Habitat Evaluation Guide for the Lesser Prairie-chicken

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Introduction

Oklahoma is home to two species of prairie-chickens: the greater prairie-chicken (*Tympanuchus cupido*) and the lesser prairie-chicken (*Tympanuchus pallidicinctus*). Prairie chickens are the only two species of grouse found in Oklahoma. The greater prairie-chicken is found in the tallgrass areas of northeastern Oklahoma, while the more uncommon lesser prairie-chicken is found in the northwestern portion of the state including the panhandle. Lesser prairie-chickens (LPC) occur in shortgrass and mixed grass prairies, sand shinnery grasslands and sand sagebrush grasslands (4). Historically, the LPC was common throughout the western third of Oklahoma (4). They depend on large expanses of native prairie that have periodic disturbances such as fire and grazing. However, since the land run and settlement of the 1890s, most high-quality LPC habitat has been lost because of the conversion of prairies and shrublands (kinds of rangeland) to cropland, introduced pasture and development (6, 35, 41). As recently as 1963, the range of the LPC included 12 northwestern Oklahoma counties (4). Presently, the LPC inhabits Beaver, Ellis, Harper, Texas, Woods and Woodward counties (3, 41). LPCs can occasionally be found in Cimarron, Roger Mills and Dewey counties. The LPC also occurs in portions of Kansas, Texas, Colorado and New Mexico (Figure 1).

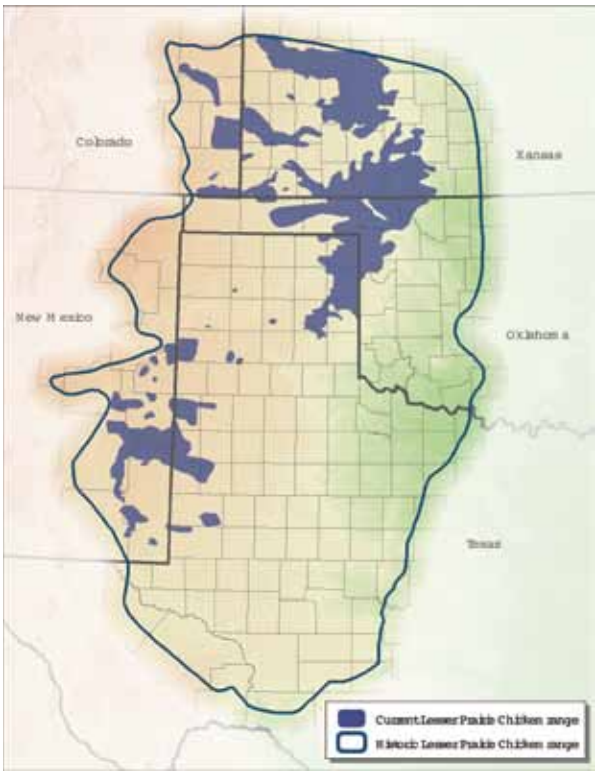

Figure 1. Historic and current range of the lesser prairie-chicken. Populations are becoming increasingly isolated. (Map developed by Lesser Prairie-chicken Interstate Working Group)

The LPC is classified as a game bird in Oklahoma, although the hunting season has been closed since 1997. Minimum population criteria have been set that, if attained, would make provisions for reopening the hunting season. This could potentially provide financial incentives to landowners. In response to a 1995 petition to list the species as federally threatened under the Endangered Species Act (ESA), the U.S. Fish and Wildlife Service (USFWS) determined it was "warranted, but precluded from listing" (46). This means the species could be listed under the ESA but higher priorities prevent it at the time. The species is re-evaluated each year by the USFWS to determine the current status. It is currently listed as a sensitive (rare) species on U.S. Forest Service National Grasslands in western Oklahoma and has also been state listed as threatened in neighboring Colorado since 1973 (14). The LPC's range has decreased greater than 90 percent rangewide since the 1800s, and their numbers have decreased accordingly (5, 14, 18, 41).

While direct habitat loss to agriculture has been the greatest long-term factor in LPC decline (Figure 2), remaining populations are threatened by ongoing degradation of their rangeland habitat (11). Tree invasion and tree planting, long-term fire suppression, and improper cattle grazing management are among the greatest threats to remaining LPC populations. Other impacts such as spraying herbicides for shrub or weed (forb) control, oil and gas development, wind development, fences and utility lines also contribute to the deterioration of LPC habitat (14, 24, 37, 43, 45).

Life History

Adult LPCs average 15 inches to 16 inches in length (22). They have a feather pattern of crosswise bars of brown, buff, blackish and white coloration (4). Elongated "ear" feathers called pinnae, erected during mating displays, are located on the neck. Below the pinnae, the males have reddish, featherless areas of skin called gular air sacs (these are orange on the greater prairie-chicken), which are inflated during mating

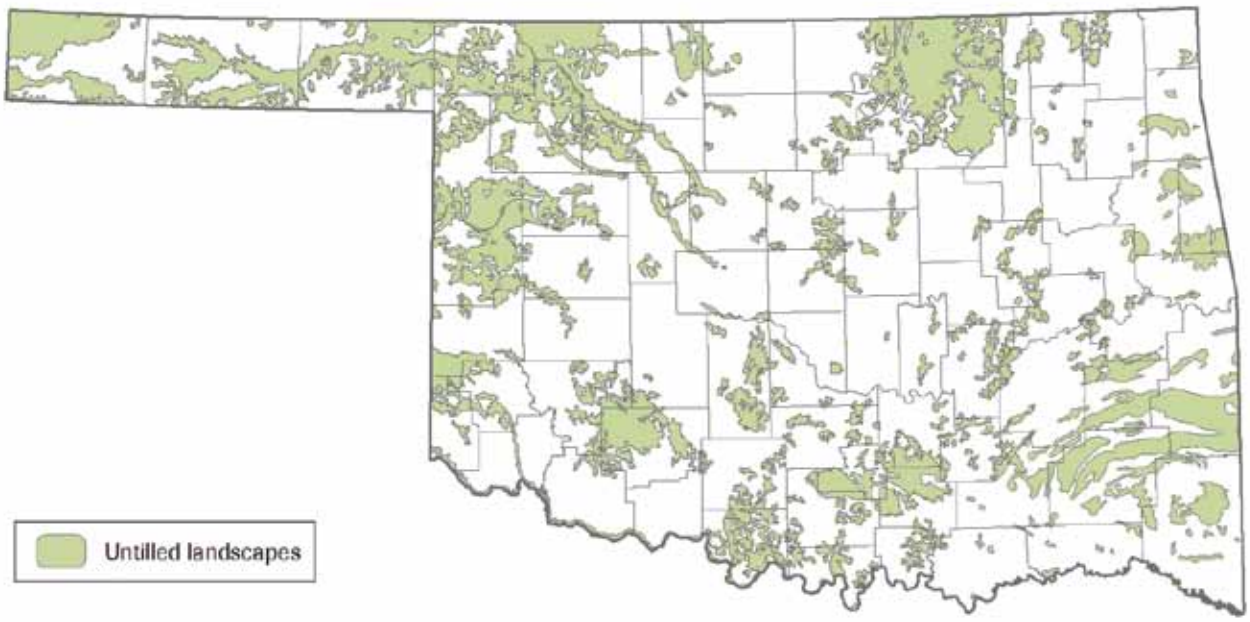

Figure 2. Few large untilled areas of rangeland remain in Oklahoma. Prairie-chickens persist in these few areas. (Wayne Ostlie and Chris Hise, The Nature Conservancy, 2005)

displays. In addition to pinnae and air sacs, the LPC has a conspicuous bright yellow comb above each eye (4, 22, 40). Eye combs, like many other secondary sexual characteristics, are most prominent on males.

As with many other grouse, mating displays of males are conducted on leks. Specifically, LPC leks are called gobbling grounds because of the characteristic sounds males make. Leks are typically located on elevated, open areas where grassland vegetation is short, visibility is good, and calls (gobbling) can be heard for a mile or more (4, 8, 41). When available, prairie dog towns are sometimes used as lek sites. Males concentrate on these communal display grounds to compete for females. The most desirable territories are in the central part of the lek and are usually held by dominant, older males (4, 41). Younger males usually defend territories toward the edges of the lek or nearby satellite leks. Most females visiting the gobbling grounds attempt to mate with dominant males that hold central territories. The males advertise their territory by putting on a gobbling display. This behavior is exhibited mainly in spring, but can occur year-round. Activity increases beginning in February, and the number birds on the courtship ground peaks the last two weeks of March and the first two weeks of April.

During the display, males erect their long feathers on their neck (pinnae), inflate air sacs along their throat, drop their wings, stamp their feet, and make a unique, high-pitched gobble (4, 16, 22, 36). Often, two males will face off and gobble in a fast tempo. Also, short vertical flights, called flutterjumps, and cackling are performed between gobbling (22). When in the presence of a female, the male may perform a bow with wings spread, pinnae erect, and bill lowered to the ground (4). The hen usually visits two or three different gobbling grounds before she finally mates (4, 41). After mating, the hen selects a nest site to lay and incubate the eggs, usually within a mile of a gobbling ground (7, 13, 28, 32). In Oklahoma, LPC nests are found in upland prairies and shrublands with no trees for long distances (4, 41). LPC generally avoid creeks, rivers, and other low topography that reduces visibility and may contain high predator levels. Nesting habitat is made up of low stature shrub cover, high grass and forb cover, and is interspersed with patches of short vegetation.

Normal clutch size is 11 to 14 eggs (4, 41). The eggs are grayish-olive, buffy-plain, or rarely spotted (1). Nests are slight excavations in well-drained soils and are lined with grasses and feathers (4, 41). The incubation period ranges from 23 to 28 days, but typically lasts 25 days (39). The hen will lead her brood away from the nest within hours after the last chick has hatched, usually in early morning. Hens then move broods into areas

of early plant succession (4, 41). Such areas have abundant tall forbs, an open understory with bare ground, and high insect densities. The brood usually remains with the hen for at least 12 weeks, after which the brood disperses (28). Often, two or more broods will intermix. Juveniles will attend established leks in the fall, triggered by changing day length. During winter LPC will use areas with abundant cover and food producing plants such as forbs. They will also use grain crops if available.

Habitat Requirements

As a rule, LPC cannot persist in landscapes with greater than 30 percent cultivation (38). The combined home ranges of all birds at a lek may be 19 square miles (12,000+ acres) or greater. The average home range of an individual bird is about 4 square miles (13, 32, 42). However, much larger areas are needed to maintain a population of birds long term. For a population to remain viable, a series (or complex) of leks is necessary. Because few landowners control tracts of land that large, cooperative management efforts are vital for success. Within a management unit, maintaining high quality native rangeland with the appropriate vegetation structure (height and density of major grasses, forbs and shrubs) and plant species composition is essential for a viable LPC population. This should include both early and late successional plant species.

LPCs live on native grasslands and shrublands. These rangelands are adapted for grazing by large herbivores such as bison, elk or cattle. While grazing can be used to maintain landscapes that favor the LPC, insufficient nesting cover from excessive grazing is detrimental to the LPC (42). Invading trees such as the eastern redcedar are another threat to the LPC and have been related to LPC decline (12). Fire is an important tool that can be used to prevent woody species from invading native rangelands. Fire also will maintain native desirable shrub cover such as plum, sand sagebrush, sumac and shinnery oak in a desirable structure. Some undesirable species that readily resprout following fire such as Russian olive and locust are best controlled with herbicide. However, herbicides should be used sparingly and only on target plants to minimize the impact on broad-leaf herbaceous plants (i.e. forbs) and invertebrate animals. No broadcast herbicide application should be applied. Fire in conjunction with grazing management and the limited use of herbicides are the best tools to restore rangelands to their proper health and function. To successfully manage for LPCs, no trees should be planted or allowed to persist in fencerows, upland prairies or shrublands. This includes windbreaks. Remember, historically trees were not common on upland prairie sites. Removing them is beneficial to many species of wildlife including the LPC.

A land management plan that maintains rangeland in both early (native annual forbs) and late stages (perennial-native tall grasses, forbs and legumes) of plant succession are necessary to meet all of the LPC's habitat requirements throughout the year. Optimum habitat is dominated by native vegetation such as sand bluestem, big bluestem, little bluestem, indiangrass, sand dropseed, sideoats grama, multiple forb species, sand sagebrush, skunkbush sumac, sand plum and shinnery oak. The preferred habitat of the LPC is prairie with intermixed shrub cover. Sand shinnery and sand sagebrush can be burned periodically to maintain proper shrub height and canopy as these native shrubs resprout quickly following a disturbance (2). Note: both of these plants typically return to preburn structure within three years in Oklahoma. Optimum habitat cover includes 40 percent to 60 percent grass, 15 percent to 25 percent forbs and 20 percent low growing shrubs (25).

Gobbling Grounds (Leks)

LPCs prefer to use the same gobbling grounds or leks each year, but often move their leks to another site if the vegetation structure is inadequate. Short vegetation is preferred on gobbling grounds. Thus, spot burning followed by spot grazing or mowing on the gobbling ground will usually improve its attractiveness to LPCs if the vegetation becomes too tall. Note: see OSU fact sheet E-998 on patch burning for more information.) However, in many areas, shallow soil prevents the plant community from becoming too tall and therefore potential lek sites are normally abundant. Prairie dog towns may also be used as gobbling grounds.

Nesting Cover and Brood-rearing Habitat

Nesting cover and brood-rearing habitat are keys to LPC management. Concerns about food during the winter are irrelevant if nests and broods are not successful. LPCs select tall grass or shrub

This lek site is on a high ridge that has low and sparse vegetation due to the shallow soil. It provides a good place for lesser prairie-chicken males to be seen and heard.

cover, if available, for nest sites. Thus, unburned and lightly grazed areas within two miles of leks are critical for reproduction (26). LPCs need native grasses that are at least 18 inches tall to completely conceal nesting hens and foraging chicks, as well as provide good thermal cover in winter and summer. Areas with high amounts of sagebrush canopy have been shown to be favored by nesting LPCs (27). Livestock grazing impacts prairie-chicken habitat by changing the amount, kind and pattern of residual grass. Uneven grazing patterns under season- and year-long continuous grazing creates an interspersion of short grass; bare ground; and tall, lightly grazed bunches of grass assuming the livestock stocking rate is appropriate. This structural diversity provides easy travel lanes for broods, abundant access to seeds and insects, and escape cover. Patch burning and the resulting patch grazing will also provide this requirement. Rangelands with light to moderate stocking rates and spot grazing will produce more food (seeds and insects) and habitat diversity than either ungrazed or heavily grazed areas. Grazing systems that promote even grazing with little variation in structure and composition (e.g. rapid rotation short duration grazing) are not conducive to LPC habitat.

Food and Escape Cover

Native forbs (commonly called weeds or broadleaf plants) provide seeds and habitat for the insects that the LPC requires. Forbs flourish where disturbance (such as grazing, mechanical action or fire) produces bare ground. In winter, LPCs consume seeds and cool-season foliage, while insects comprise a major portion of the summer diet. Insects, seeds and green leafy materials are eaten throughout the year when available (22). Insects are particularly important during the

Large landscapes of native grasslands are the cornerstone of lesser prairie-chicken habitat.

Forb dominated communities are typically open at ground level, which aids in chick movement and foraging, and provides escape cover.

summer months. As with bobwhite quail, food is seldom a limiting factor for LPC populations.

There are many anecdotal accounts of LPCs flying into grain sorghum fields by the thousands. While LPCs will use crops such as sorghum, corn, wheat and alfalfa, the importance of cultivated food plots can vary among populations and habitat quality. No single cultivated crop supplies all of the essential amino acids (protein building blocks) these animals require for optimum health.

LPCs are often eager to use food plots, so it is easy for the casual observer to assume that they "need" the extra food and benefit from its availability. However, food is normally not a limiting factor for upland game birds except during prolonged periods of severe cold coupled with heavy ice or snow. Game birds, like the LPC, have built in mechanisms for such weather catastrophes: high reproductive output and wide distribution across the landscape. Unfortunately, many remaining LPC populations are isolated, low in number, and have poor reproduction due to insufficient grass cover. For these reasons, food plots may provide a temporary benefit to small, weak populations occupying poor, fragmented habitat. However, if food plots are small (10 acres in size), or if they are located too far away from suitable habitat, they will provide little or no benefit to the LPC. Food plots are no substitute for proper habitat management of native vegetation.

Water

LPCs do not require open water (41). Similar to other birds, water requirements are met by the consumption of succulent vegetation and insects. During periods of drought, water from stock ponds and prairie streams may be used but does not appear necessary for this species.

An example of a forb rich area in foreground surrounded by sand sagebrush nesting cover. The foreground is dominated by western ragweed, which is an important food plant for LPC and quail.

A sand sagebrush community that provides excellent lesser prairie-chicken habitat.

Shinnery oak provides cover and mast for lesser prairie-chickens in portions of their range including New Mexico, Texas and Oklahoma. The structure of this plant is easily modified as this plant resprouts following fire.

Shinnery oak plant community maintained with fire. The foreground has been recently burned and is dominated by grasses. The background was burned three years before and is dominated by shrub cover. Thus, fire can be used to modify shinnery oak, depending on objectives. Note the tall hybrid (shinnery oak x post oak) mottes in the background that were excluded from fire. These should be burned to reduce height because tall cover is avoided by LPCs.

This hybrid oak motte has been burned. The plant is resprouting and fire can now be used to maintain the height in a low structure that will be usable by LPCs.

Causes of Mortality

LPCs have a short life expectancy, with around 40 percent to 60 percent mortality each year (17, 21). Mortality of adult LPCs comes from many predators including coyotes, bobcats, hawks, owls, raccoons and foxes. Not only are chicks taken by the same suite of predators, but also may be taken by smaller predators. Harvesting hay before the chicks can fly may also kill chicks. In addition, LPCs are killed by collisions with cars, power lines and especially fences. LPCs tend to fly rather low when pursued by predators, and hen LPCs often move a considerable distance to find suitable nesting habitat (15). In areas with high levels of fragmentation, this movement may be even more pronounced. Thus, as land becomes more fragmented with fences, the risk of fence collision increases. In fact, hen mortality from collisions has been shown to exceed 50 percent in areas with high fragmentation (43). Fences should be a consideration in areas occupied by this species. Nests are destroyed by a variety of nest predators including ravens, badgers, skunks, snakes and rodents (32). Although nests may be lost to trampling by cattle, this is unusual. Nests in meadows or cropland may be destroyed by harvesting or cultivating during May or June.

Habitat Fragmentation

There are significant concerns related to habitat fragmentation effects associated with grassland birds' avoidance of vertical structures and human disturbance that wind turbine complexes create (27, 29, 30). The life cycles of prairie-chickens require vast areas of relatively unfragmented grassland habitat. Loss of native prairies has been estimated to be 80 percent (23). Thus, the effect of each additional fragmentation

Fence collisions are a major source of mortality for lesser prairie-chickens. In areas where fences are needed, fence markers have been shown to greatly reduce collisions. Old fences no longer needed should be removed.

A vinyl fence marker used to help LPCs see fences during flight. Fence marking methodology is available at www.suttoncenter.org/LPCH/fences (44).

influence is magnified. Many other factors diminish existing unfragmented habitats including oil and gas production, road construction, housing development, crop production, excessive livestock grazing and woody plant invasion—this includes native woody plants that have been allowed to become too tall.

LPCs have been show to avoid even high-quality habitat within close proximity to man-made features. The presence of transmission lines, oil and gas wells, buildings, center pivots and roads reduce the use of habitat for nesting LPC hens (27). Lek activity is also disrupted by man-made vertical objects. Oil and gas development has been shown to eliminate use of leks (7). Additionally, nesting and brood rearing are estimated to be impacted up to one mile from man-made structures such as oil and gas wells (33). The development of wind power within the range of the LPC presents a new threat to the persistence of these birds. If wind turbines cause the same habitat displacement that other man-made structures have been shown to cause, then a wind turbine complex has the potential to negatively impact thousands of acres. Many sites targeted for wind power development in the LPC range lie directly in the few remaining untilled landscapes, which harbor surviving populations of the birds. This is because the remaining untilled prairies are on high ridges where wind potential is greatest. Also, transmission lines are needed to carry the power away from wind power complexes, and can likely intersect prairie-chicken habitat several miles from the actual wind development sites and cause additional fragmentation. The key to avoiding these fragmentation threats is to ensure proper placement. Wind turbines and other infrastructure should not be placed in areas occupied by the LPC. Information on minimizing impacts to the LPC from fragmentation can be found at http://www.wildlifedepartment.com/lepcdevelopmentplanning.htm.

Fragmentation can come from many sources including wind turbines, roads, fences, trees, oil and gas wells, and power lines.

Lesser prairie-chickens struggle to survive with new threats on the horizon. (Photo by Noppadol Paothong)

Habitat Management Tools

Grazing and Fire

Fire and grazing are the main habitat management tools that affect plant composition and structure on native rangeland. The frequency, size, and pattern of burning or grazing, and their relationship to each other (fire-grazing interaction) must be considered and managed to meet the year-round habitat requirements of the LPC. Typically, most LPCs occur on rangeland grazed by cattle or other herbivores. Experienced ranchers recognize light to moderate stocking rates provide the best long-term economic return and reduced economic risk in times of economic uncertainty or drought. Research supports their experience that the optimum stocking rate for beef cattle is moderate, not heavy (19). This management style also will sustain the LPC. A grazing management plan that maintains the prairie in middle to late stages of plant succession (native tall grasses, forbs and legumes) interspersed with early stages of plant succession (native annual forbs) is optimal for the LPC. Continuous or season-long grazing at a moderate stocking rate will provide heavily grazed, moderately grazed and lightly/ungrazed patches within a grazing unit, as cattle do not graze uniformly. Note: while continuous grazing provides a moderate level of diversity and habitat quality, it will not maintain optimum habitat over time in the absence of fire.

Rotational grazing systems for cattle have been promoted to mimic historical grazing patterns by large herbivores such as bison and elk. However, since there were no fences and wild animals moved freely to graze only the highest quality forage, this idea is inaccurate. Historical accounts and contemporary research demonstrate grazing animals are attracted to the new growth found either in recently burned or grazed areas, and they will stay there indefinitely until higher quality forage is made available (10). One goal of short-duration grazing (sometimes called cell grazing) is to create even grazing distribution, which reduces spot grazing and makes the plant community more uniform in height. However, if this goal is attained, the structural and compositional diversity of the plant community will decline and, thus, reduce habitat quality for the LPC. Short-duration grazing, as it is commonly practiced with multiple paddocks and frequent moves, will not provide the landscape diversity necessary for healthy LPC populations. Also, since additional fences are required, LPCH survivorship may be reduced due to fence collisions.

Prescribed fire is necessary to maintain rangelands. However, the short-term impacts must be carefully considered. Prescribed fire will remove last-year's growth and nesting habitat, yet it stimulates forbs and legumes necessary for brood habitat and reduces plant structure when vegetation becomes too dense for the LPC. Thus, location and size of the burn in relationship to the unburned area around the lek is extremely important to ensure adequate nesting habitat exists each year. An additional benefit of using prescribed fire is it will control the eastern redcedar, which does not resprout following a fire. Because this plant has the potential to reduce the habitat quality for the LPC due to the tall structure, it is necessary to remove from upland rangelands. Typically, prescribed fire should be applied at a minimum of every seven years to prevent redcedar from attaining a height that is undesirable to the LPC and is difficult to remove with fire alone. Another consideration is the season of burning. Often land managers have difficulty applying fire during the late winter because of low humidity and high winds. Native plants are adapted to both dormant (winter) and growing (summer) season fire. Plant community response to timing (season) of the burn is highly variable depending on weather (2). Therefore, specific predictions tied to calendar dates are misleading. Constraining the use of fire to dormant season only is not warranted. Land managers should apply fire throughout the year when conditions are correct to meet objectives.

Landowners should consider using prescribed fire on 20 percent to 30 percent of their management unit each year. The entire area should be burned within a 3- to 5-year period. This will provide both quality nesting cover and early successional brood habitat. Burning more than 50 percent of the area in one year may not provide sufficient cover for nesting and escape from predators. It is very important to retain unburned areas of dense grass within one mile of the leks. Fire also has potential to alter the structure and composition of the native plant community depending on the season and scale of the burn and its interaction with grazing animals. The right combination of fire and grazing at the landscape level provides the best potential to reverse the decline of LPCs. The fire-grazing interaction, also known as patch burning, mimics the historical grazing pattern of grazers, therefore having the potential to create a landscape pattern and habitat structure favorable

Young eastern redcedar is easily controlled with fire. However, within 7-10 years it becomes difficult to remove without expensive mechanical control or very intense fire.

Eastern redcedar is expanding out of shallow soil areas into upland sites due to fire suppression. These upland sites could be occupied by LPCs if the redcedar were removed.

Vegetation response six months after a fire. Note the abundant forbs present and the redcedar skeletons.

to the LPC, while also maintaining high forage quality for livestock. Patch burning has been shown to increase plant and animal diversity without negatively affecting livestock production (12). By using fire in this patchwork pattern, cattle rotate themselves around the pasture following the recent fire. This reduces high cost, high input management. This system also allows stockpiling grass (grass banking) for dormant season grazing (reduces winter feed costs) or for LPC nesting, as well as providing additional forage during drought. Except for actually conducting the burn, no additional labor or structures are required over typical rotational grazing with fences. Additionally, existing cross fences can be removed, which will benefit the LPC by reducing fence collisions. Thus, this fire-grazing interaction has the potential to be beneficial to the LPC and other wildlife species.

Mechanical Thinning

As previously noted, eastern redcedar is a serious problem for the LPC because of their avoidance of trees (11). If fire has not been applied to an area for several years, many eastern redcedar may be too large for a fire to effectively remove without using an extreme fire prescription, which is difficult to control. Also, if the grass fuel load is insufficient, due to shallow soils or high stocking rates, the fire intensity may not be great enough to remove the trees. In these cases, it will be necessary to mechanically remove eastern redcedar. The trees may be removed by cutting, pushing, chaining or grinding. If a dozer is used to push over the trees, keep the dozer blade off the ground to minimize soil disturbance. A prescribed fire should be used after the cedar has dried to help remove as much of the woody material as possible. Mechanical thinning may also be needed to remove tall mottes of hybrid (shinnery x post) oak that have had a history of fire suppression. The oak will resprout and fire can then be used to maintain a desirable height less than 3 feet. Mechanical removal is much more costly than prescribed fire. However, there are many federal and state programs available to assist landowners. Contact the Natural Resource Conservation Service (NRCS), U.S. Fish ad Wildlife Service (USFWS) or Oklahoma Department of Wildlife Conservation (ODWC) for information.

Herbicides

The use of broadcast herbicides should be minimized to maintain cover and food producing plants such as shrubs and forbs, and the insects that require these plants. If grazing management (i.e. stocking rate) is appropriate for the productive capabilities of the land and fire is periodically used to direct grazing and balance shrub canopy and height, herbicides should only be necessary to control invasive non-native plants. Introduced plants such as Bermuda grass, Old World bluestem, Johnson grass, weeping lovegrass and Russian olive are of little value to the LPC. Herbicides should be used to eliminate these plant species where LPC management is a goal. Also, some native plants such as locust and osage orange can be problematic to control without herbicides. Note: there is no large-scale pasture level data to indicate broadcast spraying forbs benefits cattle production and will eliminate many necessary plants for LPC and other wildlife. Thus, spot spray problem plants to avoid eliminating desirable plants

Cultivation

Areas with high levels of cropland have been shown to be associated with declines in the LPC over time (11). Limited amounts of croplands within a management area may benefit LPCs under certain conditions, particularly when grazing on adjacent rangelands is managed to ensure residual cover. Waste grain in fields can provide winter food. Annual warm-season seed producing plants such as grain sorghum or corn provide a high energy food source that LPCs can utilize during the winter months. However, once cropland exceeds about 25 percent to 30 percent of the total landscape, prairie-chickens begin to decline. Thus, the majority of the available habitat should consist of a native plant community and tillage of rangelands

Conservation Reserve Program Lands

Most Conservation Reserve Program (CRP) lands have little or no forb component because of the lack of disturbance and lack of forb seeds in the initial seed mix. While warm-season crops may provide some benefit to landscapes with grass only CRP, the best alternative is to incorporate native forbs, legumes and shrubs (depending on the soil type) into CRP plantings at the time of enrollment. LPCs use CRP lands when those lands provide habitat that meets their requirements. Because residual grass is sometimes limiting on native rangelands, LPC populations have benefited from the residual grass in native CRP (9). However, less than 30 percent of the total acres enrolled in the CRP in Oklahoma were planted to native grass mixtures, and few of those contained forbs and legumes (34). CRP land planted to a single non-native species such as Old World bluestem or weeping lovegrass provide little value to the LPC. Newer CRP fields have much better composition as the program has evolved to provide more environmental benefits beyond just soil stabilization.

Disking can be used to create early successional habitat for broods and for winter food production in existing CRP. Disked areas should be small and distributed in a mosaic throughout the field so adequate cover is adjacent to forbs. Note: this practice should only be applied on land that has previously been disked or cultivated (e.g. Conservation Reserve Program land or old crop fields). Large-scale disking in native prairie or shrublands should not be practiced. (This excludes firebreak construction in native rangelands.) An introduced species, adding a small component of alfalfa (0.2 lb/acre) to CRP planting, provides structure that appears to benefit the LPC (34). Insect diversity is also substantially higher in multi-species plantings including those with alfalfa. CRP lands may become less favorable to LPCs when grasses mature and become too dense. Prescribed fire, grazing and haying should be periodically applied to those lands to improve the structure and composition of the plant community. Also, fire will be needed to prevent redcedar, which will render the CRP useless to LPC. Despite the limitations of CRP, it can be an important part of the total habitat for the LPC in landscapes dominated by row crop agriculture. Priority should be given to maintaining and expanding CRP within the range of prairie-chickens, due to the overall lack of native grasslands in these areas.

A CRP field in Oklahoma planted to Old World Bluestem. Note the lack of diversity in plant composition and structure. This field will need several applications of herbicide and be planted in a native grass and forb mix to become quality LPC habitat.

This CRP field has been invaded by eastern redcedar. Fire frequency or mechanical control is the key to prevent this problem.

Management Summary for the Lesser Prairie-chicken

1. Remove all trees from the area including windbreaks and living snow fences. With the exception of a few large river valleys that have native cottonwood riparian zones, most of the historic range of the LPC was treeless. Reduce hybrid oak (shinnery oak x post oak) motte height with frequent fire. LPCs and other prairie/shrubland wildlife do not require trees and strongly avoid them. Trees also provide perches for predatory birds and encourage habitat generalists such as raccoons to invade. Trees are invasive plants in prairie and shrubland ecosystems, and they compete with grass and forbs for resources such as water and sunlight.
2. Minimize wind turbines and electric transmission development within 5 miles of LPC habitat, and avoid critical areas designated by the Oklahoma Department of Wildlife (20). The presence of these structures will render all other habitat components useless as LPC will avoid these areas.
3. Keep livestock grazing patchy to provide nesting cover (tall grass – 15 inches) and brood cover (tall forbs with sparse grass – 18 inches). Proper livestock stocking rate is the method to achieve this. Additionally, periodic fires will maintain a patchy prairie because livestock will follow the fire across the landscape. Do not use grazing systems that promote uniform grazing. The NRCS can assist with setting appropriate stocking rates.
4. Do not install cross fencing. Use proper stocking rates, water, minerals and fire to achieve patchy grazing distribution. Fences are lethal to LPCs in flight. Remove unnecessary fences and mark the remaining fences. Where fences are necessary, they should be as low as possible while remaining functional.
5. Eliminate the use of broadcast herbicides in areas with native forbs and shrubs. Broadcast spraying is indiscriminate and will eliminate many important wildlife plants. In areas with invasive plant problems, spot-treat if possible.
6. Convert cropland, Old World bluestem, Bermuda grass, or other introduced forages or trees into native warm season grasses and forbs. Consult the USDA-NRCS Ecological Site Guide (located in NRCS County Offices) for the land area of interest to determine the historic plant community composition.
7. CRP should be managed to include forbs, legumes and variable plant structure. Shrubs may be appropriate for some sites. To achieve the correct plant composition and structure for LPCs, fire, grazing, haying, disking, or interseeding of forbs and legumes may be appropriate, depending on the site.

Conclusion

Oklahoma is fortunate to have LPCs and the rangelands that support them. However, their distribution and numbers have decreased significantly from historical levels and continue to decline. To survive and reproduce, the LPC needs large expanses of treeless native rangeland with various stages of plant succession. Populations of LPCs can be maintained and increased if native plant communities are restored and maintained with disturbances such as fire and grazing. Fragmentation is a major concern for this grouse species. Fences should be removed where feasible and marked otherwise. Wind development and other fragmentation such as trees should be restricted to areas where LPCs do not occur. Remaining rangeland should be maintained in native vegetation, and marginal cropland should be reseeded to native grass, forbs and legumes when possible.

LPCs are found almost exclusively on private property and, thus, depend on the stewardship of private property owners. Programs that promote conversion of native prairie to non-native vegetation such as introduced forages or trees are not beneficial to the LPC or other native wildlife. Government and private programs that encourage restoration and management of native prairies and shrublands are available and need expansion. The LPC is a species that reflects the health of the Southern Great Plains ecosystem. Oklahoma and many other central and western states still have large tracts of land and the opportunity to reclaim and restore millions of acres of native plant communities for the LPC and other prairie species. Adequate funding, public support, competent consultants and landowner cooperation are needed to accomplish this goal. Otherwise, the LPC will be nothing more than a memory for future generations and Oklahoma will have lost an important part of its ecological and cultural heritage forever.

Lesser Prairie-chicken Habitat Evaluation Form

Size of Available Habitat (acres): _____

Management Unit Name: _____

Management Unit Number: _____

Type(s) of vegetative cover within available habitat (assign percent coverage):

Vegetation Cover Type	***Percent***
Native Prairie	
Shrubland	
Forest or Wooded (including tree rows)	
Introduced Pasture	
Cropland	
Other	

HABITAT REQUIREMENTS: Essential habitat components needed for survival and propagation of lesser prairie chicken, these components include (A) nesting habitat, (B) brood habitat, (C) winter habitat and (D) fragmentation level. Circle the lowest applicable value for each category. Enter the score from each box on the summary page at the end of this evaluation.

A. NESTING HABITAT: Upland prairies and shrublands devoid of trees. Native grasses that are more than 15 inches tall, within one mile of gobbling grounds.

1. Nesting Cover Quantity – Evaluate the plant community

	Value
> 50 percent of area is composed of native grass and shrub cover > 15 inches.	10
30 percent to 50 percent of area is comprised of native grass and shrub cover > 15 inches.	6
< 30 percent of available habitat is comprised of native grass and shrub cover > 15 inches.	3
Available habitat does not have an area with preferred nesting cover.	0

2. Nesting Cover Location – Determine the average distance from known leks to native grass and shrub nest cover > 15 inches.

	Value
Preferred nest cover < one-half mile from leks.	10
Preferred nest cover between one-half mile and one mile from leks.	5
No preferred nest cover within one mile of leks.	0

3. Nesting Canopy Cover – At a height of 12 inches, determine the percent of the ground obscured by vegetation. This should be the average percent cover for an area. Note: vegetation above 3 feet is not needed. In other words, tree cover should not be considered screening cover.

	Value
Canopy cover > 30 percent above a height of 12 inches.	10
Canopy cover 10 percent to 30 percent above a height of 12 inches.	6
Canopy cover < 10 percent above a height of 12 inches.	3

B. BROOD HABITAT: Native herbaceous vegetation in early stages of plant succession. Such areas have abundant tall (18 inches to 20 inches) forbs or shurbs, an open understory with bare ground, and high insect densities.

1. Brood Cover Quantity – Evaluate the area for forbs and insect abundance present during brood season, May 1 to August 31.

	Value
> 20 percent of available habitat contains forbs.	8
10 percent to 20 percent of available habitat contains forbs.	6
< 10 percent of available habitat contains forbs.	3

2. Brood Screening Cover – Estimate the percentage of the ground obscured by vegetation above 12 inches, which is the height of an LPC.

	Value
Canopy cover > 30 percent above a height of 12 inches.	6
Canopy cover 10 percent to 30 percent above a height of 12 inches.	3
Little to no canopy cover above a height of 12 inches.	0

3. Grass, Forb, and Legume Accessibility – Below a height of 12 inches (travel corridors).

	Value
> 30 percent bare ground below a height of 12 inches.	8
10 percent to 30 percent bare ground below a height of 12 inches.	4
Little to no bare ground below a height of 12 inches.	0

4. Brood Habitat Location

	Value
Brood habitat < one-fourth mile from nest cover.	8
Brood habitat between one-fourth mile and one-half mile from nest cover.	4
No brood habitat within one-half mile of nest cover.	0

C. WINTER HABITAT: Seeds of native herbaceous, woody plants or grain crops with protective cover.

1. Winter Food Abundance – Abundance of food producing plants during the winter months.

	Value
Food plants are abundant and comprise 30 percent or more of plants.	10
Food plants are moderately abundant and comprise 10 percent to 30 percent of plants.	6
Food plants are sparse and comprise 1 percent to 10 percent of plants.	4

2. Winter Protective Cover – Canopy cover above the height of a lesser prairie-chicken (12 inches) during the winter months. This is excluding trees.

	Value
Canopy cover > 30 percent above a height of 12 inches.	10
Canopy cover 10 percent to 30 percent above a height of 12 inches.	6
Canopy cover 1 percent to 10 percent above a height of 12 inches.	3
No canopy cover above a height of 12 inches.	0

D. FRAGMENTATION: Man-made alterations to the available habitat that create barriers to LPCs.

1. Fences – Evaluate the potential for fence collisions within LPC habitat.

	Value
Fences on section perimeters or less in area.	4
Fences on one-half section perimeter in area.	2
Fences on one-fourth section perimeter in area.	0
Fences have been marked to alleviate prairie-chicken collisions.	1

2. Roads – Evaluate the locations of roads within LPC habitat.

	Value
No primary roads or county roads within area.	4
Primary roads or county roads on most section lines.	2
Primary roads or county roads on most quarter-section lines.	0

3. Trees – Evaluate the amount of trees within LPC habitat.

	Value
No trees present outside of major riparian areas within available habitat.	4
1 to 10 trees present/section in available habitat.	2
> 10 trees present/section in available habitat.	0

4. Wind Turbines and Transmission Lines – Determine distance to tall vertical man-made structures.

	Value
No structures present within two miles of available habitat.	4
Structures present one mile to two miles of available habitat.	2
Structures present < one mile from available habitat.	0

5. Oil and Gas Wells – Determine distance to tall vertical man-made structures.

	Value
No wells present within one mile of available habitat.	4
Wells present one-half mile to one mile of available habitat.	2
Wells present < one-half mile from available habitat.	0

Summary of Habitat Evaluation

Criteria	*Rating Score*	*Management Recommendations**
A. Nesting Habitat		
1. Nesting Cover Quantity	___	B, E*
2. Nesting Cover Location	___	B, E
3. Nesting Canopy Cover	___	B, E
B. Brood Habitat		
1. Brood Cover Quantity	___	A, B, C, E
2. Brood Screening Cover	___	A, E
3. Grass, Forb, Legume Availability	___	A, B, C, E
4. Brood Habitat Location	___	A, B, C, E
C. Winter Habitat		
1. Winter Food Abundance	___	A, B, C, E
2. Winter Protective Cover	___	B, E
D. Fragmentation		
1. Fences	___	D
2. Roads	___	none
3. Trees	___	A, C
4. Wind Turbines and Transmission	___	none
5. Oil and Gas Wells	___	F

* See next page for management practice descriptions corresponding to the letters listed in this table.

Management Practices to Improve Habitat Quality

A. *Prescribed Fire.* This practice is used to create early successional habitat that has abundant forb and legumes for brood and winter habitat. Prescribed fire also reduces grass litter to enhance movement of birds through grasslands, and it reduces woody plant encroachment such as eastern redcedar to prevent grasslands from being converted into woodland or forest.

B. *Prescribed Grazing.* By adjusting the stocking rate (either higher or lower), livestock can be used to manage the structure and the composition of grasslands. Areas with dense grass and little forbs could be grazed more intensively (i.e. higher stocking rate) to decrease grass cover. Areas with little nesting cover would benefit from lower stocking rates to ensure there was residual grass cover during the spring nesting season. Finally, stocking rates should be conservative enough to ensure adequate grass fuel exists to conduct prescribed fires to control eastern redcedar. Grazing systems that ensure uniformity of grass structure are detrimental to the LPC because they require various habitat types throughout the year.

C. *Strip Disking.* Disking creates early successional habitat that can provide brood and winter habitat requirements. Disked areas should be small and distributed throughout grassland so that adequate cover is adjacent to the native food plants. Note: this practice is only for land that has previously been disked (e.g. Conservation Reserve Program land or old crop fields). Native prairie that has never been broken should not be disked because this changes the soil structure of these sites and risks invasive plants not already present. Disking for fire lanes is the only exception to this rule.

D. *Remove Fences/Mark Fences.* Fences cause significant mortality to LPCs. Old fences that are no longer needed should be removed. Fences that are needed should be marked with fence markers. This is particularly important in upland areas within two miles of lesser prairie-chicken leks.

E. *Establish Native Grass/Forbs/Shrubs.* Marginal crop fields can be converted to native plant communities to increase the amount of habitat for the LPC. Lists of plants adapted to the site can be obtained from USDA-NRCS. Introduced pastures such as Bermuda grass, Old World Bluestem and weeping lovegrass should also be converted to native grass when possible. However, these invasive exotics must be fully eradicated with several applications of herbicide before native plant establishment.

F. *Remove Trees.* Tall vertical structures such as trees are strongly avoided by lesser prairie-chickens. One of the simplest management actions to increase habitat for prairie-chickens is the removal of trees from upland prairies. Eastern redcedar, black locust and osage-orange are the most common woody plants that invades LPC habitat. Eastern redcedar is easily controlled with prescribed fire as long as the trees are of small stature. Once large stature is acheived, mechanical thinning is often necessary. Both locust and osage-orange resprout. Thus, herbicide is the most effective control for these species.

G. *Reduce Noise.* Place noise dampening devices on oil and gas wells to limit noise or stop pumping during breeding season. Noise can disrupt LPC during their spring courtship on leks.

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