has lower habitat response potential.

Temporal Components of the Metrics

Quantifying impacts and benefits to LEPC habitat is influenced by several characteristics of LEPC populations and habitat. First, LEPC populations fluctuate with weather patterns and other short-term changes to their environment. In good years when weather conditions don't directly affect populations and enough precipitation is present for good vegetation growth, LEPC can reproduce rapidly and expand population sizes quickly. However, their populations can also decline rapidly following severe winter conditions, poor weather during nesting or early brood rearing, or during prolonged drought. LEPC will remain in areas supporting good habitat, and males have been shown to have a strong site fidelity to leks. However, LEPC populations can also move and with their rapid reproductive potential, can take advantage of new habitat quite rapidly, as demonstrated by the rapid expansion in range and population size that has occurred in Kansas where substantial patches of native grass CRP have been established (Rodgers and Hoffman 2005). While maintaining existing good habitat is desirable, it is also quite feasible to create new habitat for LEPC and to expect the species to respond rapidly to favorable habitat conditions. A second consideration is that LEPC habitat is not static, even under consistent weather conditions. As discussed previously, LEPC habitat in areas that have received recent disturbance (previous 1-3 years) such as fire or moderate grazing tend to produce greater cover of forbs and associated insects producing good brood habitat (e.g., Jones 2009). After several years, desirable grasses and shrubs recover from the disturbance improving the quality of nesting habitat. Over time, shrub cover may become too dense, reducing grass cover and lowering the quality of the site for both broods and nesting until it again burns or is subjected to another disturbance. Thus, LEPC habitat is dynamic and either natural or prescribed disturbances appropriate to the specific site are important to maintaining LEPC habitat quality. Finally, LEPC habitat can change in quality with weather patterns (Grisham 2012). During drought years grasses may not grow tall enough to provide the desired structure for high quality nesting habitat. Forb production may be reduced by drought, reducing the quality of brood habitat. As these weather patterns vary annual, the quality of a site as LEPC habitat can fluctuate significantly from year to year. While sites with the preferred vegetation composition will always be higher in value to LEPC than sites with less preferred vegetation, the actual quality of the site for nesting or brood rearing is variable. These factors were considered in developing a metric system to quantify development impacts or mitigation benefits to LEPC habitat.

The metric system measures baseline conditions and then quantifies changes to these baseline conditions on an annual basis either after the development occurs or after mitigation practices are applied. Improvements to habitat are considered annually, and are not linked to measures that can fluctuate considerable with weather differences. Thus, while LEPC require good structure of vegetation for nesting, this is not directly measured because it can change substantially from year to year because of weather. Site habitat variables are used that tend to be more consistent through weather patterns, although even these will show some fluctuations with weather patterns. In this way, changes to baseline vegetation conditions can be measured and tracked and used to quantify debits or credits. However, a component of credit generation is achieved through tracking of the implementation of prescriptive management practices that have a proven record of improving LEPC habitat. To receive credit, the application of these practices must be done according to specific requirements for improving LEPC habitat and be part of an overall LEPC management plan for a mitigation site.

As mentioned, because of the dynamics of LEPC habitat, there is a time component to impact and mitigation evaluations. Impacts debits are determined as changes to the baseline score for a duration of time that the impact is present. Credits are created based on protecting a site under a LEPC management agreement as well as by positive changes to the baseline score of an evaluation site due to changes in the plant community at the site or that are produced through the application of management practices over time. Thus, this temporal component (Figure 4) is an important consideration in an LEPC metric system. For this reason, debits and credits are expressed on an annual basis. In this way, a debit or credit is assessed as the value of one acre of LEPC habitat from its baseline score for one year, and will range from 0-1. If perfect habitat (baseline score of 1.0) is impacted by a development this will generate 1 debit for each year that this condition persists. Similarly, if a mitigation program improves a site of 0 baseline value to a 0.5 value for a year, this would produce 0.5 credits for each acre improved.

Quantification of Impacts

Impacts from developments will be assessed both for their direct changes to the quality of LEPC habitat at an impact site and to their indirect effects on avoidance of surrounding areas by LEPC due to the presence of structures or human activities. Impacts from existing structures or activities will be determined and the baseline scores of evaluation sites reduced where existing impacts occur. Impacts of new developments can be minimized by siting developments on or near existing impacts, as the new impacts are quantified based on the baseline conditions including the reductions from the existing impacts. New proposed or implemented impacts will be quantified by reductions to baseline scores of evaluation sites caused by the direct and indirect impacts of the development. Avoidance behavior impacts will be determined based on impact buffers placed around the impact. Buffer distances were recommended by the science team using the best available science (Hagen et al. 2010, 2011), acknowledging that many of these buffer distances lack substantial empirical data, and may need to be adjusted as significant new information becomes available. Table 4 lists the recommended impact buffers.

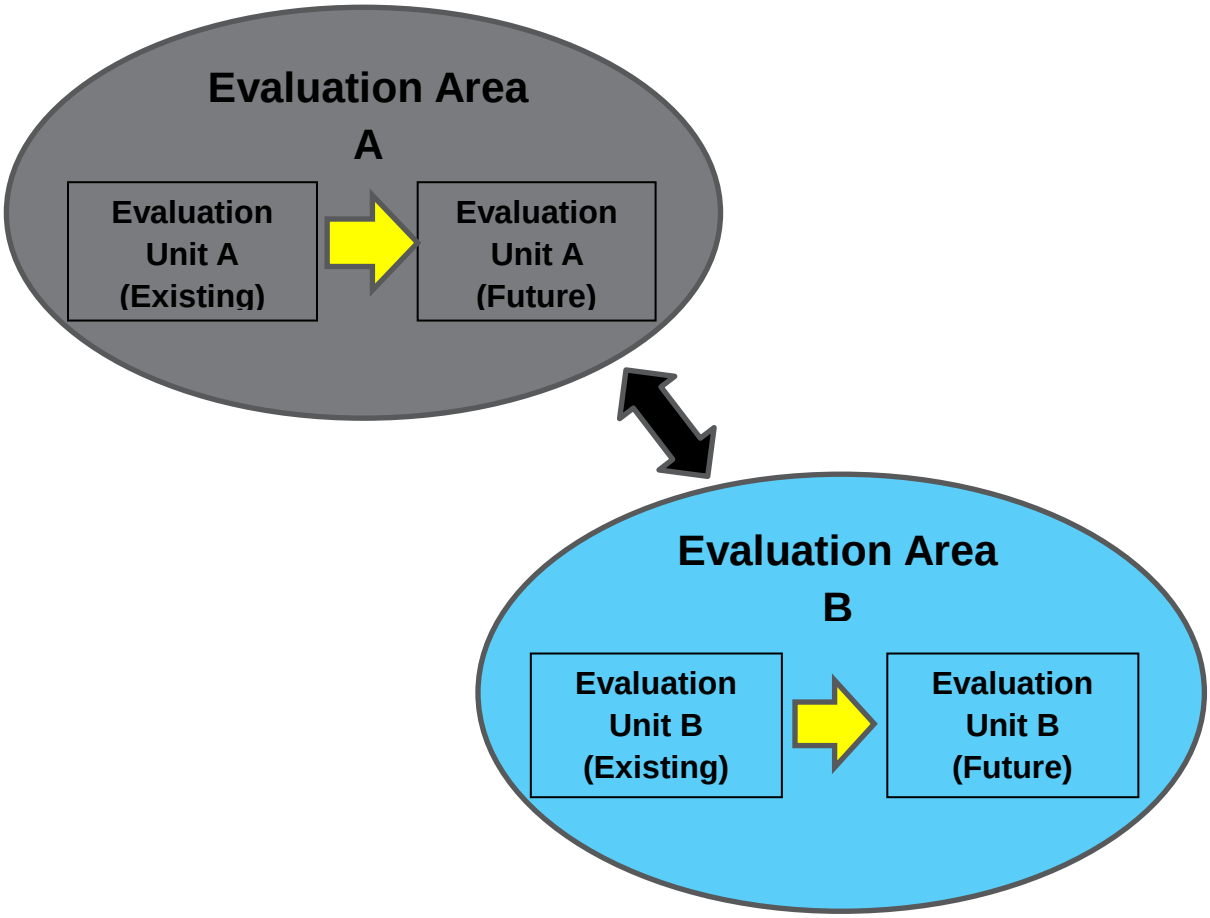

Figure 4. Impact debit and mitigation credit depiction with existing (baseline) conditions and future (resulting) conditions for an impact and mitigation area. (After Haufler and Suring 2011).

Table 4. Recommended impact buffers for human structures and disturbances.

Type of Impact	Buffer distance feet (meters)
Oil and gas pads	984 (300)
Wind farms and towers	3281 (1000)
Transmission lines	1968 (600)
Distribution lines	656 (200)
Tall vertical structures (>99 ft)	3281 (1000)
Gravel roads	328 (100)
Paved roads	2460 (750)
Commercial buildings	3281 (1000)
Residential buildings (houses)	656 (200)

Buffers are applied in three bands, with the total width of a buffer divided into thirds. The first (closest) band to the structure will receive a 100% reduction in the underlying LEPC habitat value, the second band will receive a 67% reduction in habitat value, and the third band will receive a 33% reduction in value. Examples of impact debit calculations are provided in the Mitigation User's Manual (Appendix A).

Impact debits are quantified from both the changes to conditions from the footprint of the development (direct impacts) as well as the decrease in quality of the surrounding area based on the buffer distances in Table 4 (indirect impacts). Impacts debits are assessed for each year that the impact is present. The mitigation system assigns impacts for a minimum of 30 years and considers permanent impacts to be a 100 years for impact debit calculations. If impacts are removed prior to the minimum 30 years (e.g., an oil well only operates for 20 years and then is reclaimed) a credit for the additional 10 years of assessed debits will be issued, and can be applied against another development or traded (sold) in the credit market.

Generation of Credits

Mitigation credits can be generated in several ways. First, ½ of the credits earned from a mitigation site will be the habitat value of the site including the ecological site weighting for the quality of the site for each year that the site is enrolled in a mitigation agreement. More credits will be earned from this habitat condition as the habitat quality of a site is improved through the application of treatments that change the vegetation conditions of the evaluation site. A second way that credits can be generated is by removing an existing development or disturbance. The score of an evaluation site will be lessened by the impact buffers applied around existing developments, and the habitat value decreased by the effect of these buffers. If an existing development is removed, such as removing an oil well and reclaiming the pad and road, the reclaimed area and the area under the impact buffer would contribute credits based on their habitat score. To receive these credits, the site must be entered under a mitigation agreement.

A third way that credits can be generated is by application of approved prescriptive management treatments to an evaluation site. To earn credits through this method, a landowner must enter into at least a 5 year agreement to manage the evaluation site according to a LEPC management plan developed by an approved technical service provider. Entering into a mitigation agreement will earn a landowner an initial signing credit equal to the baseline score of the evaluation unit times the proportional length of the agreement, where a permanent agreement will earn 100%, a 30 year agreement 30%, a 10 year agreement 10%, and a 5 year agreement 5% of the baseline score. Each year that the landowner applies the treatments specified in the LEPC management plan for the unit, the landowner will receive credits according to the scoring of that treatment. The application of management practices comprise up to half of the credits that can be earned from an evaluation site. In this way, up to ½ of the credits from a site are earned by protecting the site and its habitat value for a specified length of an agreement, and the other ½ of the credits are earned for applying practices to the site that will maximize the quality of LEPC habitat. Treatments must follow the guidelines specified for

each specific practice as detailed in the Mitigation User's Manual and as specified in the LEPC management plan for the evaluation site.

Mitigation credits are generated and quantified using equivalent metrics for how debits are calculated with the one difference being that ½ of the credits are generated by implementation of approved management practices that have a strong foundation for their positive effect on LEPC habitat quality. Assigning credits based on implementation of practices provides a practical means of quantifying habitat improvements that avoids the complexities of directly tracking habitat changes that often fluctuate more on an annual basis from differences in weather patterns than as influenced by the management practices. Application of the approved practices according to the guidelines for their use in the LEPC Mitigation system and following an approved LEPC management plan assures that the highest quality habitat is consistently being provided from any property regardless of the weather conditions in any one year. Further, tracking the implementation of practices is far less cumbersome than detailed measurements of vegetation changes that would need to occur annually within each unit and measure a substantial number of plots to account for variability in a unit. Vegetation monitoring of each unit is part of the mitigation system but is designed to monitor the long-term trends and to provide data to adjust the vegetation parameters in the baseline evaluation scores such as overall composition of preferred species of plants in the site rather than changes to such parameters as grass heights or forb cover values that fluctuate annually.

A final way that credits can be generated is by converting non-habitat areas such as agricultural fields to native grassland by seeding these areas and maintaining them as grasslands. CRP has been an effective program of the FSA in doing this in parts of LEPC range, particularly in Kansas where native warm season grasses were emphasized in the seed mixtures. LEPC populations have responded very well in these areas. The mitigation system provides credits for implementing similar practices. This will put into place a system for reversing the impacts of agricultural fragmentation in key locations, and provide a system that can extend CRP or replace it should it not be authorized in the future. Credits are generated for seeding an area to native grasses as well as for maintaining these areas as grasslands. Credits are also generated in such conversions by the changes created to the baseline conditions and then maintaining the improved conditions over time.

Vegetation Monitoring for the Mitigation Framework

Vegetation monitoring, as indicated above, is required as part of the impact/mitigation tracking system. The vegetation monitoring required for the NRCS LPCI program is the minimum vegetation sampling required for mitigation monitoring. More detailed monitoring including detailed species compositions, vegetation heights, and similar measures of a site are encouraged. For impact assessment, an evaluation site must have a baseline sampling of vegetation conditions to document the habitat score of the site. Repeated sampling over time is not needed, as the impacts are assessed upfront based on the baseline conditions of the site. For credit generation, periodic monitoring of vegetation conditions will be required, but not necessarily on an annual basis. To earn credits for improved vegetation

conditions, repeat sampling must occur to document these changes. Sampling at intervals of 3-5 years may be sufficient to document the beneficial response to the LEPC management applied to the site.

CHAT Category Weightings for Debits and Credits

Impact debits and mitigation credits are further weighted based on their location within CHAT categories. The more important a location to LEPC population goals the higher its weighting and the more debits or credits that the location generates. This encourages development to locate in areas of lower importance to LEPC (thus generating fewer or even zero debits) and encourages mitigation to occur in higher quality areas by generating more credits for conducting the same habitat improvements in these areas than in areas of lower importance to population distributions. In addition, debits are weighted at twice the weight of credits, creating a 2:1 mitigation: impact ratio. This ratio is needed for several reasons. First, the current population size estimated in 2012 was approximately 37,000 birds while the desired population goal is 67,000 birds, almost a 2:1 desired increase. For this increase to occur, habitat quality must double, especially in key population areas, and the 2:1 mitigation to impact ratio reflects this need. Second, mitigation must generate a benefit to the species if it is to provide a foundation for mitigation tools such as CCAA's, VOP's, or HCP's. The 2:1 ratio assures that a benefit to the species is being produced. Third, some credits are generated by providing assurances that existing LEPC habitat will be maintained for the long-term. This is important to providing certainty that such high quality areas will exist and provide known source locations for future populations. However, these areas are maintaining habitat quality but not increasing habitat quality. Requiring a 2:1 ratio assures that LEPC populations will be attaining an overall gain in long-term population certainty. Finally, mitigation programs must generate improvements to the species to justify the financial and personnel commitments to administer the programs. If credits only match debits, then the monies and efforts expended to simply balance habitat gains and losses might be better applied to efforts to improve habitat, but with the 2:1 ratio, improvements to LEPC habitat are provided.

The recommended weightings of the different CHAT categories are listed in Table 5.

Table 5. Weightings of impact debits and mitigation credits for LEPC categories from the Southern Great Plains Crucial Habitat Assessment Tool.

CHAT Category	CHAT Name	Impact Multiplier	Mitigation Multiplier
1	Focal area	10	5
2	Connectivity zones	6	3
3	Leks and Maxent	5	2.5
4	Maxent	3	1.5
5	Within EOR	2	1
6	Common	0	0

Opportunities for Application of the Mitigation System

The mitigation metrics and their weightings within different CHAT categories provide a foundation and operational guidelines for evaluating impacts and commensurate mitigation benefits. This system can provide the needed assurances that benefits will be provided to LEPC through mitigation actions designed to offset impacts to LEPC. Various possible applications or tools are available or proposed for its application. It should be noted that landowner incentive programs and the mitigation credit program both provide opportunities for landowners to receive technical and financial support for conducting improvements to LEPC habitat. Enrollment in mitigation credit programs are likely to provide a greater financial return to landowners, but will also have greater expectations for actions for LEPC. Landowners that receive payments from federal incentive programs for LEPC cannot receive credits for those practices or improvements, if those credits are compensation as part of a development CCAA or HCP.

From the mitigation side of the equation, off-site mitigation can provide offsets to impacts in a number of ways. As presently proposed, mitigation offsets are voluntary programs whose benefits can be quantified through application of the metrics to document benefits being provided to LEPC. For some applications (CCAA's, HCP's) companies are provided assurances that they can continue to operate as they propose at present in exchange for their voluntary actions to improve LEPC habitat. The metric system provides a way to demonstrate that the desired conservation benefits of such agreements are being produced. On the credit side, various programs may be developed to provide credits and thus benefits to LEPC. These will require the ability to track debit and credit generation to assure that mitigation benefits are produced according to the mitigation guidelines. Programs may seek a recognized credit-trading framework or may develop formal conservation bank(s) for LEPC.

One use of the mitigation system is for companies or other developers to use the metrics to conduct mitigation activities on their own property or to directly work with other landowners to improve LEPC habitat and to document that the mitigation actions they are applying are creating sufficient mitigation credits to offset the impacts they have incurred through their development activities. The metrics provide the tool to measure and track these actions and to document to others that desired mitigation benefits have been produced. In this way, companies have the option of creating their own mitigation "market" through application of the mitigation system.

Creation of two separate mitigation trading markets is envisioned through use of the mitigation system. It is desirable to have some mitigation actions occurring as permanent activities at known locations. The establishment of strongholds, discussed below, emphasizes these types of locations although with even further stipulations concerning sizes and locations. To create this market, at least 25% of the impact debits created by developments must be offset in permanent credits. Initial signup credits will be earned for the baseline credits present at the mitigation site. A second market (up to 75% of the debits) will be for shorter term agreements. A minimum 5 year agreement is required to enter the short-term mitigation market. As discussed above, the initial "signing" bonus provides credits based on the length of the agreement, with a 10 year agreement receiving 10% of the baseline credits under the short-term market. Because the two markets operate under different requirements for debits to

be matched with credits, it is expected that the permanent market will have credits of significantly greater value than the short term market.

Split estates are a recognized problem. Where possible, especially for permanent agreements, it is desirable to have both surface and mineral rights included in the agreement. Where only surface rights are available, an arrangement will be needed to address the possibility of the mineral owner exercising their development rights.

Application of the metric system can occur through voluntary offset programs or more formal CCAA's or HCP's. Various oil and gas interests are working on a CCAA.

Multistate CCAA

WAFWA is discussing how it can serve as the permit holder for a multistate CCAA that could be used by oil and gas and other potential developers operating within LECP range. WAFWA would administer the oversight of the mitigation framework, and would issue certificates of inclusion to companies that meet the CCAA requirements. Requirements for inclusion in the CCAA would be adherence to a set of BMP's applicable to operations within LEPC range as specified in the CI and application of the mitigation system. An upfront creation of credits associated with an issuance of a certificate of inclusion could then be used as to create initial credits. As specific developments are then implemented, they would be assessed for their additional debits that will continue to provide for a positive benefit for LEPC. Similarly, wind energy and transmission impacts could be developed though similar instruments. The following are conservation measures that are anticipated for issuance of a certificate of inclusion.

Development practices that result in habitat fragmentation must consider a thorough pre-project planning analysis, and to the maximum extent practical avoid, minimize and mitigate impacts to LEPCs and their habitat.

Pre-project planning

1. Utilize the Southern Great Plains CHAT for initial project siting review.
2. Once a set of potential project sites are identified, developers are encouraged to contact State Fish and Wildlife Agency staff for more detailed information to assess the potential impacts to LEPC habitat associated with each site.
3. If surveys of proposed project sites have not been conducted within the previous three years, and the project sites are within a habitat focal areas, connectivity zones, or within areas identified as high probability lek habitat based on the SGP-CHAT, the developer has the option of conducting surveys themselves according to State Fish and Wildlife Agency protocols, allowing agencies to conduct surveys of the site prior to project initiation, or considering the sites as occupied with active leks.

Avoidance

1. Where practical, avoid fragmenting large, contiguous tracts of grassland, particularly within designated LEPC focal areas, connectivity zones, or within 1.2 miles of known leks that have been active at least once within the previous 5 years.
2. Where practical, focus development on lands already altered or cultivated (such as row-crop agriculture or developed oilfields), and away from areas of intact and healthy native grasslands. Select fragmented or degraded habitats over relatively intact areas, and select sites with lower LEPC habitat potential over sites with greater habitat potential.
3. Avoid non-emergency construction and maintenance activities during lekking, nesting, and brooding season (Mar 1–Jul 15) between the hours of 3:00am and 9:00 am within 1.2 miles of leks recorded active within the previous 5 years. These restrictions will not apply to routine around-the-clock operations designed to operate in the absence of a human presence.

Minimization

1. To the maximum extent practical, minimize roads, fences, power lines, well pad size, and other infrastructure within focal areas, connectivity zones, or in other areas identified as high probability lek and nest habitat by the CHAT. Utilize common rights of way for multiple types of infrastructure where practical. Utilize alternative development techniques such as horizontal drilling, pad drilling, and common tank batteries where practical with regulatory approval to minimize new surface disturbance.
2. Where possible, install appropriate fence markings along new fences within one quarter (1/4) mile of a leks that have be recorded as active within the previous five years
3. Where possible, utilize mono-pole construction for new electrical transmission lines to minimize visual impacts within the estimated occupied range (EOR) and 10 miles outside of that range.
4. Install raptor deterrents on electrical distribution and transmission poles as indicated by Avian Power Line Interaction Committee (APLIC) Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 2006
5. Minimize both the amount of construction as well as construction activities during lekking, nesting, and brooding season (Mar 1–Jul 15) within focal areas, and areas identified as high probability lek habitat.
6. Where possible, noise abatement should occur, year-round, for new facilities located within focal areas or within 1.2 miles of a lek recorded as active within the previous 10 years. Noise from these new facilities shall not exceed 75 db when measured at the Participant's property line or any point greater than 30 meters from the facility boundary.
7. Minimize traffic volume, control vehicle speed, control access where feasible, and prohibit off-road travel within focal areas and areas identified as high probability lek and nest habitat by the CHAT.
8. Bury new distribution power lines that are planned within 1.2 miles of leks active within the previous 5 years.
9. Where possible, reclaim or remediate inactive or abandoned facilities under your control in compliance with applicable state rules and regulations. Reclamation activities may include removal

of equipment, well pads, roads, overhead power lines, etc. unless it conflicts with an agreement with the landowner.

10. Provide escape ramps, rafts or ladders, depending on configuration, in exposed, manmade water containment sources.

Conservation offsets (Mitigation)

The developer will coordinate as needed with WAFWA, State Fish and Wildlife Agency Staff, or other mitigation and conservation delivery providers to assess impacts debits in accordance with the User's Manual (Appendix A). The default impact duration for these assessments is thirty (30) years, but the developer may specify longer or shorter impact durations for the assessment. If impacts are shorter than the duration assessed, remaining impact units may be transferred to other impacts. However, if the impacts are longer than the duration assessed, the developer may be liable for take if the species is classified as threatened or endangered and will be responsible for contacting a mitigation and conservation delivery provider to address those impacts. Once impact debits and fees are assessed and paid, the developer will be provided the appropriate documentation to proceed with development.

Establishing Strongholds

The USFWS (2012b) indicated the desirability of establishing voluntary LEPC strongholds. As discussed, strongholds are areas of high quality habitat at least 25,000 acres in size with conservation easements that ensure their continued management for LEPC. The USFWS (2012b) indicated that one or more strongholds totaling at least 25,000-50,000 acres should be established in each ecoregion. Establishment of these voluntary strongholds as a subset of focal areas would help provide certainty for the continued persistence of LEPC.

A number of strongholds already exist in New Mexico. These are described below:

Stronghold Area #1 consists of 19,150 acres owned and managed by the Grasslands Charitable Foundation (the Weaver Ranch) and eight Prairie Chicken Areas (PCAs) Managed by the New Mexico Department of Game and Fish. The PCAs total 8,455 acres. Total area in Conservation #1 is 27,605 acres. The BLM manages 19,355 of federal mineral estate, and of that number, 11,326 acres are closed to future oil and gas leasing. Federal leases (8,029 acres) that expire will not be re-offered and the remainder of the federal mineral estate is closed to future leasing.

Stronghold Area #2 consists of 27,966 acres owned and managed by the Nature Conservancy and seven Prairie Chicken Areas (PCAs) Managed by the New Mexico Department of Game and Fish. The PCAs total 12,717 acres. Total area in Conservation #2 is 40,683 acres. The BLM manages 19,736 acres of federal mineral estate, and of that number, 13,676 acres are closed to future oil and gas leasing. Federal leases (6,060 acres) that expire will not be re-offered and the remainder of the federal mineral estate is closed to future leasing.

Stronghold Area #3 (Gallinas Wells) consists of 4,727 acres in 10 Prairie Chicken Areas (PCAs) Managed by the New Mexico Department of Game and Fish. The BLM manages 4,249 of federal mineral estate and of that number, 3,251 areas are closed to future oil and gas leasing. Federal leases (998 acres)

that expire will not be re-offered and the remainder of the federal mineral estate is closed to future leasing.

Stronghold Area #4 is the BLM's Lesser Prairie-Chicken Area of Critical Environmental Concern (ACEC). The ACEC contains approximately 55,000 acres of public land. The management goal of the ACEC is to protect the biological qualities of the area with emphasis on preservation of the LEPC habitat. The ACEC is closed to future oil and gas, has no authorized livestock grazing, and off-highway vehicle use is limited to existing roads and trails.

Stronghold Area #5 is the BLM's Mescalero Sands ACEC, consisting of nearly 8,000 acres of public land. The management goal of the ACEC is to protect the biological qualities of the area with emphasis on preservation of the LEPC habitat. The ACEC is closed to future oil and gas, closed to off-highway vehicle use, and has no authorized livestock grazing.

In Kansas, a partial stronghold has been identified. TNC owns the Smokey Valley Ranch, and has dedicated much of this ranch to LEPC habitat in perpetuity. Presently, 8,600 acres of the 17,000 ranch would qualify. Efforts to expand the committed acres in this area to further build this stronghold are being pursued.

Oklahoma may be able to build a stronghold around one of its wildlife management areas in the center of LEPC range. This possibility is being explored.

Monitoring and Adaptive Management

The range wide aerial survey of LEPC discussed in the population status section is planned to continue. Al 5 states have the intention of continuing this monitoring assuming availability of funding. It is conducted range-wide using a standard method so it provides a consistent survey of LEPC status throughout the occupied range. This survey will provide both population estimates on an annual basis as well as good population trend information, so will be an excellent monitoring tool for the overall status of LEPC populations. In addition, comparisons of the amounts of LEPC habitat improvement work conducted within the 15 by 15 km. survey blocks will provide an assessment of LEPC population responses to these cumulative practices.

NRCS in cooperation with several universities is evaluating both vegetation and LEPC population responses to practices implemented as part of the LPCI. Vegetation monitoring is being conducted by participants in the LPCI, and while not greatly detailed, will provide good information on basic plant community responses to various LPCI practices. In addition, LEPC telemetry studies of selected populations will allow for analysis of responses of these populations to management practices and other factors.

Monitoring will be required as a component of the credit generation of the mitigation framework. Each evaluation site enrolled in an agreement will have repeated monitoring of the site as well as a history of the management practices applied to the site. With numerous sites enrolled in the program, a substantial database should be developed that will allow a rigorous evaluation of LEPC habitat

responses to management practices across a number of ecological sites of importance to LEPC. A more specific monitoring program and protocols will be developed as part of the mitigation framework with monitoring expectations specified for credit generators.

Various components of LEPC ecology remain poorly documented by empirical data. As mentioned, LEPC avoidance of human structures and activities has relatively little empirical data for determining impact buffers. Various on-going research projects should provide additional information on these questions. Questions remain about densities of LEPC in habitat conditions of varying quality. Questions also remain about the effectiveness of different sizes of LEPC habitat blocks and their habitat quality in relation to sustainability of LEPC populations. Even broader questions remain including how will climate change affect LEPC? Will its primary effects be from increased temperatures, decreased annual precipitation, prolonged droughts, or increased storm intensities during critical times of the year? Movement capabilities and habitat characteristics that support movements through connectivity zones are very poorly understood. These and many other questions need additional research.

As new information becomes available, this plan will need to be modified. When substantial new information on a specific component of the plan becomes available, that part of the plan should be adjusted to incorporate the new findings. The entire plan should be reviewed every 5 years. During that review, a plan revision should be discussed, and the plan revised based on this assessment of needed changes. It should be noted, however, that agreements made as part of the mitigation framework for debit or credit determination or for landowner CCAA's will not change if changes are made to these programs in the future. Rather, existing agreements will be grandfathered while new agreements will be established according to the new criteria.

CONSERVATION STRATEGY SUMMARY AND THREAT REDUCTION ASSESSMENT

The above conservation strategy is designed to provide LEPC the habitat needed to maintain the population with good numbers and distribution of birds. The greatest need is for habitat quality to be improved within sizable blocks of habitat well distributed throughout LEPC range. The habitat improvement component of the conservation strategy is designed to do this. While increased focus on LEPC on Federal lands might be enhanced through listing of the species, these lands already have LEPC as a high priority, and with the exception of NM, represent such a small part of the land base as to be a minor contributor to the habitat needs of the species. All existing programs have been coordinated to provide focused delivery of habitat improvements through landowner assistance and incentive programs. These programs can only be encouraged through voluntary programs, with economic incentives being a primary tool to effect change. The effectiveness of these programs is felt to be maximized when landowners perceive any potential negative consequences of their actions to their legitimate land uses to be minimized, the condition that would exist with the species remaining unlisted under the ESA.

The second component of the conservation strategy is designed to avoid, minimize, and mitigation new impacts to LEPC. The designation of focal areas and other CHAT categories highlights to development companies the areas where impacts to LEPC will be greatest and thus avoided, as well as areas where developments can occur with no or low levels of impacts to LEPC. By engaging most or substantial numbers of developers in conservation tools such as CCAA's, developers will be provided with greater certainty that their developments in appropriate locations can proceed, while developments that occur within LEPC areas will use practices that minimize their impacts and provide for replacement of their impacts through mitigation. The effectiveness of these programs will depend on the level of engagement of development companies in either these formal agreements or in equivalent voluntary offset programs.

The USFWS (2012a) presented its evaluation of the PECE criteria for listing. In this proposed rule it stated "The primary factors supporting the proposed threatened status for lesser prairie-chicken are the historical, ongoing, and probable future impacts of cumulative habitat loss and fragmentation. These impacts are the result of: conversion of grasslands to agricultural uses; encroachment by invasive woody plants; wind energy development; petroleum production; and presence of roads and manmade vertical structures including towers, utility lines, fences, turbines, wells, and buildings." The conservation strategy applies incentive programs to improve LEPC habitat on private lands and to encourage conversion of agricultural lands back to native grasslands. It accomplishes this both through voluntary landowner incentive programs as well as through the ability for landowners to engage in mitigation programs where incentives are provided through the purchase of mitigation credits that the landowner can generate. Similarly, the conservation strategy emphasizes the restoration of LEPC habitat that has been invaded by woody plants through both the voluntary incentive programs and the mitigation system. Impacts and fragmentation from developments are addressed through the various conservation tools such as CCAA's, HCP's, and VOP's, and the effectiveness of these programs is promoted and measured through the mitigation system. In summary, the conservation strategy is designed to improve conditions created by past changes to LEPC habitat, and to reduce or eliminate future threats to the species. Below is how specific threats will be addressed through application of this conservation strategy.

Agricultural Conversion

Landowners convert lands to agricultural production for a real or perceived economic advantage for doing so. The conservation strategy in this plan offers landowners various programs to prevent these conversions and to reverse this trend through reestablishment of native grasslands. Providing landowners with technical assistance and economic incentives to maintain or restore native grass and shrublands is the solution. Various voluntary incentive programs have been documented including LPCI, GRP, WHIP, state incentive programs, CRP, SAFE and others. All of these offer landowners economic benefits for maintaining native grass and shrublands or to convert current agricultural fields back to native grasslands. The strategy encourages maintaining and restoring large blocks of LEPC habitat by coordinating efforts to enhance LEPC habitat improvements in focal areas, connectivity zones,

and other areas of high value to the species. Additional points for enrollment of lands occurring in important areas are being incorporated into program selection processes. Agencies and organizations are coordinating efforts to provide one-stop-shopping from any technical service provider to make is as easy for landowner engagement as possible. Stacking of programs within these areas allows for maximization of economic benefits for landowners.

In addition the mitigation framework provides willing landowners with an even greater incentive to maintain native grass or shrublands or restore native grasslands through the credit market. The structure of the credit system provides landowners with economic return for enrolling their lands into a LEPC mitigation agreement. These agreements will maintain and improve habitat for LEPC for varying lengths of time, with at least 25% of the credits applied to permanent conservation sites. The strategy specifically rewards landowners in the most important areas by multiplying credits earned in these areas so as to stimulate the establishment of large blocks of quality habitat. No better solution exists to counter the threat of agricultural conversions than the combined voluntary incentive program and mitigation framework program.

Livestock Grazing

Grazing, as discussed previously, is a land use practice that is compatible with LEPC habitat, but that can reduce the quality of habitat, especially nesting habitat if not applied with LEPC habitat needs in mind. The same programs identified above for addressing conversion of agricultural lands also provide the opportunity for incentives to landowners to incorporate LEPC habitat considerations into their grazing regimes. The voluntary incentive programs provide financial compensation to landowners for adjusting their grazing plans to accommodate LEPC habitat needs. Enrolling lands in a mitigation agreement provides further opportunities to offer landowners additional compensation for improving LEPC habitat. Guidelines for grazing programs used in a mitigation framework are provided in the User's Manual (Appendix A). These voluntary approaches to addressing grazing threats to LEPC are the only effective ways of engaging landowners in making any needed adjustments to their grazing regimes to improve LEPC habitat.

Shrub Control and Eradication

As discussed previously, herbicide application designed to reduce amounts of sand sagebrush will have detrimental effects on LEPC habitat. Similarly, widespread application of tebuthiuron to control sand shinnery oak will be detrimental to LEPC habitat, however limited use of this herbicide at lower application rates can help restore over-grazed shinnery oak to desired reference community conditions (Haukos 2011). Recommended guidelines for use of herbicides in shinnery oak ecosystems are provided in the User's Manual (Appendix A). Haukos (2011) indicated that without government subsidies chemical control of sand shinnery oak was not cost effective in terms of increases in grass production and associated weight gains by cattle in sand shinnery oak at current cattle prices. Government subsidies to private lands of widespread application of tebuthiuron in LEPC range should stop, and agency use of this practice on public lands within LEPC range should cease. Use of herbicides

to improve LEPC habitat according to a LEPC management plan and following recommended guidelines will allow for benefits to both LEPC habitat and rangeland conditions, where appropriate. Providing voluntary incentive programs for such programs is an appropriate approach. More importantly, encouraging the use of appropriate prescribed grazing and prescribed burning programs that improve and maintain LEPC habitat are included in both the voluntary incentive programs for landowners as well as the mitigation framework. Both of these programs provide technical and financial assistance to landowners for applying these management practices, with an expanded financial compensation for landowners engaging in a mitigation agreement. Further demonstrations of the benefits of these types of management can help change the perception of the benefits of widespread herbicide use.

Altered Fire Regimes and Invasion of Woody Plants

Increasing recognition and public knowledge of the important role that fire played historically in LEPC habitat and in maintaining productive sand shinnery oak, sand sagebrush, and mixed grass ecosystems are needed. Providing training and assistance in use of prescribed burning and increasing landowner assurances through cooperative burn associations and provision of appropriate liability insurance options would decrease fears of use of this practice. Cooperative efforts identified previously within each state are providing technical assistance from agencies, organizations, and universities to prescribed grazing associations and landowners in proper use of prescribed burning programs. Both the voluntary incentive programs and the mitigation framework provide technical and financial support for application of prescribed burning to improve LEPC habitat. Technical and financial assistance for mechanically controlling redcedar or mesquite where it has invaded to such an extent that burning may not be feasible with current conditions are also provided through these programs. Through these programs appropriate uses of prescribed burning and mechanical brush control can be applied to reverse the invasions of woody species and return fire to these ecosystems. As with livestock grazing, only voluntary incentive-based programs will be effective in expanding practices that address the threats of altered fire regimes and invasion of woody plants, as landowners have the right to management their lands according to their needs and desires.

Wind Power and Energy Transmission

The obvious solution to the threats of wind energy and transmission line development on LEPC populations is to encourage placement of these developments in areas that can avoid impacts and where this isn't possible, to use practices that minimize the impacts. Where impacts are unavoidable they can be mitigated through off-site habitat improvements to offset the effects on LEPC populations. Engagement of industry in programs or initiatives that will allow for needed expansion of this renewable energy source while balancing this need with those of LEPC populations can reduce this threat. The mitigation framework provides an effective approach to accomplish this. Wind energy companies have expressed an interest in developing an HCP that would include LEPC. The HCP would strive to avoid impacts and where they can't be avoided to minimize these impacts. The mitigation framework further provides the opportunity for off-site habitat improvement to compensate for any impacts to LEPC habitat that do occur. This program is voluntary, but the level of interest shown by the wind

energy industry indicates a serious intent to address the concerns over threats of wind energy development on LEPC.

Similarly, energy transmission companies have expressed an interest in working towards mutual solutions to avoiding, minimizing, and compensating for impacts associated with new transmission projects. Voluntary offset programs supported by OGE in OK are a good example. While a specific CCAA or HCP have not been developed at this time, a clear interest in such tools has been expressed.

Petroleum Production

The ability for regulatory control on oil and gas developments varies with the ownership of mineral rights as well as among the states. Where the Federal government owns mineral rights, such as in substantial areas in New Mexico, it can incorporate LEPC needs into its leasing agreements as the BLM programs discussed above have done. Some states have the ability to regulate densities of wells if they fall into critical areas for species like LEPC, while other states lack this ability.

The solution with the greatest potential is to engage the oil and gas industry into programs or initiatives that can accommodate their needs for development and production while addressing the needs of LEPC. Development of the CCAA discussed above by oil and gas companies and associations in cooperation with WAFWA and other partners is on-going.

Climate Change

The challenges of addressing climate change are far beyond this LEPC plan. However, there are actions that can be taken to minimize climate change threats to LEPC populations. Maintaining high quality habitat will ensure that populations will be robust and best able to respond to local extreme weather events. Reducing potential fragmentation of LEPC habitats will allow for movements and shifts of LEPC populations. Recent expansions of LEPC in KS are an example of the ability of the species to move to new favorable environments. Should climate change require shifts in populations, maintaining connectivity zones that allow for movements will be important. The establishment of focal areas and the concerted efforts to provide high quality habitat in these areas coupled with the designation of connectivity zones and the management of these areas to allow movement and dispersal of LEPC are the best strategy available for addressing climate change. This strategy is consistent with the recommendations of the National Fish, Wildlife, and Plants Climate Change Strategy.

Solutions to Collision Mortality

Minimizing the presence of collision mortality factors, principally distribution lines and fences in close proximity to leks where LEPC may concentrate will reduce the threat of this mortality. Marking of fences that do occur near leks is another possible solution. Providing landowners with technical and financial assistance to remove fences in high risk areas or helping provide marking of fences can reduce this threat. Provisions for fence removal and fence marking are included in both voluntary incentive programs for landowners and in the mitigation framework.

Habitat Loss and Fragmentation

Restoring, enhancing, and maintaining high quality patches of LEPC habitat that are of adequate sizes, numbers, and distributions to provide population source areas and population movement capabilities to withstand periodic unfavorable weather and other conditions are the cumulative goal of this conservation strategy. Focal areas are designed to provide the needed habitat patches of sufficient size, quality, and distribution to provide the habitat needed for a sustainable LEPC population throughout the 4 ecoregions. The landowner incentive program and mitigation framework provide the tools to improve habitat quality in these areas, while the mitigation framework also engages development interests in avoiding and minimizing development in these areas by providing them with assurances for future development actions. Connectivity zones will enhance movement capabilities among focal areas through the same incentive and avoidance programs. These programs provide the best solutions to the concerns for loss, degradation, and fragmentation of LEPC habitat. Focal areas will provide areas of high quality habitat that will support populations with the best opportunities for high reproduction and survival rates and should serve as source areas for demographic support to surrounding habitat patches and for movements of birds into new areas. While weather events will still have an influence on actual reproduction and survival rates, the proposed plan provides the best solutions to addressing droughts and other extreme weather events.

Additional Management Actions

Recognition and rewarding exceptional LEPC management programs has been identified as an additional action to further enhance landowner and industry engagement in LEPC conservation. Both a landowner and industry reward program have been suggested. Specifics still need to be identified.

ON-GOING OR PLANNED ADDITIONAL ACTION STEPS

To be added later, as appropriate

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APPENDICES